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Marco Maretto, Nicola Marzot, Annarita Ferrante

MORPHOLOGY AND URBAN DESIGN

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# Book of Proceedings



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*Marco Maretto, Nicola Marzot, Annarita Ferrante*

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International Seminar on Urban Form  
Italian Network  
<http://www.isufitaly.com/>

Contacts

Phone: +0668878832

Fax: +0668878832

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6<sup>th</sup> ISUFitaly International Conference | Bologna, 8-10 June 2022

# **MORPHOLOGY AND URBAN DESIGN**

new strategies for a changing society

# PROCEEDINGS

*edited by*

Marco Maretto, Nicola Marzot, Annarita Ferrante

*with the collaboration of*

Silvia Tagliazucchi, Francesco Scattino, Greta Pitanti

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## Sixth ISUFIItaly Conference Presentation

We open today the sixth conference organized by the Isufitaly Association, the Italian network of the International Seminar on Urban Form that we founded 38 years ago with the contribution of the English school of geographers which followed the scientific tradition of the researches of M.R.G Conzen (which had, in turn, roots in the tradition of German cultural geography) and the school of Italian architects referred to the studies of Gianfranco Caniggia and Saverio Muratori, with its roots in the studies on urban form conducted between the wars by innovators such as Gustavo Giovannoni, Arnaldo Foschini, Giovan Battista Milani.

From the beginning it seemed clear to all of us how useful the disciplinary differences and how fertile integration between the two groups were.

Geography is a fundamentally descriptive discipline. However, it was interpreted by the Conzenian school with great attention to the shape of the city, and after all the Muratorian school considered reading, in turn, intended as a critical study of the built reality, an integral part of the architectural design itself. Indeed it considered the very form of the territory as architecture. This explains why our Association, made up mainly of architects, had the project as the central object of our studies.

Isufitaly was founded much later, in March 2007, with the aim of promoting above all those studies in urban morphology having the architectural design as their goal.

In these sixteen years, during which I had the honour of being its president, the Association has grown a lot, gaining a significant role in the context of urban morphology scholars.

I think a good job has been done, despite few inevitable mistakes. Above all we remained consistently in our cultural area of interests, within the sphere of what can be rationally verifiable and didactically transmittable. This in a cultural context in which the disciplinary boundaries of the architectural design seemed increasingly uncertain. Today each of us knows well that beyond those boundaries other important questions arise, of different nature, linked to languages and meanings, to new investigation techniques, to perception and to the artistic component of our work. But we also knows that it is crucial to preserve and develop in contemporary terms a nucleus of knowledge and methods which allows any aesthetic synthesis to be based on sharable foundations, as required by the civil responsibility of our work.

In this spirit, since its foundation, the Association has organized conferences and communicated its activities. As president, I have also considered vital the parallel activities in which the members of Isufitaly participate, such as the organization of meetings, university courses and publications.

It seems to me that, over time, even in these specific activities, our Association has earned the esteem of similar organizations which, in the wake of Isufitaly, have been founded all over the world.

*It would take too long just to list the activities carried out by all of us in these years.*

*I will only mention the two most recent, linked to each other, which, I believe, have had particular success and international echo. The first arises from the idea of transforming Isufitaly, from a structure that only plays an aggregative role and disseminates the themes of urban morphology, into an active subject, which carries out research and manages its organization. The occasion was the Kaebup project, (Knowledge Alliance for Evidence-Based Urban Practices) coordinated by Nadia Karalambous of the University of Cyprus with the aim of studying the relationship between urban morphology and design. Unlike the other participating academic partners, who reorganized the research within the university structures, I chose to involve Isufitaly which was supposed to represent, symmetrically to other departments, the Italian referent in research management. It should have been a first experiment: other members could have brought other projects and funding, contributing, while their autonomy would be respected, to strengthening the scientific credibility of the Association.*

*As part of the research, some of us organized the ISSUM, International Summer School in Urban Morphology, which we will discuss in a future session in this conference. I think it could be a useful experiment not only for Isufitaly but also for all the Isuf regional networks and could have interesting developments.*

*As president of Isufitaly let me therefore say that the outgoing Isufitaly Board has not only taken care of the administrative aspect of the Association, but of an organic structural project that includes communication (conventions, conferences, website) research (participation in financed projects) and, finally, teaching (with the Summer School).*

*Let me also make a brief consideration on the future of Isufitaly.*

*As it should be, within Isufitaly the interests of each of us, our beliefs, even our own values, have differentiated, and are increasingly differentiating, over time. The reasons are several (scientific, professional, academic) and all valid, but we must not hide the fact that, for this reason, we are going through a phase of crisis completely new in the story of our common work.*

*Change, however, is the salt of any structure aimed at experimentation. If it is likely that this condition leads to difficulties in organizing common work, also implying a risk of losing our identity, it is also true that the differences that have arisen could constitute, if well used, not a reason for division, but a resource. And since I consider that my duty, under the new conditions, has been exhausted, I believe that whoever will takes my place, will have to place this consideration at the centre of future projects.*

*A mention to the specificity of this conference.*

*This sixth Isufitaly meeting has a particular character for several reasons, all linked to the fact that it takes place in Bologna. For the*



*first time it is not organized within an architecture faculty but an engineering one, opening up, in my opinion, a new field of interests for Isufitaly. I recall that the Bologna Faculty of Engineering boasts an illustrious tradition in the field of urban studies, and that a well-known representative of it, Adolfo Dell'Acqua, participated in our first conferences proposing important reflections on the integration between morphology and design. This tradition continues today, in contemporary terms, with the work of Annarita Ferrante (co-chair of this conference) on the existing building heritage.*

*Bologna was also the seat of some of the most interesting urban experiments in Italy.*

*I recall, among others, the innovative ideas of Pier Luigi Cervellati on the function of the historic centre organically understood in the context of the entire urban and territorial organism.*

*Furthermore, Bologna has a particular interest for us as well for the tradition of studies and experiments on the relationship between governance and the city development process. Not surprisingly, the city has had, over time, administrations that have sometimes been an example of a virtuous management in the transformations of the building fabric.*

*For this reason, some of the central themes of the conference are precisely the problems of urban policy, governance, urban communities and public space as a laboratory for transformation.*

*Another relevant theme is that of the renewal of the analysis and design tools of the urban space, the study of new technologies dedicated to new environmental strategies.*

*Of course, ample space will be given to traditional themes of our conferences such as the reading and design of the existing city integrated with the ever-current theme of urban regeneration, I believe that the organizers of the conference and their collaborators have done a generous and intelligent job. I thank them all on behalf the Board of the Association and I wish everyone a good job for the next few days.*

*Giuseppe Strappa  
President of ISUFITALY*



# Foreword

*Since the beginning of the third millennium, the rapid changes that contemporary societies are facing are radically transforming the perception and the structures of our cities. New topics seem to dictate the political agenda, suggesting alternative options to manage the emerging urban mutations.*

*An increasingly "data-driven society" is forcing the migration into an almost immaterial world, prompting Information and Communication Technology together with the Smart City .*

*The crisis of the traditional real estate industry, propelled by the global finance system, is contributing to a renewed consideration of the Public Space as a "space of encounter, sharing, experience and inclusivity", mapping the everyday life to discover unexpected urbanities , through the application of GPS to record pedestrian movement flows.*

*Most of the deficiencies in the governance methods are addressing us with new social, economic, cultural roles, inviting human beings to perform as strategic Agents of Change. As an immediate consequence, new "forms" of cities are strongly brought to our attention: the "city of sharing", the "city of temporariness", the "city of Life between buildings ", giving an unexpected impulse to the so-called incremental Urbanism processes.*

*In such a way, the very idea of the city is radically under discussion. We are then required to answer these numerous questions in order to define the scientific coordinates for the city of the 21st century. In that respect, the conference has been calling experts in the field of Urban Studies in order to reflect upon the following main topic:*

## *1. Communities and Governance*

*The role of Communities and Neighborhoods, conceptually framed within urban policies based on new participatory concepts, sustainable oriented principles and supported by the idea of "proximity" and multi-layer strategies of land management, are one of the test beds of new approaches in Urban Morphology.*

*Research approaches, as well as design strategies, must be able to read these phenomena, to understand them and translate them into tools for supporting decision makers, stakeholders, citizens, in the transformation process of the city.*

## *2. New methods and Technologies for the urban analysis*

*The society of the 21st century, being "data-driven", will be highly technological. Urban Morphology should be able to deal with these issues and learn to play an active role in their development, so as to consist in a mediation tool between environmental strategies and the city. It should also experiment with new technological means by developing new analytical methodologies capable of grasping the ongoing transformations.*

### *3. Reading the changing Urban Form*

*A Classic in Urban Morphology, urban analyzes and the theories underlying them constitute its very foundations, the greatest legacy, of the International Seminar on Urban Form. A legacy that must be fed and implemented in new research and new studies, demonstrating the capacity to deal with the new emerging challenges of evolving cities. If unsuccessful, in that respect, the meaning of the urban morphological discipline will be lost.*

### *4. Designing the sustainable Urban Form*

*Urban Morphology is also the basis for Urban Design. The city of the 21st century has to be sustainable, to react the ever-changing conditions of existence. The complexity of urban phenomena requires, therefore, a scientific awareness capable of catalyzing different disciplines and expertise, different needs, different themes, within the urban fabrics. Fabrics that will, in turn, be an expression of this complexity, giving "form" to it.*

*Under those circumstances, Urban Morphology can claim again a disciplinary status.*

*It is not simply a matter of broadening the disciplinary horizon of Urban Morphology. It is a question of defining a new theoretical and methodological framework, a new "horizon of meaning", and new analytical tools, to understand the complexity of the city's transformation processes. In other words, it is a matter of building a renewed morphological discipline able of intercepting the needs of the globalized society and translate them into physical forms.*

*Marco Maretto, Nicola Marzot and Annarita Ferrante  
Conference Chairs*



# Urban morphology and the challenges of transition

## Plenary Sessions Foreword

The etymology of the term 'transition', from the ancient Greek μετάβασις (metábasis), still bears a trace, evoking its presence, of the implicit threat contained in the unfolding of its effects. It is, in fact, a compound of μετά (metá), meaning "between", "in the middle", and βάσις (básis), denoting "foot", "base" and "foundation". As such, it clearly expresses that condition of profound uncertainty, unconsciously removed, between a stability that "is no more", i.e. the socially constructed reality we have left behind, that has now entered crisis, and that which "is not yet", implying the expectation of a new system of values. The multifaceted call for transition, continually evoked by EU policies, especially since the Next Generation EU program, therefore entails an equally obvious assumption of responsibility by all those involved.

These include, first and foremost, individual and/or collective subjects already operating within institutions that have fallen into disgrace having lost their credibility and authoritativeness, to which must be added the outcasts, the marginalized citizens who, in the previous season, were not considered organic to the systemic logic conventionally accredited by the majority, being prejudicially expelled from it. These, along with the willing and enthusiastic for new adventures of all kinds and degrees, are thus faced with crossing a landscape of ruins, which need to be given a name, in order to be able to orient themselves in their choices.

For these reasons, as conference Chairs, we agreed that the function of the keynote speakers invited to the opening session was to provoke an "unreserved call" of challenges capable of activating the participants' reaction during the presentation of their respective papers and posters. It was therefore a question of imagining arguments whose compelling topicality was capable of programmatically destabilizing the fragile certainties of any knowledge that could be defined as scientifically founded, by revealing and opening up its conventional limits. The declared objective, since the original call for papers, thus became that of forcing teachers, researchers, and scholars to take a critical stance towards a built environment that is inevitably hostile to any ideas received, insofar as it has not yet been explored. Even more so, it was ultimately intended to allow them for comparison, verifying a posteriori the emergence of classes of belonging as future goals towards which the advancement of knowledge and the hoped-for identification of new refoundation epistemes could be directed.

With this in mind, we asked Raffaele Laudani to address the issue of 'agentivity' in the design of the contemporary city. This is, on closer inspection, a theme emerging from the progressive collapse of the credibility of representative democracies, whose legitimacy has been profoundly undermined by the behavior assumed by national sovereignties, first, and then by local administrations, in governing the disorientating effects induced by globalization processes. When the facts were tested, the demonstrated inability to administer territories was responsible for the emergence of movements claiming a role in the promotion and management of urban transformation. The growing demand, over the last decade, for regenerative processes involving a multiplicity of actors, many of whom had never before appeared on the political scene, is an 'immediate' confirmation of this phenomenon. Urban morphology has often misunderstood the principle of the "autonomy of form", almost canceling the dimension of the civitas from that of the urbs. It is therefore called upon to rethink the function of agency both in the destruens phase of overcoming spatial arrangements that no longer conform to change, and in the construens phase of new articulations prodromal to the demand for renewal of customs.

We asked Elena Cock to reflect on the function of 'energy' in contemporary society. The assimilation of nature as a resource to be consumed has produced states of increasing devastation and abandonment of the resulting landscape, in which many authors see the

effects of the so-called anthropocene. The paradigm shift in favor of a more responsible use of the planet, which is recognized as a potential to be preserved for future generations, leads to the identification of every human product as an accomplished expression of 'embodied energy' regardless of its dimension, complexity and impact on existing conditions. Its overall assessment must not only guarantee the balance between the various factors that contribute to its construction, but also allow for the full reversibility of its effects. This implies that the project is increasingly accountable to its community and aware of its dynamic interaction with the assigned circumstances.

We proposed to Kayvan Karimi a reflection on the impact of the material and immaterial 'flows' on the contemporary city. In a society increasingly characterized by movement - of goods, people, resources and data - exposure to change becomes paradoxically programmatic. This conflicts with the idea of stability and permanence in which we are led to recognize the meaning of the institutions on which the modern conception of civil living is based, putting the need for regulation of the operation of the subjects, that are part of it, to be verified. The notion of ex-ante government of territories, in this way, tends to be replaced by that of ex-post monitoring of the effects of processes beyond human control, through the increasing recourse to algorithmic logics. Urban morphology, in this way, is forced to review its own statutes, still based on the primacy of the type, as a principle of prediction and conformation of behavior and its relative arrangements, necessarily opening up to an eventual dimension in which the ephemeral and the transient find a full size and authority.

Finally, we asked Alessandro Melis to relaunch the debate on the function of 'information' in territorial performance. This is, on closer inspection, the most ambitious challenge, which somehow implies all the others in view of the objectives it intends to pursue: guaranteeing the transition from material to immaterial culture. This also implies that technology should cease to exist as an instrument at the man's service, capable of claiming control over him, to rather become the unprecedented 'environment' within which we will be made to inhabit. The result is the possibility of recording our continuous "leaving a trace", far beyond any possibility hitherto considered admissible in the natural and/or artificial pre-digital environment. The foundations are thus created for a new anthropology, based on a living/environment interaction that is far more performative than hitherto imagined, because of which the transformation of data into facts will be processable in real time. Thus, it is credible to think that urban morphology can be fueled by an impressive mass of information through the continuous monitoring of the transformation of natural and artificial spaces, drawing undoubted benefits for the definition of the coming society and its urban scene.

Although these aforementioned challenges to the study of urban form do not exhaust the full spectrum of possibilities, we at least consider them to be imperative priorities on which to reflect, and we therefore thank our authoritative guests and colleagues for their valuable contribution to the growth of a shared awareness of their implications.

Nicola Marzot and Annarita Ferrante

## Comunity and Governance

Raffaele Laudani

*Alma Mater Studiorum - University of Bologna*

*Municipality of Bologna*

Thank you to all the organizers who invited me and thank you all for being at the conference opening today. I'm attending this event with a double role. On the one hand, I'm here on my institutional role, welcoming you on behalf of the Municipality, and its Mayor Matteo Lepore, who was unable to be here today. In that respect, I would like to express how we are glad that such an important conference is going to be held here in our city. And then, I'm also here as a speaker. If the first of the two roles is relatively easy to perform, it is a little bit more complicated the second one, i.e. being here as a speaker. In fact, I am not an architect, neither an urban planner, nor even an engineer. I am here as Deputy Mayor of urban planning, but I am an historian of political thought, a kind of a hybrid "beast" between a historian and a political theorist. So then, I feel today has been sent in the "lions dip". So the only way to survive in such a situation is just trying to give some kind of insight useful for the discussion, starting from the new experience I'm dealing with as Alderman. Moreover, I will try to do it using my skills as a scholar, which is trying to bring to concepts experience. Therefore, what I will try to bring to the discussion is some insight, starting from this experience in these first six months as a Deputy Mayor on urban planning of the municipality of Bologna. So the first thing I would like to share with you is the kind of peculiar feeling I had starting my job six months ago, in particularly experiencing the fact that today urban planning in a city, in a municipality such as Bologna, is more than having to deal with the physical transformation of the city. It is something that is now quite obvious, especially for people that have expertise on that, that the relationship between *urbs* and *civitas* are an essential dimension of the urban planning of a city. Nevertheless, my first experience is that this is more than a definition. People mostly agree on the fact that the dimension of the *civitas* and the dimension of the *urbs* has to deal with. Then in practice, in most cases, these two dimensions are just opposed. And in some cases, there are, in reality, contradictions. I think we need to make a step forward on that.

The two dimensions have to be considered as one and the same thing. And this brings the necessity also to revise the tools, scientific tools, but also the administrative tools, to make this statement real. But my experience, especially in these years of great global challenges, of great transformation, is that it is not even enough to try to make a step forward in making the relation between the *urbs* and the *civitas* one and the same thing. Because today's cities are, on the one hand, the space in which global challenges are becoming real to people, where the effects of the global transformations are becoming real in the daily life of the people. But on the other side, there are also the space in which there are more opportunities to face with these challenges in terms of political, social, economic, technological conditions to give an answer to these global challenges. Therefore, this makes the municipalities more of the conventional local articulation of the State. More than that, cities are political actors that operate on a multiplicity of spaces. The local municipal spaces, the regional spaces, the national spaces, the European spaces, the global spaces. In addition, all these spatial dimensions operate simultaneously. So if we continue with the metaphor of the *urbs* and the *civitas*, I think that today two more dimensions are becoming essential in the urban planning



of a city. These are the dimension of the domus , i.e. the oikos . The economy interpreted as the "taking care" of the community has an integral part of the urban planning of a city. Another dimension which is traditionally the most neglected one, is the dimension of the foedūs , which in ancient times was the dimension, let's say, of the foreign affairs, but more in general the federative power of the polis or the civitas .

This means the capacity of producing alliances internally among the actors of the civitas and externally between different civitate , different cities and in different levels. This is becoming more and more an integral part of the city. For me this is really evident in this first month of administrative job. Let's make an example. During the pandemic, of course, school and education have been deeply affected. The first reactions of people, of families, of parents, is complaining with the mayor. It is very complicated to explain that in our national administration the mayor has competence on school for very small dimension because others depend on the Metropolitan cities and then depend on the Region. But because cities are the space in which challenges are becoming real in the daily life, the mayor is the face of the institution. Therefore, you can say then that it is not on our capacity to give an answer to these needs.

You have the political urgency to give an answer to that beyond your administrative limits. So this makes necessary a politics of alliance between cities to lobby, to make pressure to the national governance or to create networks on the European levels to give an answer to other defies. Let us focus, for instance, on the development of new capitalist platform economy tha are deeply affecting the morphology of the city. Then, these four dimensions are becoming one and the same. They are the urban planning of the city. If this is true, then urban planning is becoming more and more the space of urban policies in all dimensions. And you have to take care of that as we are the people who are in charge- in my case the man who is in charge of the urban planning of the municipality. I have to move along these four dimensions: the urbs , the civitas , the domus and the foedūs . If this is true, then also the tools, the administrative tools that we have, the zoning planning has to be redefined, deeply redefined.

So I start my job as deputy mayor when the new tool of the city, the urban planning tool of the city has just been put in motion. What we call the PUG (Piano Urbanistico Generale) is a tool that tries to give an answer to this request because it is less and less conformative and operates more on a strategic level.

Still, it is built on the idea that you make a photography of the city and then you deal with it. But cities are life, which is an inner part of the city. The cities are always changing. Therefore, if the city is an urban form, and what I was trying to say is that it's more than just an urban form, then it is a moving form.

So you have to operate considering that this form is moving and you have to adapt to that. In addition, if this is the case, and now is the part in which my political theorist dimension brings to surface, then urban planning is more and more a matter of governance. I am using governance as a concept, as a political concept. Therefore, the idea that political decisions are the result of a peculiar, complex, articulated process of conflict and negotiation between a plurality of actors that operates immediately beyond the form of traditional representation. This means that the planning of a city has to be covered, assuming this conflictual dimension has a key part of the process of political decision. Also in terms of renovation of the city, of the urban renovation of the physical space of the city. In order to make it real, this governance of the city, this governance of the urban intended as the space of urban policies, as I was mentioning before, then you need political priorities. Because otherwise the risk is that the governance becomes, as it was in the last 30 years with the neoliberal bug that has dominated the transformation of the cities, the space in which the law of the strongest prevail. So then, you

have to be an active political actor as a municipality. This means that you need priorities. So in our part, what Bologna is concerned, we have defined a few priorities that will try to shape the urban planning of the city in the future.

I am just giving you some elements of that. First of all, we have two flagship projects. The "City of knowledge" and what we have called the "Green footprint" of the city. The "City of knowledge" and the "Green footprint" means that you have some priorities in governing the transformation of the cities, both in terms of big transformation but also in a small transformation. In that respect, I am in charge of urban planning but also private transformation. Moreover, my experience says that the transformation of the cities depends on big transformation projects, but also and probably mostly on the small transformation that operates during the city. So you need to govern that too. And today our national and regional legislation make almost impossible the government of a municipality of these small private transformations.

In addition to the two "flagship projects", we decided to participate to the EU mission on carbon neutrality. We have been selected among the first 100 cities. Of course, this will shape our ideas of the future of the city and also the urban transformation of the physical space.

Finally, in a city like Bologna, taking care of people is part of the history of the urban transformation of the city. So then taking care of the city, not leaving anybody out of the transformation is a priority.

Therefore, if we can make a summary of these four axes, we could say knowledge, greening of the city, carbon neutrality, proximity and community. These are the four priorities that will shape my job as the one who is responsible of the urban planning of the municipality of Bologna.

In addition, to make it a little bit more concrete, what does it mean, I will focus on one of these four axes of priority, which is the one I am more directly involved, which is the flagship project of the "City of knowledge". The idea, basically, is that for very historical but also actual reasons, Bologna can be a European platform for knowledge.

The history of the city, the intersection between the university and the city, also in terms of physical development of the city, it's so evident that it doesn't really need any explanation. There is no transformation of the city without the transformation of the university.

In addition, as it was said before, when Bologna was in the past a model for urban planning, it was when the two institutions worked together. Therefore, this is essential. It is not always the case. I think that in the last 15 years, we lost this kind of priority. We need to work on that.

But for some very peculiar reason, in the next few years, the territory of the municipality of Bologna will host, just to make an example, 90% of computing capacity of the country. We will host one of the five most powerful high-performing computers in the world. 90% of computing capacity of the country, almost 30% of the European capacity. Therefore, this territory is becoming a strategic asset for the country and for Europe in the digital revolution we are experiencing. So, the municipality cannot be just the space that hosts that. It has to be a proactive actor in this process; the city of knowledge. Basically, the idea is that knowledge, science, research, education has to become the keystone for rethinking all the urban policies of the city.

Both in terms of urban renovation, but also in terms of economic policies, policies of attractions, and so on and so forth. This will shape my job in the next few years during this mandate.

Concretely, we are organizing this project around two axes, two levers. We could say the hardware, which is the urban planning actually levers, the capacity of orienting the transformation of the city, the physical transformation of the city, in order to make real this goal of making knowledge the keystone of our city in the future. And on the other hand there is the software, we could say, what is the strategic levers. So the idea that we need a political

governance of the process. We need to put together all the main actors operating in this territory on science and research and higher education to define priorities, strategies, common actions.

And this is not the case so far. I was mentioning the necessity of a real strong political alliance between the University of Bologna and the municipality. This is a goal in itself. Nevertheless, in these few years, new actors on science and research emerge in this territory. Among them, several US American universities, the Academia delle Belle Arti and new corporate academies. And then I can continue mentioning of that. They all operate separately. We need to make all this potential a system. We need a systematic approach. Therefore, we need a strategy and a governance. It is the goal of the municipality to create the condition of transforming this potential into a reality.

To say it differently, we need to rethink the action and the functioning of the city in terms of platform. Actually, we need to think the city has an urban platform. And what makes up, what platform do? Platform connects the users. So we need to connect physically and projectually all the different actors that operate in the territory. This is a priority. This is part of the activity that urban planning has to do. Connecting physically and projectually. Then what a platform does. Platform habilitates the users. Therefore, we need to work to fully involve all the potential of these actors that we have in this territory. It means to habilitate all the actors including citizens. This is because the fact that we will be hosting 90% of computing capacity of the country would be of interest for citizens. It is our goal to make it clear how this could be possible. This means use this potential as a way to empower citizens and this is what the platform does. Platform attracts new users. Therefore, we need to work to attract new research centers, new talents, new quality investments. Coherent with this idea of the city as a "city of knowledge". Moreover, this is what is going to guide the municipality in this idea of quite complex governance of political relations for the near future.

## Design a Sustainable Urban Form

Helena Coch

Polytechnic University of Catalonia

### *Understanding cities: from the analogy to the human*

Understanding cities has been a recurring interest and challenge for many fields and a very diverse range of scholars. Cities are key for humanity, as places of exchange, innovation, progress and civilisation. They defined the history of humanity and the future to come. They are also the battle place of environmental and social issues, defining the direction that our society at large may take in the future to come.

A recurring challenge in urban-related research is the understanding and study of cities. They are highly complex systems, they are unique, and they bring together multiple disciplines and perspectives. Is it possible to find a single understanding that can consider all of their aspects and relations? How can we find ways to measure, characterize, quantify and describe them that allow us to extract generalizable conclusions, or find universal trends and principles that guide us towards certain desired futures? How can we ensure that we are considering everything, not leaving anyone out, or overseeing the exceptions, the cases that differ from the norm? How to strike the right balance between abstraction and complexity, generalisation and uniqueness?

### *Re-thinking our cities as dynamic realities*

Urbanism is not the only discipline faced with the challenge of understanding a very complex system. Other disciplines, such as biology, have developed approaches and methods to study complex systems, like living organisms. An interesting step that interdisciplinary research can take is using the concepts developed in one field to look at phenomena in another discipline through different lenses. In this case, can urban planning better understand cities by relating them to living organisms? The discipline of urban metabolism takes this approach and borrows concepts from biology and ecology to apply them to the understanding of cities.

Vascular systems in mammals are key to providing them with the nutrients they need. In biology, scaling laws have been used to explain the structure of these vascular systems. In fact, the explanation of biological scaling laws as a consequence of vascular networks has had an enormous effect on biology, including the creation of an entirely new field: "metabolic ecology".

In metabolic ecology, the scaling observed is a simple power law:

$$Y = Y_0 M^b$$

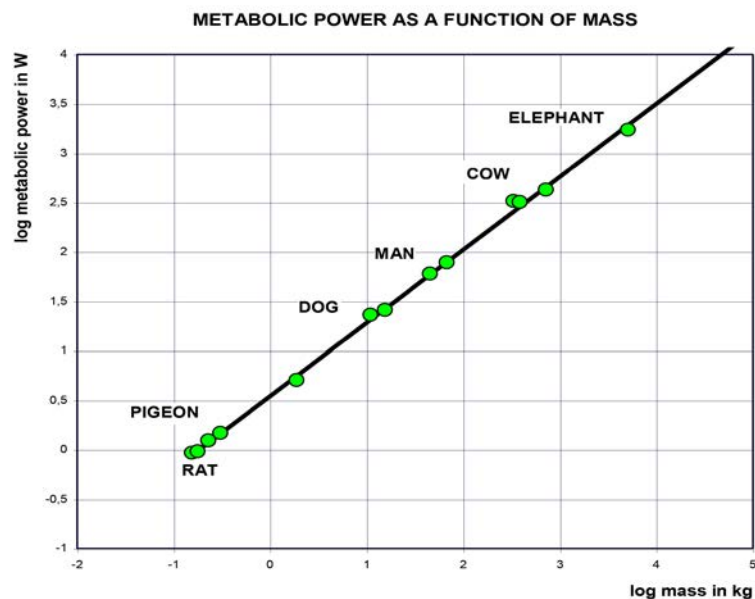
Y is an observable magnitude

$Y_0$  is a constant

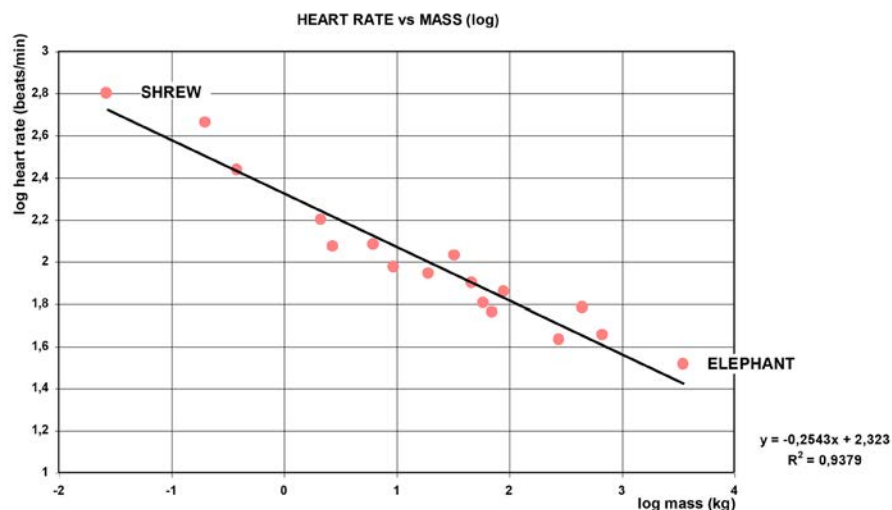
M is the mass of the organism

b is usually a simple multiple of 1/4

This allows to relate the metabolic power of living organisms as a function of their mass (Figures 1 & 2) that is, the energy needed for an animal to function is proportional to the size of a living organism. A similar comparison could be drawn between the heart rate and the mass. Other examples include animal circulatory systems, plant vascular systems, and intracellular networks. Therefore, it can be proposed that these scaling laws reflect the specific constraints of the networks<sup>1</sup> (West, 2004).



Examples: 0.75 (3/4) exponent law



Examples: -0.25 (-1/4) exponent law

**Figures 1 & 2.** The metabolic power of living organisms as a function of their mass.

<sup>1</sup>G. B. West, 'Life's Universal Scaling Laws', *Physics Today*, September 2004.

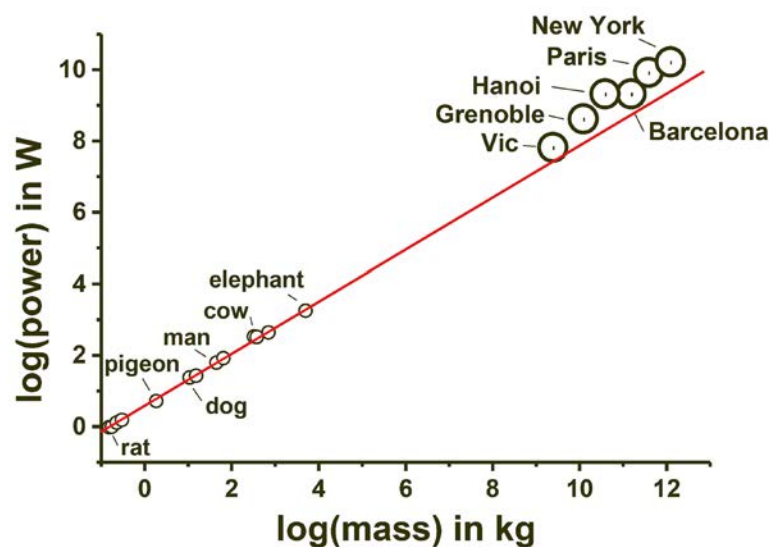
Therefore, it can be proposed that scaling laws and the generic dynamical behaviour of biological systems reflect the constraints inherent of such networks. Putting in relation the metabolic networks of organisms and their mass allows us to extract three observations. First, networks service all active regions in both mature and growing systems.

Second, the evolution of these organisms tends towards a state in which the energy required for distribution is minimized. Lastly, these properties are presumed to be a consequence of natural selection.

These patterns cannot only be identified in the case of living organisms, but also in larger systems, such as urban systems. In the same way that vascular networks in organisms give service to existing and growing parts, urban networks also give service to the city, the part that is already there but also the area expanding. All forms of life transform energy from physical to chemical sources, inter-organic molecules, and then metabolic processes, and, even though cities seem quite far from living organisms, some activities are comparable: transporting energy, information and goods, and repairing damage.

Therefore, we can re-think the urban systems of transport and the distribution networks in a city as entities that possess the same scaling properties as those of living biological organisms. In fact, Helbing suggested that the properties of traffic networks might influence the size and functioning of cities.

Considering these parallelisms, the question that arises is can we apply these scaling laws to cities? To address this, we tested this basic prediction of the distribution network theory, considering the metabolism of a city as its power consumption and the mass as the weight of its built environment. The graph displays the relationship both for specific species of mammals and cities in the world (Figure 3). Cities approach the predicted extension of Kleiber's Law (Kleiber, 1975 ), that is the city data points are slightly above the extended energy. It is remarkable that the relation between the mass of the city and the energy used are similar to those used by living organisms. This observation offers a novel perspective to study and understand cities and consider their similarities with living organisms.



**Figure 3.** The relationship for specific species of mammals and cities in the world.

The application of metabolic scaling laws into cities was introduced as a concept more than 50 years ago and has regained relevance currently due to more data availability and computational power that allows us to take these comparisons and models further. Several studies have developed models to predict the growth of cities based on these scaling laws, sometimes considering transportation networks as input and other times complementing it with other types of data, such as population, rental or property prices, race or green spaces. However, when observing these parallelisms and their applications in predictive models, some conceptual questions arise.

Firstly, the dimensionality of organisms compared to cities. While living organisms develop in all three dimensions in a fairly equal manner, cities grow mostly bi-dimensionally, with the vertical axes growing at another scale. How does this difference should be considered when studying the growth of cities through the lenses of networks and scaling laws?

Secondly, many of these models have a predictive nature, introducing a dynamic dimension that is not present in the previous comparisons we presented. The idea is that the relationships identified are going to hold through time, while the city evolves. However, some conceptual aspects should be considered when moving from a static to a dynamic approach. One approach would be to consider the evolution of a city in line with the lifespan of a living organism. In this case, cities, like living organisms, are dynamic beings, that do not only grow but repair damage and change. They are never a finished entity, but a system in constant evolution and change. Like cells in a body, humans in cities appear and disappear in a much shorter lifespan than the city where they experience their lives. The city, however, retains an overall identity through all these changes and transformations. However, how can we define the lifespan of a city? Can it be directly compared with a living organism? If we zoom out on the time scale a bit, we may also look at the evolution of the species "city". If we focus on the case of Europe, we could talk about an evolution from the ancient city, to the medieval, to the industrial one, modern and post-modern. Could we compare it with the evolution of species? If we look at the graph, we can see that the energy consumption of cities is not as optimized as that of living organisms. Could it be that they have had a longer evolution time and that's why they have reached a level of higher optimization? If our cities are in their evolutive phase, how can we work and contribute so they become more energy efficient?

Thirdly, and in line with the reflections presented above, the application of scaling laws in cities with a dynamic approach has generally treated growth as a quantitative unidimensional vector equated to augmentation instead of a multidimensional process reflecting a more complex transformation. In a way, it seems that we borrowed only partially the concept of growth from living organisms, applying a more restricted interpretation closer to the economic growth in power law models. Growth, for a living organism and, I argue, for a city, does not only entail augmentation but also transformation, metamorphosis and evolution. For instance, damage repair for living organisms, which could imply renovations in cities, but also neighbourhood change, rezoning, or infrastructure improvement, is as important as an increase in size, which translates to area for urban systems. Understanding the relationships and internal dynamics during this process of growth may be very revealing and a good approach to ensure that these models do not stop at an exciting correlation and try to explore the mechanisms behind it.

Finally, we should also ask ourselves, where is the limit? How much can we use these laws to abstract the dynamic and evolutive behaviour of cities and to what extent are we taking the generalisation too far and ignoring the idiosyncrasies of the context?



### *Re-thinking our cities as unique and contextual*

Let's take a step back to think about the context. Better even, let's take a step up and look at several cities from above (*Figure 4*). By looking at these images, we may be able to recognize several cities only based on a zenithal shot, i.e. Barcelona, Bologna, Buenos Aires, Edinburgh, Paris, Chicago, Marrakech and Brasilia. The urban form of each city is so distinctive that makes the place easily recognizable from above. Each city is the result of geography, climate, and history, along with the social and economic realities. All these contextual aspects, spatial and historic, create a confluence of elements that affect the development of each city, swaying it from a generic conceptual model into a unique reality.



**Figure 4.** Aerial view of Bologna.

Furthermore, cities are not homogenous units with uniform geographic circumstances and a shared historical path. Cities have different neighbourhoods and areas that can also be recognized through distinct urban morphologies. In the case of Barcelona, we can observe the different fabrics that make it up (*Figures 5 & 6*). The medieval part of the city, as in many cases, has a much dense built environment, with narrow streets and an irregular structure. The area of l'Eixample, the expansion plan of Cerdà in 1860, shows wide streets and regular building blocks with an inner courtyard. The working-class neighbourhood of Gràcia displays an organisation around squares, based on the land-ownership structure, with vertical continuous streets, a consequence of existing rivers and water streams, and regular housing dimensions as a consequence of available construction techniques of the time.

These examples show how the morphology of urban fabric depends on several contextual aspects that render their development unique and, thus, challenging to introduce and take into consideration in generic models. One could argue that any model is an abstraction of reality and that one needs to compromise on what is included and left out. Although this is certainly the case, in this process of reading the city, we believe that the scale of urban tissues or urban textures is crucial to understanding the environmental performance of the cities we live in, and, therefore, understating the fluxes of energy, matter and information.



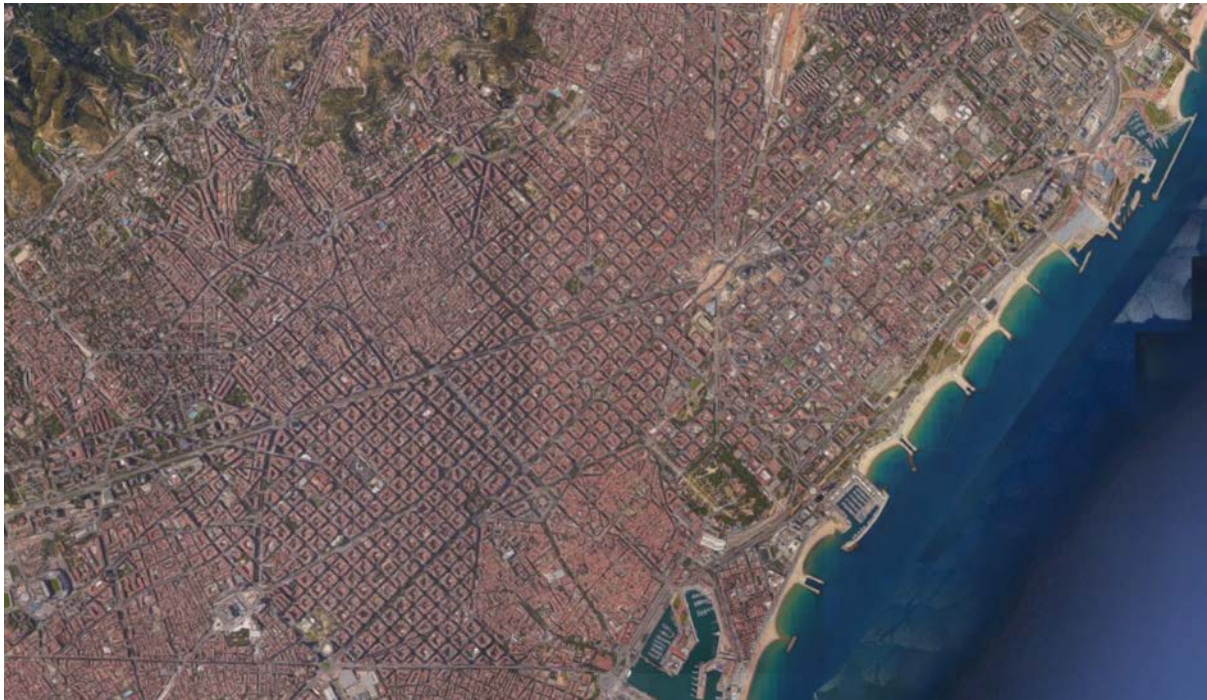


Figure 5. Aerial view of Barcelona.

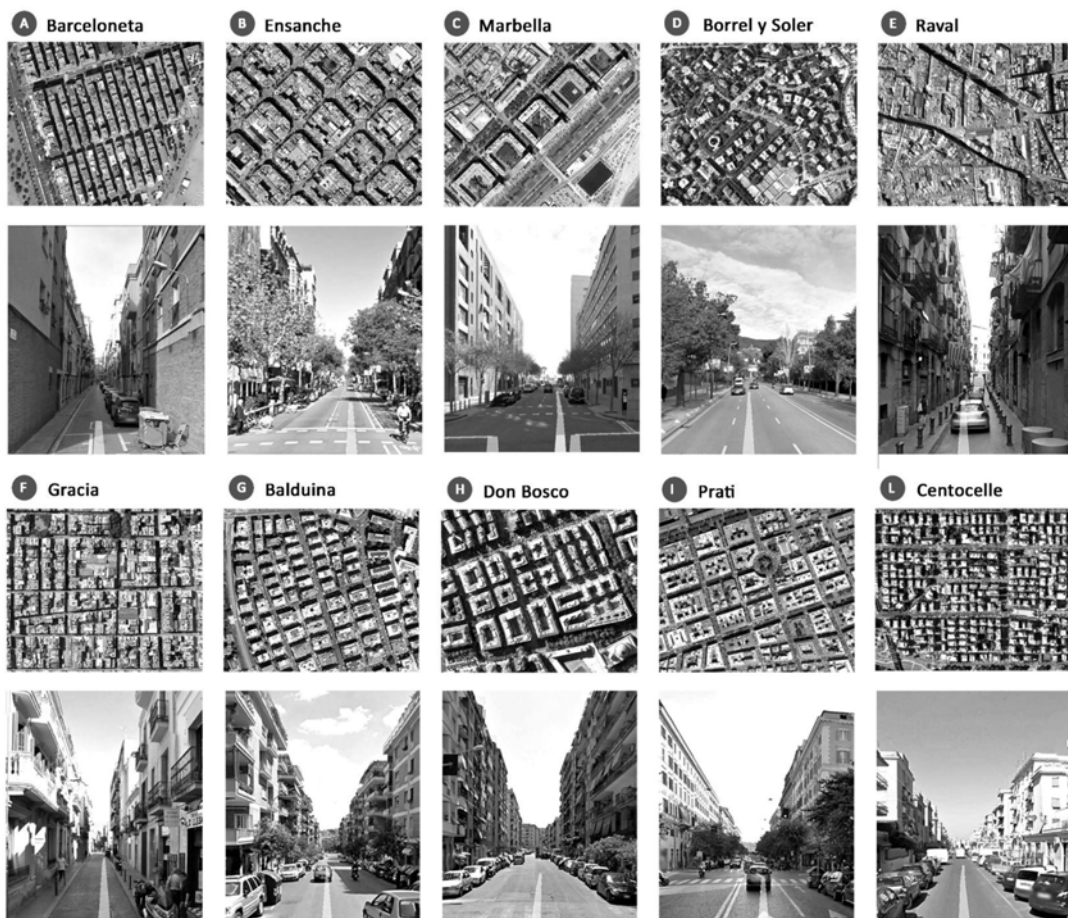
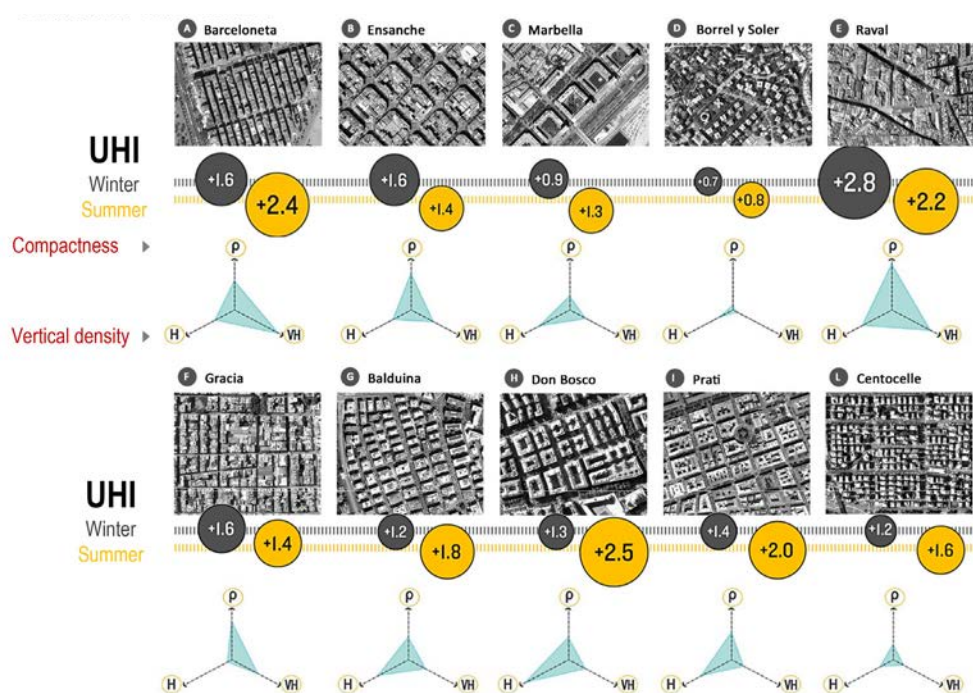


Figure 6. Urban textures of Rome and Barcelona.

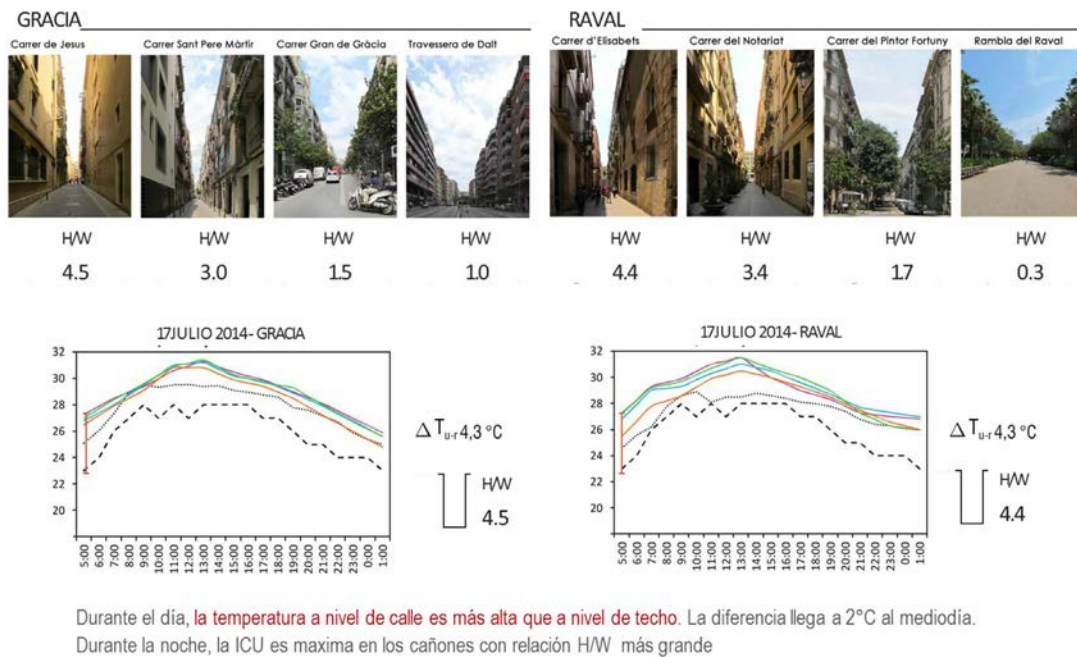
Although it is not the only aspect that affects environmental performance, urban building morphology is an important one and perhaps the one in which diversities between cities and areas within cities are more visible. Building urban morphology, also called urban fabric, can be characterised by several variables, such as floor rate area, density, compactness... etc. These variables are useful to evaluate the effect of urban morphology on different environmental phenomena, such for instance, solar access, the number of sunshine hours at the street level or the urban heat island. Figure 7 shows that areas with different urban morphology, quantified through compactness and vertical density, display different urban temperature increases (UHI) in summer and winter.



**Figure 7.** Urban temperature increase (UHI) in the different textures in summer and winter.

If we compare two neighbourhoods in Barcelona, the case of Gràcia and el Raval, we can evaluate the effect of the urban morphology and the specific types of the built environment on the temperature in different parts of the city, during summer and winter (Figure 8). While both neighbourhoods experience urban heat island effect during summer, in el Raval it is less extreme during the day due to the effect of sea breezes. It is important to understand the effect of the urban heat island both in winter and summer because the consequences are different. In winter, the urban heat island may be considered as positive, as it increases the temperature of living spaces and reduces the demand for heating. However, in summers of areas where the temperature rises above comfort levels, the urban heat island may be a negative phenomenon, becoming, in some circumstances, extremely critical. This effect may tilt the balance to raise the temperature above a healthy threshold, which may put vulnerable populations at risk, as well as promote an increase in air conditioning (AC) use in buildings. Additionally, the latter can have a ripple effect due to the additional heat that AC equipment produces while in use, approximately 2 to 3kWh of heat is released outside for each 1kWh used to cool the indoor space.





**Figure 8.** Atmospheric heat island intensity in Barcelona: temperature in *nivel de calle*.

The urban heat island is just one example of a highly impactful phenomenon that is very dependent on the specific characteristics of urban morphology. What these observations and studies show is that by overriding these specific and unique aspects of cities in our models and analogies we may be missing crucial aspects of their energetic performance. Therefore, it is important to aspire to find a balance between generalisation and understanding of the specific contexts and unique characteristics of each case as well as being aware of all the aspects that one may be overriding one developing generalized models. Nevertheless, we also do not want to transmit the idea that we will address these limitations solely with more data and detail. We argue that this tension cannot be only addressed by throwing in more data points into a large-scale model or urban twin that records every detail taking place in the city. We believe that it is important to understand the present and past mechanisms that form the history and dynamics of our current cities. It is important to keep asking ourselves the question why (causality?) but also how? (mechanisms and processes) to extract guiding principles and unique narratives that, together, will inform our choices when asking ourselves about the level of abstraction needed and what to include or leave out.

#### *Re-thinking our cities at the human level*

Until here, we have discussed how we can better understand our cities, learning from other fields, finding parallelisms, using analogies and models but also paying attention to the context, unique situation and particularities of the place. At this point, we may ask ourselves, what is the point of studying all this? Why do we understand how our cities function? We believe that the aim of these studies must be to focus on people's well-being. If we look at images of Barcelona during the COVID-19 pandemic, we have a feeling of uneasiness. We are all quite familiar with similar images in different cities. They toured the world on our televisions, smartphones or digital devices when we were sitting on our couches during the isolation parts of the pandemic. The uneasiness they transmit is due to the lack of people on them. Photographs depicting an urban

environment without people are disturbing because, in fact, what really makes the city are the people living in it and the potential exchanges and interactions that this confluence of human beings enables.



**Figure 9.** Social interactions during pandemic days in Barcelona.

It is not only the number of people that generates a city but their daily interactions in a common space. The pandemic also showed us how people needed to go outside, to see others and to have regular social interactions to preserve their well-being (*Figure 9*). In order to make these interactions possible, people need a common ground, a space to meet with friends and acquaintances but also with strangers, others with whom they would have never dreamed to exchange and that may open new worlds and perspectives to them. The public space takes on this role and becomes the living room of the city, a common room, as Louis Kahn would say. This common room needs to be a comfortable space for all to open up the possibilities for human interaction and, therefore, ensuring people's comfort in the streets and squares of a city is key to promoting our societal well-being.

To focus on people's well-being means to shift the spotlight towards where people are. Seeing the cities from an aerial point of view allowed us to recognize the different patterns of urban morphology. However, people do not live on rooftops and, for now, we do not move around flying with drones. Therefore, if we want to understand how cities affect people, we need to understand what is happening at the street level.

If we go back to the topic of the urban heat island effect, it is relatively easy to take measures on the roofs of buildings and, therefore, that is where our data on the urban heat island usually comes from. Measurements of urban climate at the street level are almost impossible to be accurately performed for reasons linked to instrumental constraints and urban boundary conditions. However, the difference between the two measurements is sufficient enough to justify making the effort to better understand the local urban climate. One approach to do that is to measure the radiant temperature of surfaces surrounding an urban space. An additional aspect to consider is the effect of shading in an urban space, which generally is tied to urban vegetation. These complementary methods aid in improving the estimations of the environmental conditions that individuals at the street level feel. Taking this approach implies looking at the city at eye level, not at bird's eye view, as well as taking human comfort as the focal point of the study, finding the variables that may affect it as a departure point, and not only as a consequence of a general model. We must study the city without ever forgetting that the objective is to make it a pleasant and liveable place.



## Reading the Changing Urban Form

Kayvan Karimi

*UCL - The Bartlett School of Architecture*

*Space Syntax*

It is my pleasure to address the challenge of reading and analysing urban form. As the subtitle of this talk suggests, I want to make a case for how urban morphology can meaningfully contribute to the design and urban planning of cities. I am an academic, teaching at the Bartlett School of Architecture. We run master's and PhD programmes and conduct research studies at the University. I also serve as the director of Space Syntax Limited, a company established in the early '90s to transfer knowledge and academic know-how to the industry. The flow of people, ideas, questions, methods, techniques, and tools between these two entities is fascinating. I personally find this interaction recommendable for academia and universities to establish similar relationships with direct architectural urban design and urban planning practices.

The subject here is reading the urban form, the related complexities, and challenges. I am not a traditional urban morphologist, but I have been working in this field for the past 30 years. I have a specific way of looking at urban morphology, which might not be very different from most of yours. This talk will be slightly provocative because I was asked to set challenges for the next three days of the conference in Bologna, and I hope to address this task meaningfully. To start, I will introduce some sub-challenges.

The first sub-challenge is how we map urban morphology, how we represent urban morphology, and how we record urban morphology. The second sub-challenge is about how we measure urban morphology. Is urban morphology measurable? Can we do it, and if we can, in what ways can we do it? Finally, as a third subtask, how do we use urban morphology? How can it be used in real life for designing and planning places? What items are already there, and what items do we need to add in the future?

Let us start by making some reflections on how we map urban morphology. The figure 1 shows nicely how agricultural land parcelling and connections with the outside world turn into built fabric, and then the buildings, and the connections between the built and unbuilt, and how all this creates urban form. The first mappers of urban morphology were cartographers who shaped very old maps, such as the map of Paris (Figure 2), depicting built bits of the city versus unbuilt parts of the city. They also realised the importance of looking at urban blocks to identify the type of block buildings and parcels that stick together, creating a larger system. But they also realised that these insights were not enough to read and understand the urban form. They went to the level of plots, like in the incredible cadastral maps of Florence in 1427 (Figure 3), where the details of the plots and buildings are astonishing.

In almost 500 to 600 years, this was the way of thinking about and mapping cities. But then there's the issue of buildings. Urban blocks, plots, but then buildings. How do we map and represent buildings in the city? In the maps of John Speed (Figure 4), the British cartographer of the 17th century, there is an indication that mapping the built fabric is not limited to parcels and urban blocks, but also to the actual buildings of the cities and the ways they work and relate to the entire system, including the linkages, which can be linear links like streets or convex links, like squares. These latter ones are the public rooms, as Rob Krier Cock called them, or the



Figure 1. Agricultural land parcelling, connections and built fabric.



Figure 2. Map of Paris.

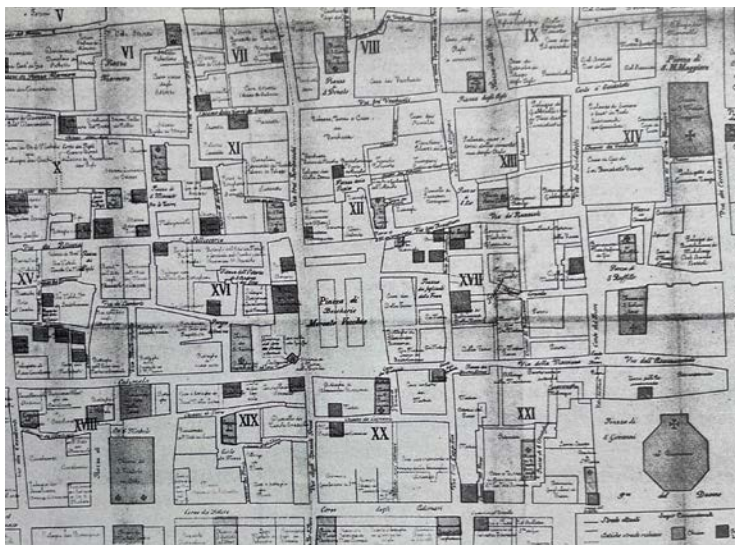


Figure 3. Map of Florence



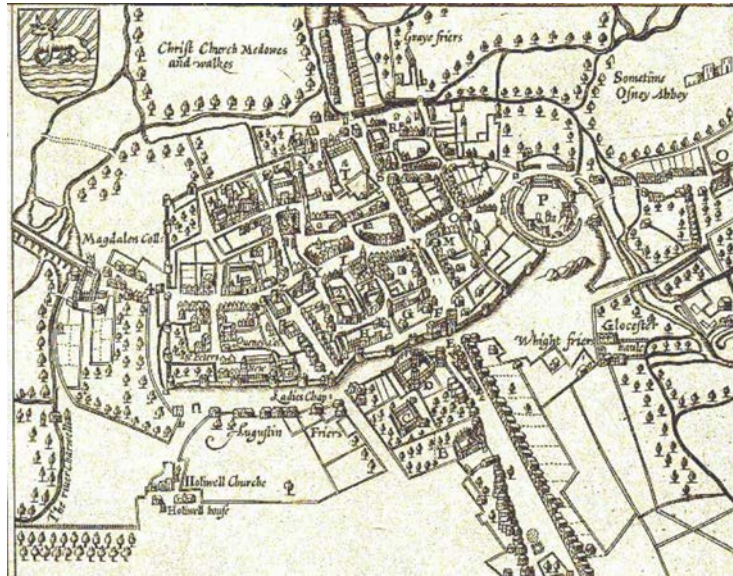


Figure 4. John Speed (17th Century)



Figure 5. Giambattista Nolli.

public spaces that accommodate activities and interactions between people. We have linear access and activities in convex spaces, and we start mapping and representing them as entities in addition to buildings and many additional entities.

As an example, I mention the incredible map of Giambattista Nolli (Figure 5), showing almost every important element in a city, including public buildings. This map is still the best way of representing urban morphology. I must admit that I have not found any better way because urban life does not stop outside the buildings. It comes in, especially in public buildings, and including them is the best way of representing urban morphology. But is that enough? Or do we really need to know what is happening inside these buildings in terms of functions? The issue of land use and building use is very important. We must map, show, and use them. Yet, there are different ways of mapping.

Twentieth-century planners started to look at these big blocks of things, zones, and labelled them. But we know that this is not as simple as that. There are edges of the blocks that work with different roles and functions, and then there are interior parts of the blocks. Thus, there is the



issue of mapping land uses, which is important. Also important are the conditions, particularly the human conditions. In this context, a fascinating map of poverty in London, Charles Booth's map, shows where the higher income, or lower income conditions also in terms of health and well-being. More recently, in the 21st century, we can map different parts of the cities and show how they are performing in terms of various issues and socio-economic characteristics. Sometimes these factors can be combined into something that we define as the index of multiple deprivation, but they can also be separated into different indices.

But, is there something missing here? We have reached a good degree of definition in the reading of the city, mapping the built versus unbuilt, until now. So, what could be missing here, and what do we need to develop further? One of the biggest things that is, in my view, still missing is the issue of people and the understanding of space and people as one single paradigm. This was addressed by people like Gordon Cullen, a British journalist in the second part of the 20th century. Hence, how people see the space, how they navigate through the space, how people interact in the spaces has become an important issue. Again, another journalist, American journalist Jane Jacobs, wrote about the way people interact with the built environment and with each other, considering the city and society as one paradigm.

Furthermore, there is the issue of movement, how people, goods, and vehicles flow through the urban system, which we really need to map and represent in a more efficient way. This is another issue that started to be addressed in the second part of the 20th century, considering the city as a network, not as disconnected bits and pieces. The seminal paper by Christopher Alexander argues that the city is not a tree; it is more like a connected network of different places. And as you can see, the use of network analysis and graph theory started to be incorporated, which is something that we need to continue and develop further.

My first statement in response to the first challenge of reading the urban form could be the following: Urban morphology means much more than the study of physical form. The urban form is realistically understood only in a social context. Urban morphology is the study of form and people as one single paradigm.

Obviously, it is not enough just to map and show the urban form. We must find a way of measuring; otherwise, we cannot use it. Analysis of 'figure ground' in research is not new; we have been seeing and using it: the usually black and white image of the cities, where the buildings are the black masses, and the open spaces are white. We can even measure it by percentages, such as in a representation of the Elephant Castle in London before the Second



1916

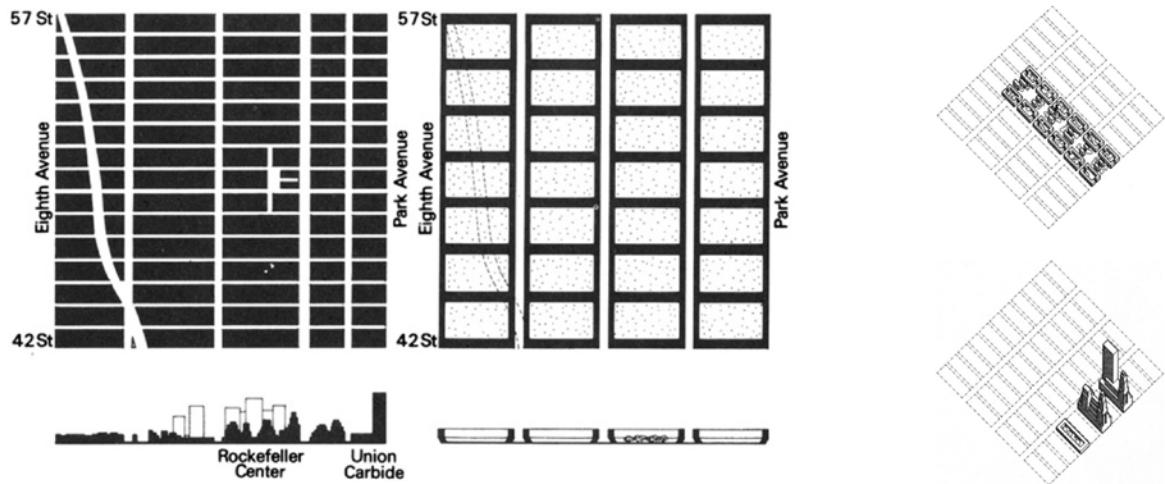


2005

Figure 6. Elephant Castle in London before and after the Second World War.

World War that shows a percentage of 50% of built spaces (Figure 6). But afterwards, in the Second World War, everything was bombed, and new social and residential housing projects were built, along with nasty roundabouts, and large roads of the 1950s and 60s. The morphology has changed drastically, which we can measure and demonstrate how the figure ground has changed.

But is that measuring of the black and white of the urban morphology enough? Leslie Martin's incredibly simple and effective analysis of Manhattan (Figure 7) shows, for instance, that the entire mass of Manhattan could have been accommodated in a specific type of urban morphology, the perimeter block, developed for up to eight stories, without any need for high-rise buildings up to 100 stories or more to create high density. People from cities such as Barcelona and other European cities know that high density is not necessarily linked to high-rise buildings. Sometimes this is a misunderstood concept.



**Figure 7.** The height and floor space compared by two type of grid envisaged for Manhattan, New York. With the same floor area the courtyard (right) type produces less number of floor (Leslie Martin 1972).

We can perform this kind of block size analysis even more rigorously and easily through GIS analysis. The red colour on the map shows a small block, and the blue colour shows bigger blocks, with a full range between them. In the central places of the cities, we often find smaller blocks, where people can navigate easily. Furthermore, there are the issues of process and transformation in urban morphology.

In this context, it is worthwhile to mention the work of British geographers, which started from Conzen, and then went on with the work of Larkham and Jeremy Whitehand, to name but a few. They represent a very well-established and recognised historical geographical approach, and one of the most familiar approaches in urban morphology.

In relation to building types and building typologies, there is another well-recognised approach from the Italian school, starting from the work of Saverio Muratori and Gianfranco Caniggia, to the work of other colleagues and friends at the Sapienza and other universities in Italy. They are further implementing and developing this highly respectable approach in urban morphology. But what is missing or could be missing here? Can we think about other things that complement or add to the way that we think about urban morphology? I think that the use of quantitative methods, sophisticated quantitative methods, is inevitable in urban morphology.

The use of GIS, Geographical Information Systems, not only for mapping but for analysing the cities through statistical models is fundamental and necessary. It could be used, for instance, to explore some regression analysis between the energy consumption versus the mass of the city. We must build these statistical models building upon big data, which is becoming increasingly available; we need to find a way of using this abundance of data in the world and link it with urban morphology, also considering network analysis since cities are networks, and there are multiple networks connected to each other.

I also think that we should not think about urban morphology only in geometrical terms. Geometry is the study of shapes, but there are topological characteristics that need to be investigated. Topology is the pattern of relationship, regardless of shape. So, if we look at an urban system, for instance, we always have a particular geometry here and there, but then if you think about the connections between these different places, they create a configuration that is meant to be extracted from geometry and investigated in a different way, to then be brought back to their relationship with the geometrical characteristics of the overall urban system. Graph analysis, persistence homology, deep learning, and other methods are all becoming more and more popular and well-used methods of topological studies or configurational studies.

Yet, I think that it is not even enough to have models of the cities. These models should be not only quantitative but predictive as well because we want to predict and make changes to the cities. The earlier speaker, Raffaele Laudani, mentioned their plans for turning Bologna into a knowledge city, or a city of green infrastructure. How could we measure that? How could we predict the impact of the decisions that are going to be made in the city? For this, we need predictive models.

Here is my second statement in response to Sub-challenge 2, or how we measure urban morphology: the reading (analysis) of urban morphology cannot be limited only to descriptive mapping/analysis of the urban form, nor purely to its geometrical characteristics. The study of urban morphology has to move towards a quantitative and analytical investigation of urban form, inclusive of non-geometrical characteristics and structural patterns. Based on these principles, an effective methodology should be capable of creating evaluative and predictive urban models.

Finally, how do we use urban morphology and what kind of methodology do we basically need? Here things are different between academic studies and practice. Yet, if you are equipped with tools and methods that can help you with design and planning, you will be much more successful in terms of design, communication with the clients and stakeholders, and in terms of proving that your design will work in the future.

Adopting a methodology that can help us with this process is extremely important, but this methodology needs to have strong theoretical foundations to avoid the fragmentary creation of bits and pieces of urban models without an overarching theory that brings them together. Now, there are some architectural urban theories to help in this endeavour; yet there are not too many comprehensive architectural urban theories that we could practically use. And even rarer are the theories that manage to produce the methodologies and tools.

We need a theory that can turn into tools, into a methodology capable of linking the physical space to human behaviour. I think this was mentioned strongly by Helena Coch, and you all agreed that we cannot really forget about people, since any methodology that does not consider people in its approach would potentially fail in the process of urban design and urban planning. Issues such as wayfinding, clustering, natural movement, and so on, should be considered in thinking about urban models.

In this framework, we should mention that social models also exist, but sociologists have an even bigger challenge linking with us; hence, we need a new generation of sociologists and anthropologists who understand that they cannot study societies without considering the built environment. And I hope there are no sociologists in the audience; otherwise, I might be in trouble!

A good methodology in this field should be constructed simply. There's no point in spending years creating your model, as the city would have moved by that time. For those who practice urban planning, it is well-known how things can happen quite quickly; this is why we need a methodology that can respond quickly and simply. Yet, at the same time, that same methodology should be capable of becoming more and more sophisticated when needed because we have to deal with very complex issues, and sometimes simple models are not enough for that.

Indeed, we cannot sit in our silos and think that we cannot or should not connect with other disciplines: engineering, economics, sociology, transport, and many other fields are important in urban planning and urban design, and we need a methodology that can bring these different disciplines together instead of separating them and putting them in different silos.

These are real challenges, and they are further complicated by the problem of the scarcity of data in the world. We have places with plenty of data, overflow of data, and places with nearly no data. Almost one billion to two billion people in the world live in unplanned settlements, or informal settlements, for which we do not have no to or very basic information. Is there a methodology that can help us with this kind of sparse data condition? We really need that; otherwise, we would forget about almost 60% of the world and just focus on places for which we have data.

Moreover, it is about integrating research with design seamlessly, the process of design and the process of research. If they cannot come together as one single process, there is no point. Research would do its job, and then the designers and planners would do their job without ever meeting. Unfortunately, this is probably the case with most of the things that we see in the world. I mean, there is a lot of research, a lot of studies, but then the practitioners go and do their own thing. There is no methodology to bring them together.

The issue of scale was mentioned by Nicola Marzot and other speakers. So, you need a scalable methodology that can take us from the smaller scales to the bigger ones and back without using separate methodologies for these different scales.

Here is my third statement in response to Sub-challenge 3, how we use urban morphology: Urban morphology can be efficiently used to study, understand, design and evaluate spatial systems based on their physical form, configuration, function and human use. To achieve this goal we need a methodology that can utilise quantitative spatial models, which link directly with social conditions and behavioural interactions, and are capable of integrating various layers of urban information into a network-based urban model.

This is a huge statement, but this is, I think, the challenge. This is the thing that we need to address if we want to bring urban morphology up to the highest level.

Now, does such a thing exist? I do not want to be accused of advertising my own work, but I just want to take you through some of the possible responses to this sort of challenge.

There is plenty of literature on space syntax. You can read and look at websites and videos. Very briefly, the theory of space syntax was developed in the 1970s by Bill Hillier, who is one of the greatest urban morphologists. What he means by space syntax is the understanding of spatial systems through configuration and in connection with society: thus, in brief, it is all about space, society, and configuration. Space syntax has also developed into various sub-theories,



such as the theory of natural movement, the theory of centrality as a process, and some other theories that you can investigate. It is a solid theory, which has branched in different directions and is becoming more and more inclusive: anybody willing to develop a further sub-theory under this paradigm or umbrella is welcome.

Bill Hillier went on to produce a lot of publications. The most seminal one is the Social Logic of Space, which explains that this theory is about the social logic of space or the spatial logic of society. All these theories started from the observation of failing urban design and architectural design in the second part of the 20th century and the projects that basically failed not only in the UK but in many other cities of the world, as we can observe in the former socialist countries or even in Italy.

This theory of space and society can be read in the more difficult-to-read versions of Bill Hillier's publications, but I am providing here a very simple explanation that can be summarised in two principles. The first principle is that space is intrinsic to human activity. It is not the background to it; this proposition is very difficult to challenge, to be honest, and I have never seen anyone who could really challenge it. Space and society as one thing, this is the first principle.

The second principle, which is slightly more difficult to understand, is that space is fundamentally a configurational thing, meaning that any spatial system is composed of different components in a special relationship with each other. Let us make the case of the space we are in now, just looking at this spatial system: if I open the door to the courtyard, the role of this courtyard and our behaviour in relationship to that open space would change. This is the concept of configuration: any spatial system is configurational, and on that basis, we can study the configuration, learn from it, and apply it to our design.

Human behaviour is a very interesting part of this approach. If we take this kind of urban room and its linear access, our movement will be linear predominantly, to be optimised according to the spatial configuration. This is, again, common-sensical. Considering public spaces, they can be scanned to find the interactions with them, by extracting very basic things such as axial lines, common spaces, and convex isovists (Figure 8).

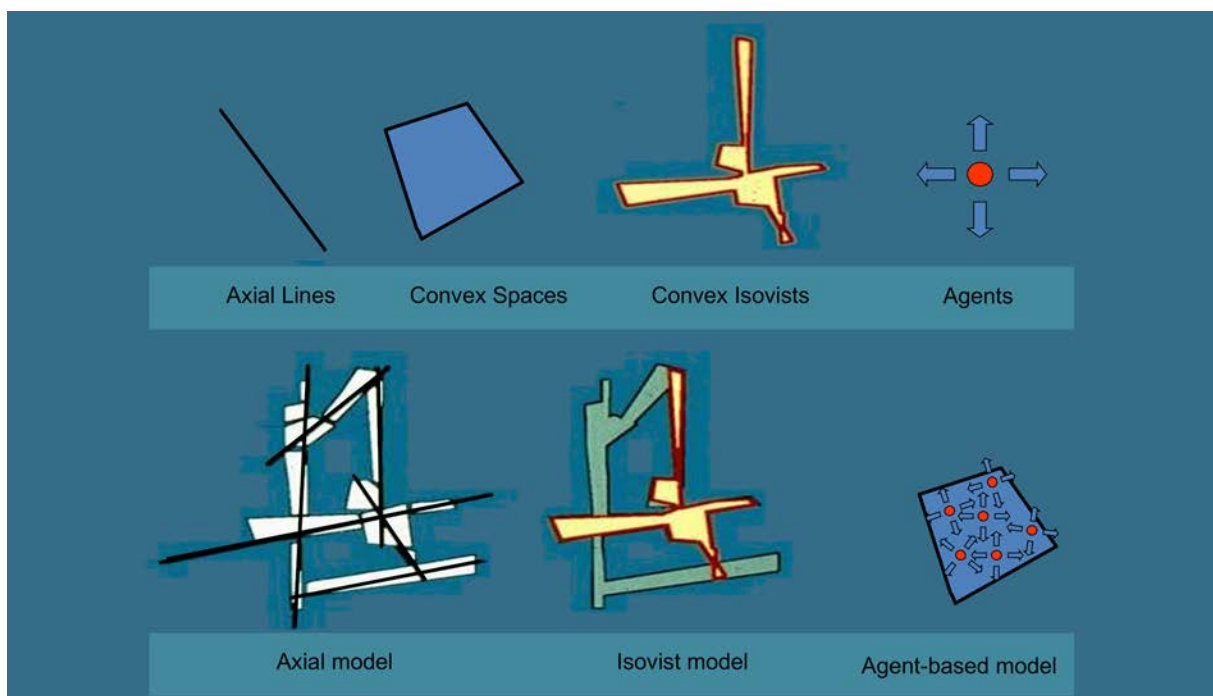


Figure 8. Basic things extracted from the spatial interactions of public spaces.

These are people-based entities, but they are also physical and geometrical entities; thus, we can turn them into models. This is what we call a spatial accessibility model: how every segment of the road network or street network connects with everything else (Figure 9). The virtue of this type of modelling is that it brings behaviour, cognition, and wayfinding into the built environment, into the physical space, and as such can produce a locational model that can offer a human-based modelling of space (Figure 10).

Another virtue of this model is that it can be scalable. We can observe a city, for example, an old city 300 years ago in the world, e.g. the city of Shiraz, in my home country of Iran and compare it with the entire Great Britain (Figure 11). We modelled the entire country using the same principles, and it is possible to download it, or use it online, zoom in, zoom out for free.



Figure 9. Spatial accessibility model.

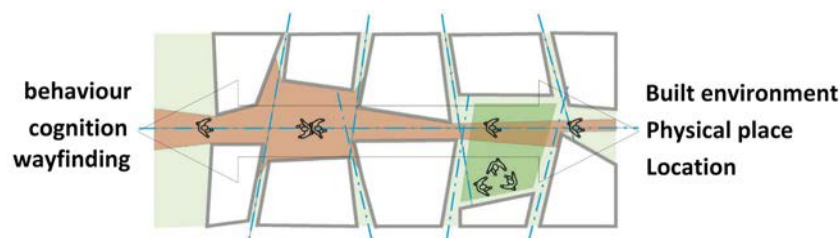


Figure 10. Human-based modelling of space.

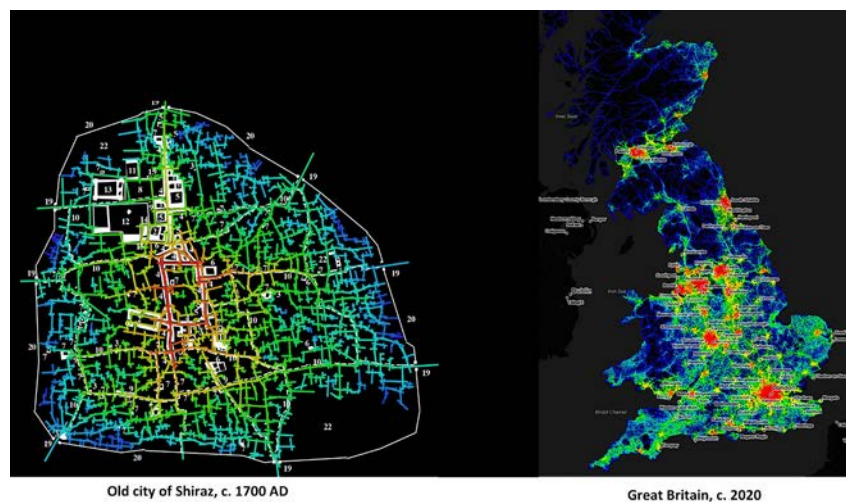


Figure 11. Comparison between the model of the city of Shiraz, Iran, and the model of the entire Great Britain.

This is the point: using a model for various small places as well as very large systems, always finding correspondence with things such as movement. So, we can measure the spatial accessibility versus movements and find out strong correlations (Figure 12). And if we cannot trace strong correlations, this kind of statistical analysis can help us to understand what is going on in terms of the relationship between space and society. Moreover, there are the issues of land use, viability, crime and safety, and many other things that we can additionally explore. It is a very simple model, but it can be converted into a very complex one. It starts from a spatial model, morphological or configurational model, but we can build density, land use, transport systems, and other things like environmental layers. This example is what we are currently working on: an Integrated Urban Model that can be presented to and used by local authorities.

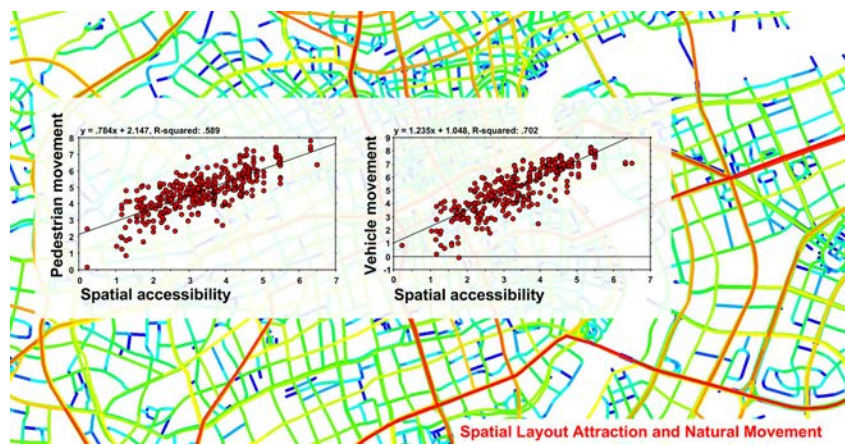


Figure 12. Accessibility versus movements

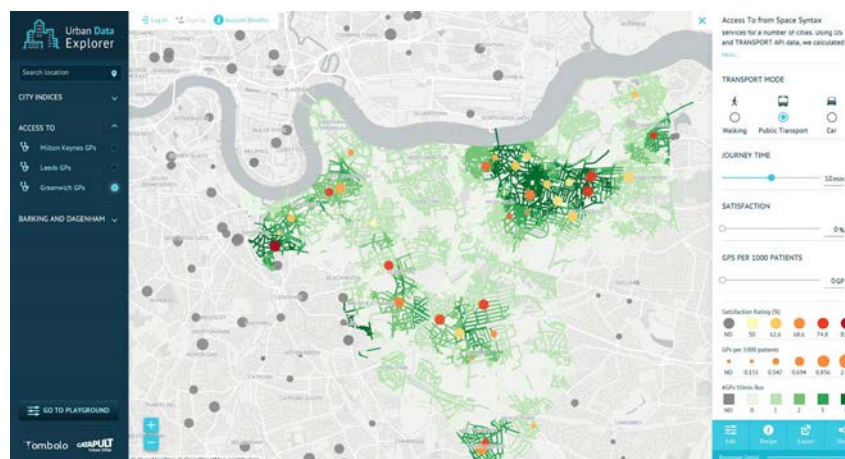


Figure 13. The Integrated Urban Model.

This (Figure 13), for example, is a platform that we developed for local authorities as they were not using the technology they needed.

When provided with these tools, they were able to use them efficiently. Nowadays, both for sparse and rich, dense data, it is possible to model cities in a few hours. For this kind of model, it is possible to just download the road centreline, for instance, from Google Maps or OpenStreet Map and then turn it into urban analysis. It is not perfect, but it might do the job. For example, the huge city of Mumbai was modelled in just a few hours.



It is very useful to have such a methodology that could be easily integrated into the design process and connected with the work of different specialists from various disciplines: economists, environmentalists, urban planners, transport engineers, and sociologists. They all understand the approach, and they can easily relate to it.

Now let's talk about the design process. In traditional design, starting from the brief, you develop your design ideas, perhaps on wider issues such as politics, social issues, etc. You consult with people and then develop it further to produce the final design.

In the analytical design process, which I think you're familiar with and that many of you advocate for, there is a baseline analysis in the beginning, and there is an analytical evaluation of the development of design options.

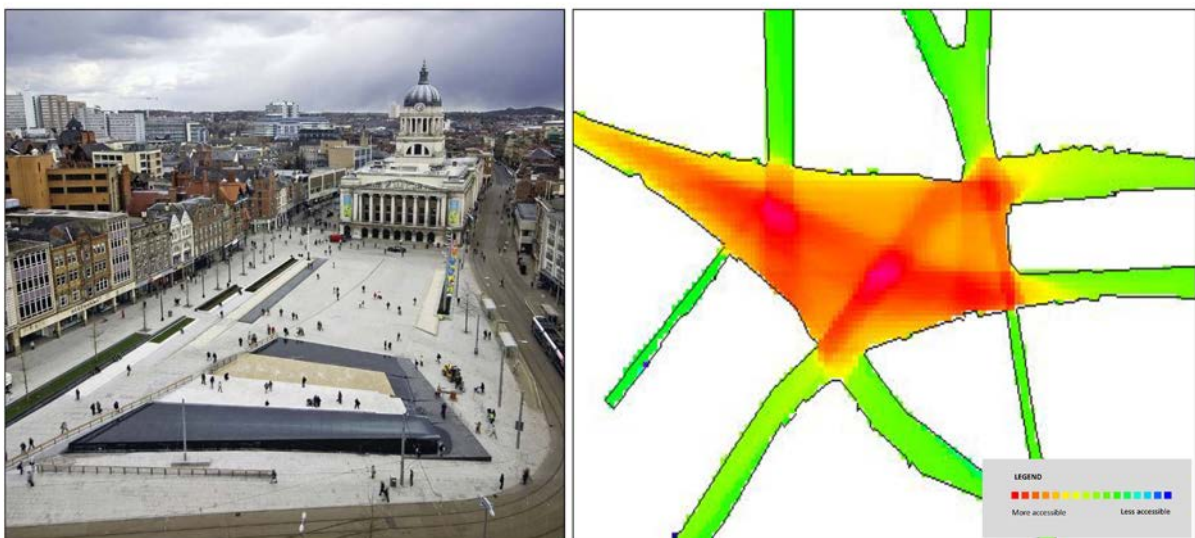
In our approach, the process starts with spatial analysis and carries on. I mean, it's fairly much like other analytical design processes, but it starts from this kind of specific analytical morphological studies in relationship with humans, but we build models for this purpose and then we use the models for assessment.

The process goes from macro to micro, and it helps us in the first phase to diagnose what is right and wrong with the system, and in the second phase, develop a prognosis, which is predicting what is going to happen. As I said, the model can be used to look at different aspects of a big city like London; if you look at certain measures, it shows the superstructure of movement. But if you use another type of analysis, you can see the urban villages and these kinds of organic places where local centralities are.

In the last part of this presentation, I would like to focus on the different scales of the projects that go from buildings to urban strategies. I will go quickly through a series of slides to show how analytical design can be used at various scales.

We start with building scale analysis and then move on to public spaces. This is a really interesting case in Nottingham (Figure 14), an award-winning project. So the analysis produced the foundation, not only for understanding the problems but also for developing the main concept of the design and evaluating the design scheme.

In the Elephant and Castle project in London, we helped with the replanning of this area with prominent architects and urban designers in the UK (Figure 15). We assisted them in stitching together fragmented bits and pieces of the urban fabric and resolving a problematic traffic



**Figure 14.** The Analysis in Nottingham, UK.



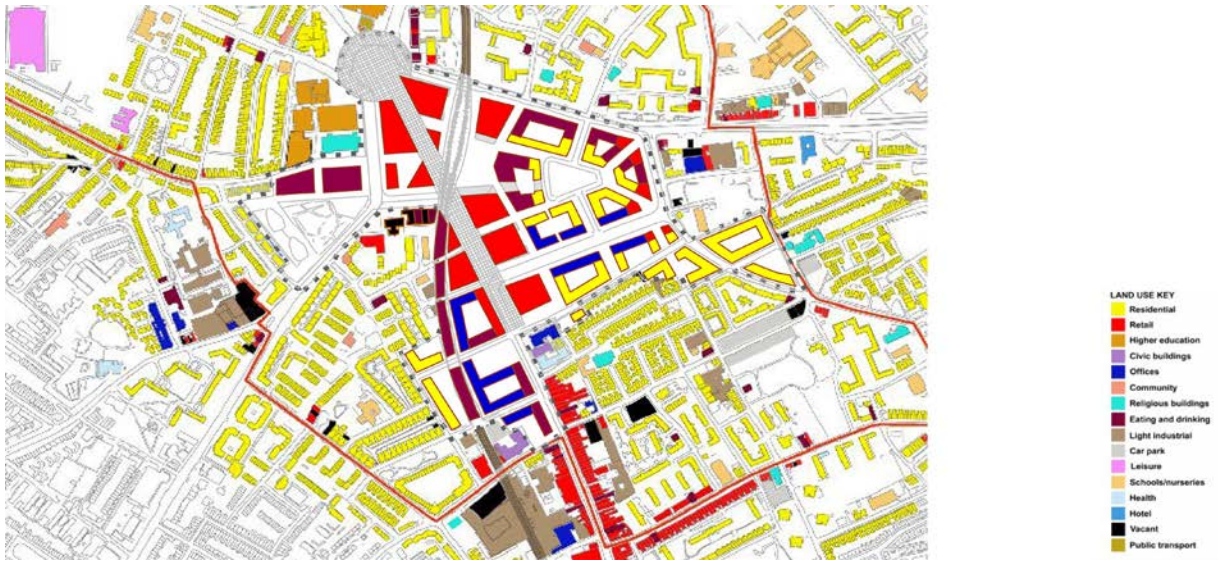


Figure 15. Elephant and Castle project in London.

roundabout, which has now been transformed into a public space. And then we helped them with properly locating the land uses and everything.

The next scale is large urban development frameworks, such as the City of Masdar in the UAE. In this one, the designers originally tried really hard to address some environmental issues, but they got the basics of city planning wrong, so we helped them to fix it (Figure 16). To do that, we developed a full-scale Integrated Urban Model for predicting how things will work in the future.

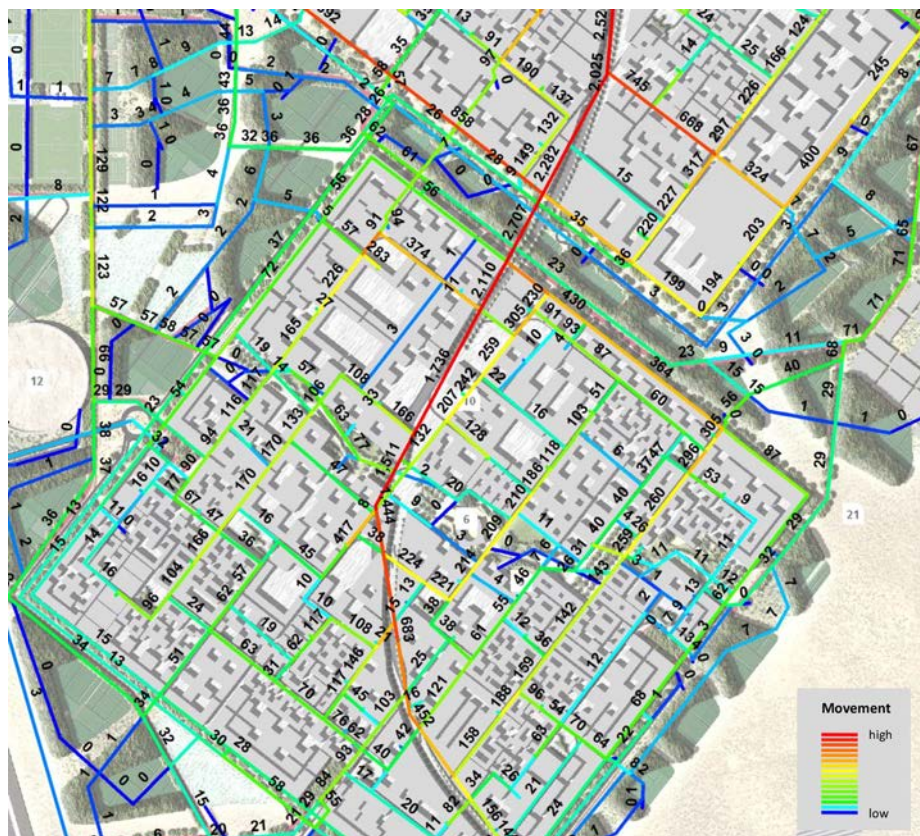
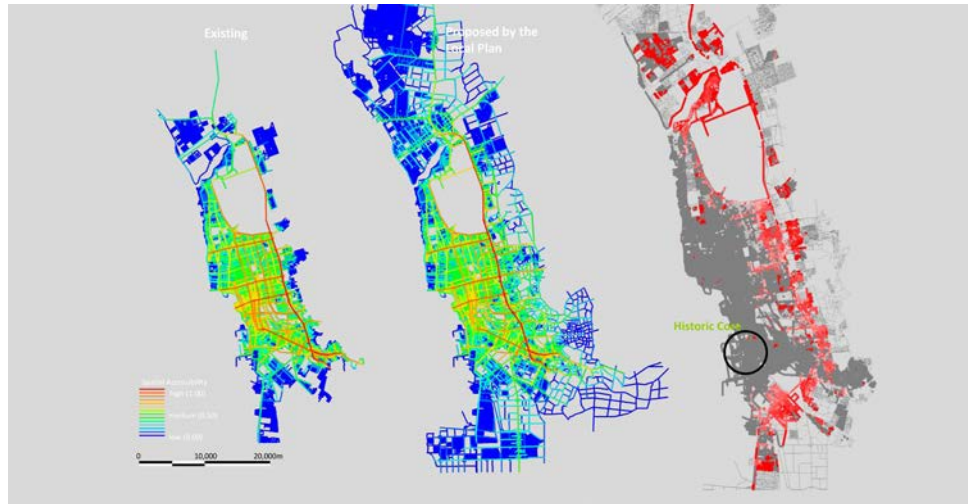


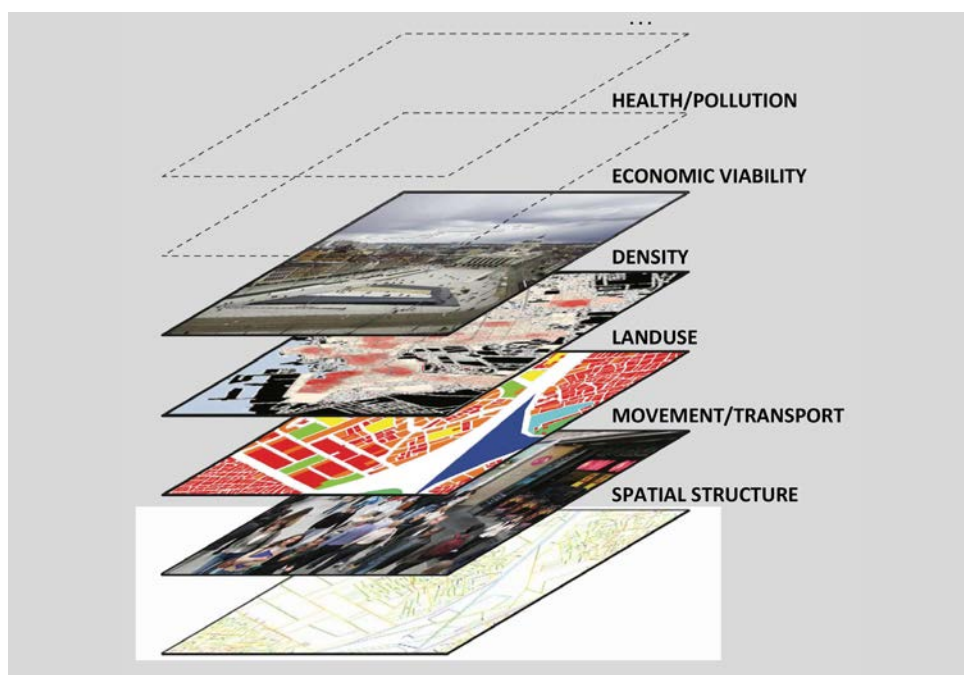
Figure 16. The City of Masdar in the UAE.

Finally, we can look at urban strategies at the city level (Figure 17). This is the city of Jeddah in Saudi Arabia, and how the city's plan was evaluated to assist them with the replanning.



**Figure 17.** The city of Jeddah in Saudi Arabia.

This figure illustrates my view of cities as sustainable entities (Figure 18). Sustainability, in my opinion, is such an important thing. It's about endurance, continuity, minimising damage, maximising output, and so on. To understand sustainability, you have to prioritise the spatial structure or the morphological layers because they are the most resilient layers to change. You start with that and then overlay the movement layer, land use layer, density, economic viability, health, and so on. I should have added an environmental layer as well. Sorry, Helena! But yes, I mean, this is the way to look at sustainability as a very intrinsic relationship between these

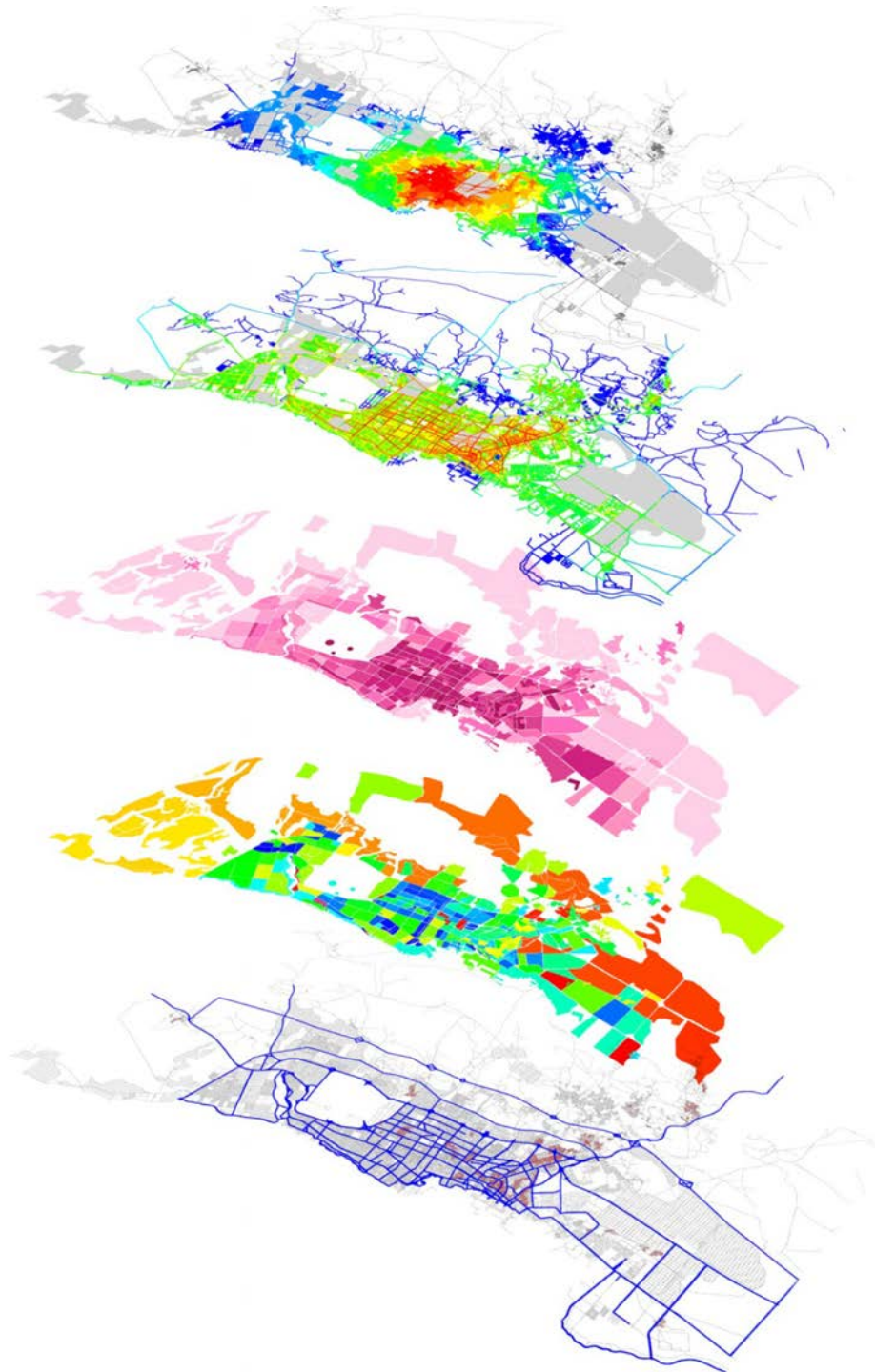


**Figure 18.** The view of cities as sustainable entities.



urban layers, but we should start from urban morphology, and this is the strength of this approach.

And finally, Integrated Urban Models (Figure 19). This is what we need to bring different aspects of the city and urban layers into one single model and try to complement it as much as we can.



**Figure 19.** The Integrated Urban Models.

## New Methods & Technologies for the Urban Analysis

Alessandro Melis

*New York Institute of Technologies*

I want to express my sincere gratitude for extending an invitation for me to participate in this conference. My primary objective is to explore the role that technology can play in our comprehension of urban evolutionary processes.

The relevance of this topic cannot be overstated, especially in the current historical context where we are grappling with significant environmental challenges. These challenges arguably represent some of the most profound obstacles our civilization has encountered since its inception.

To provide context for our discussion, I would like to draw your attention to a recent exhibition at the Italian Cultural Institute in New York (2022), in collaboration with the IDC Foundation and the New York Institute of Technology. This exhibition, co-curated by Christian Pongratz and Domenico Lucanto and involving a dedicated team of students, was titled "UpCycling." It focused specifically on the concept of ecocities, which explores the potential of creating inherently ecological urban environments. These are cities that can integrate biomass into their built environments, without adhering to the traditional distinction and rivalry between these two elements. To illustrate this concept, I've included images of three cities that were featured in the exhibition (Figures 1-2-3).

In fact, in contemporary times, we often perceive our planet as if it were a chessboard. The term "chessboard" serves as a metaphor frequently employed in traditional biological discourse to illustrate the contrasting roles played by humans and nature. With great consistency, we may also utilize this chessboard analogy to precisely differentiate, particularly in times of environmental crises, between the competing domains of the built environment and biomass. Therefore, when we contemplate this fundamental representation of our planet, characterized by the distinct boundary between water and land coexisting with a burgeoning population, we can gain an understanding of why we have started to view design, project planning, and architecture through the lens of photography. Some planners and architects can be still likened to photographers, capturing a frozen moment of the city at a particular juncture in its future. However, the limitations of this perspective have now prompted us to acknowledge the importance of portraying the ongoing, dynamic evolution of cities.

Such complexity cannot be encapsulated in a solitary image but can be more effectively conveyed through means such as animation.

Hence, a territory in perpetual flux and its relentless adaptation to environmental factors necessitate ongoing monitoring, rather than mere representation. This incorporates into the design process a concept borrowed from evolutionary biology known as 'niche construction,' underscoring the notion that within the biosphere, there are no static circumstances; instead, everything comprises an incessant interplay among human and non-human entities, living and non-living elements, all engaged in an unceasing effort to maintain an equilibrium of adaptation. "This is what is usually called resilience.

When contemplating the cities of the future, it is essential to grasp the global environmental challenges, recognizing that a simple depiction of change can be somewhat deceptive. For

instance, when we consider the projection of a two-degree temperature increase between the present and 2050 in our designs, we should move beyond the fundamental notion of designing for a static snapshot of the year 2050.

Instead of designing exclusively for a 2050 scenario, we should consider crafting a process of continuous scenario evolution, transitioning from A to B to C to D, and so forth. This approach mirrors our previous research efforts, where we aimed to comprehend how this perspective influences the urban landscape's forms and, consequently, their representation. We know that all the revolutionary phases in the history of town planning and architecture have also had an impact on the way we perceive and represent the city. As an example, the central perspective has been a pivotal tool in the conceiving of the design of the ideal city of the Renaissance, which emerged after the 14th century environmental crises.

Today, we find ourselves contemplating the means of representation and how technology can assist us in comprehending a world that becomes progressively more complex, continually challenging the boundaries of established definitions and disciplines. Given these considerations, incorporating 'processing and monitoring' into the term 'representation' in our discourse on design more effectively conveys the need for ongoing engagement with a phenomenon that evolves and unfolds unpredictably, in contrast to the frequently mistaken assumption of predictability.

What if we were to start considering these advanced representation tools as a more effective means of promoting health security, sustainability, and their impact on the policies of future low-carbon cities? Our recent studies on the food-energy-water nexus, which have received increased support from organizations like the Belmont Forum and other international research funding bodies, have underscored the necessity of adopting a more systemic perspective. Recognizing the potential for two problems to become an opportunity is paramount in our quest for sustainability today.

From a political standpoint, sustainability is frequently viewed through the narrow lens of energy-related issues. However, in the field of urban planning, there is a growing awareness that inequality is one of the primary drivers of environmental problems. Consequently, the need to develop a representation that allows us to understand these complex relationships is becoming increasingly significant today. This shift in perspective encourages us to perceive cities not only as our objectives but also as our laboratories, where we can devise strategies to comprehend the phenomena of both the biosphere and our society. In the past, research often resembled an ivory tower where members used their own languages, occasionally employing cryptic codes. This situation perpetuated the traditional image of the science laboratory, where standardized conditions were imposed to comprehend the phenomena being investigated, following a cause-and-effect logic.

During times of global crises, research is increasingly viewed as an opportunity to have an impact beyond academia, particularly in understanding the complex and sometimes challenging interaction between decision-makers and researchers.

In fact, every time we fail to provide a clear and direct explanation of our actions in the field of sustainability, we potentially contribute to the promotion of climate change denial or enable deceptive practices like greenwashing.

Numerous examples can illustrate the consequences of our inability to effectively communicate with stakeholders, particularly decision-makers.

Therefore, addressing this communication challenge is of utmost importance.

Integrated Decision Support Systems (IDSS), for instance, serve as tools that enable the transformation of complex data into comprehensible and manageable decision-making



processes.

Dataframe, the research work, as well as an artistic piece, presented at the Italian Pavilion in 2021, by Guido Robazza, Filippo Lovato, Gustavo Romanillos, in partnership with the team coordinated by Andrea Taramelli was aimed at effectively represent and convey this complexity, making it comprehensible and integral to the decision-making process.

The 'Water World' segment provides insights into water resources, consumption by country, and the extent to which each country's population is affected by water-related diseases.

The visual clarity and the graphic effectiveness exhibited here pertain to the domain of decision support systems, as it facilitates the comprehension of complex relationships, such as the water-food-health nexus.

Indeed, through data analysis, we come to realize that in the post-pandemic world, the primary health risk factor is not the potential emergence of a new virus, but rather the scarcity and accessibility of freshwater.

Simplifying phenomena can in fact lead to misunderstandings. Many diagrams depict for instance the Heat Island Effect as a result of high-density urban environments. But is this the reality? Through a study regarding the Auckland area, we've collected data that has led us to realize that the issue doesn't solely depend on the quantity of urban structures or the compactness of the city. Instead, it primarily stems from the characteristics of horizontal surfaces, including their albedo, especially in areas devoid of buildings. The most significant Heat Island effect issues are concentrated, for instance, in airport and industrial zones. In cities such as Auckland, Melbourne, and Los Angeles, the primary issues are not related to the urban infrastructure but rather revolve around the expansive artificial surfaces like asphalt found in low-density peripheral urban districts. In contrast, historic European cities have demonstrated a more effective response to the Heat Island effect, even under extreme climate change conditions. This insight prompted us to formulate a blueprint proposal for the post-earthquake reconstruction of Christchurch, New Zealand (University of Auckland, Studio Christchurch, 2014). We were tasked with the southern industrial district of the city, situated beneath the greenbelt of the city center.

In collaboration with Emanuele Lisci and Alexander Figg, we harnessed satellite data to craft a smart grid network with the goals of efficiently managing energy resources, diversifying the urban landscape, improving the microclimate of the city environment, and enhancing connectivity through upgraded walkability and alternative transportation options. Our project included the extensive deployment of solar panel arrays on warehouse rooftops, the collection of water through a large canopy, and the utilization of hydrogen batteries. Our findings demonstrated that this design could enable the production of renewable energies sufficient to recover the reconstruction investment within 20 years.

However, during the official presentation of our design, a city council representative expressed reservations, suggesting that the government might not be inclined to support an initiative that doesn't directly bolster the economy of existing companies, particularly those involved in motorway construction.

Another research project in New Zealand, led by Liam Stumbles, focused on the Spaghetti Junction in Auckland, provided an opportunity to employ generative design as a decision support system. The intricacies of the information guided a theoretical process facilitated by generative software, and our research question revolved around repurposing asphalt and built-up materials from highways for alternative uses. We illustrated how agent-based modeling could transform the embodied energy of highways into a different configuration.

Additionally, this project involved the design of a machine capable of performing this

transformative process, repurposing highway materials for purposes contrary to their original function.

The converted filament materials were utilized in constructing climate buffers during the renovation of existing buildings in Auckland. This served to reinforce their structures while creating devices that shielded them from extreme climatic conditions.



**Figures 1, 2, 3.** Examples of cities that can integrate biomass into their built environments, without adhering to the traditional distinction and rivalry between these two elements.

# URBAN MORPHOLOGY. Balance and perspectives.

## Plenary Sessions Closing

We concluded the Forward by revealing the underlying and ambitious objective with which we would have to deal during the conference. That of defining a new theoretical and methodological framework, a new "horizon of meaning" and new analytical tools, to understand the complexity of the city's transformation processes: "I believe that the important question is to define a sort of new universe of meaning", explained Alberto Ferlenga, "that is, reconstructing a knowledge that is placed within a knowing activity that has limits much older, starting at least from Alberti, and which feeds on the great changes in history". In other words, it is a matter of building a renewed morphological discipline capable of intercepting the needs of the globalized society and translating them into physical forms.

But the reconstruction of knowledge necessarily starts from the reconstruction of a "point of view", without which any information is sterile and useless for the purposes of re-establishing a true disciplinary corpus. To this end, the conference defined some research and discussion "tracks".

We talked about communities as the new dynamic actors in the construction of the city. Raffaele Laudani gave us an effective and detailed picture focusing on the problem of their governance. Today the Civitas appears to be the true protagonist of the urban scene, apparently relegating the Urbs to an ancillary role with the emergence of new urban neighbourhoods as new units on which the contemporary metropolis is formed, as new Oikos through which define and recognize the different urban communities.

We talked about the great social changes brought by the digital revolution and how it is radically transforming our cities but in the awareness that is the Thought that must understand its coordinates and consciously guide its trajectories. We spoke, therefore, about the new methods of urban analysis, not only from an instrumental point of view, I am thinking for example of the words of Kayvan Karimi, but also and above all ontological. Different readings of the city can, in fact, offer us "different cities". They can highlight elements and characters once considered secondary, "invisible" to urban analysis but today bearers of meanings structuring society and the contemporary city. Elements through which a society modify the form of the present city adapting it to new needs. Alberto Ferlenga still remembers, "we have always lived differently in previous cities and the future has always been nourished by the present". New methods of urban analysis and new tools, therefore, as result of ongoing socio-cultural and economic changes, can contribute to the identification of those coordinates and trajectories of change that Thought is called upon to signify.

Finally, we talked about environmental challenges and how to metabolize them within a new disciplinary corpus for Urban Studies. Elena Koch enlightened us in her essay on "Understanding cities: from the analogy to the human".

The latent theme of all the work was therefore the need to define a renewed dialectic between knowledge and project, between knowledge of the city and the project of its transformation. What for years has characterized the combination of analysis-synthesis and the difficulty of passing information and choices from one to the other must necessarily find a new definition.

The fragmentation of knowledge, typical of modern man, has entered into crisis, the plans of scientific research are rapidly changing, opening up new dimensions of knowledge aimed at apparently upsetting the traditional logical-compositional processes.

The themes that emerged highlight the focus of some concepts around which, from now on, we believe, the process of renewal of the Italian urban studies tradition, which is the basis of this conference, will have to be started.

The first concept is undoubtedly that of the City, its definition and the role that architecture can play within it: that of a "desperate beauty abandoned in a dystopian archeology of the

present?", asks Carlo Quintelli, or that of "wise builder of those spaces, of those relationships, of that beauty?". The city is certainly a "human thing par excellence" wrote Claude Levy-Strauss many years ago and as such it represents perhaps the most characterizing element of the new metropolitan realities. Franco Purini recalls: "It is the superstructure that determines the structure, it is the ideas that modify reality; therefore, when we read about a city we must go back to the genetic superstructures of the latter, to the human wills that started the processes of creation. Without an interpretative model, in fact, it is not possible to grasp the true meaning of what you are looking at.

To interpret the city we must have, in other words, a pre-judgment, or rather an "empathic model of knowledge" which is the only one that can allow us to proceed with an urban analysis that is truly human". To better understand the concept it would be appropriate to complete the definition of the city that Claude Levy-Strauss gives us: "Object of nature and subject of culture, individual and group, lived and dreamed, human thing par excellence".<sup>1</sup> The city as a moment of synthesis of the human being, as place of collective identity and personal identification, as experiential and memorable reality, as great narrator of that history of men called Anthropocene: "Reality in the absence of an attentive eye that interprets it critically is nothing, (...) it is empty and indeterminate", adds Luigi Franciosini, "In order to become a teaching, it needs a critical exercise, only in that moment reality changes and becomes "true", understandable, readable by man. This is especially important when talking about the form of the city, the soil and the geography." Because the form of reality is always a "semantic form", bearer of meanings, stories, narratives and ultimately, values.

"Are we still able to reflect on these values?" continues Franciosini "I think that architects must rediscover the ability to observe things, from multiple points of view, broadening their gaze to poetry. Poetry is always, in fact, an opening of truth, it captures the issues in an authentic and at the same time, synthetic way. But the project is also a synthesis". We cannot talk about cities without talking about projects. The conscious project of the city is, perhaps, the instrument of knowledge that anticipates (and follows) the reading itself. It is the a priori of any cognitive experience of an urban organism and the a posteriori of knowledge itself. "It is an instrument of pre-vision, pre-figuration and pre-judgment on the city", recalls Carlo Quintelli, "We live today in a clear condition of heterotopia". But heterotopia is what is furthest away, upon closer inspection, from any idea of the city: "Utopias console; in fact, if they have no real place, they nevertheless open up in a marvelous space (...) they open up cities with vast avenues, well-planted gardens (...). Heterotopias are disturbing, they secretly undermine language, (...) they break and tangle clichés, they devastate syntax and not only the one that constructs sentences, but the less obvious one that makes words and things "hold together". This is why utopias allow fables and discourses: they are placed in the straight line of language, in the fundamental dimension of the fabula; heterotopias dry up the discourse, block the words in on themselves, contest every possibility of grammar, unravel the myths and make the lyricism of the sentences sterile".<sup>2</sup> This is why the heterotopic city is not, in fact, a city. The city, "human thing par excellence", needs syntax on which to base itself; it is made of "fabrics", material and immaterial, which hold it together; it is made up of narratives, languages, "fabulae and clichés", without which it loses the ability to transform and look forward, giving itself, from time to time, new perspectives; it loses the very ontological foundations of its existence. For this reason, Quintelli concludes, "a different vision of the utopia for the city must be regained." To do this,

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<sup>1</sup>Levi-Strauss, C., (1968), *Tristi tropici*, Il Saggiatore, Milano.

<sup>2</sup>Foucault, M. (1966), *Les Mots et les Choses (Une archéologie des sciences humaines)*, Gallimard, Paris. Trad. It. (2016), *Le parole e le cose. Un'archeologia delle scienze umane*, Rizzoli, Milano.



however, "it is not enough just to exit the apse and go to the churchyard, to get to know the city you must then return to the apse from the churchyard" in order to fix the experience and translate it into new awareness. An awareness capable of "situating oneself" as Lucia Latour would have said, recalls Orazio Carpenzano, or rather "understanding what are the interdependent variables of culture which in the meantime have gradually taken over and which have defined a palimpsest, in which it is necessary to trace both the reasons for some survivals, both the reasons for some roots and those of some overcomings". Among these variables certainly figures that "value of presence" that characterized the very first experiences of urban analysis. Both Muratori and Bill Hillier, apparently so far, begun their work by walking around the city, watching the buildings, looking at the streets and seeing what was happening inside urban spaces, trying to understand the "plastic value" of that dynamism that is the city as "human thing par excellence". In this regard Jeorg Gleiter writes provocatively: "Architecture is a function of time, more than space" and "the Urban Morphology is the embodied dimension of time". The present is thus cancelled, because it has a past behind it (now almost remote) and a future ahead which is often redefined, foreseen, even predicted, through an incredible quantity of interpretative models translating, in fact, this prediction into present evaluation tools. Today, in environmental issues, for example, this is extremely frequent. Mathematical models are created to say what will happen in 2050 or 2070. But the moment a future is "modelled" and we act in the present in response to this model, it ceases to be "future", becoming even "past", or rather, a "prior future".

The times of daily life and therefore of the city are changing. The new tools of Urban Morphology must necessarily take into account this renewed (and complex) "temporal" dimension of the city and of the society. They must be able to understand it, interpret it and translate it for the project. Luigi Franciosini writes again: "Igor Stravinsky, on composition, states that we must look for the "similarity of things", and therefore interpret, observe, study, analyze, (...) there is a scientific part that meets the synthetic one and in the synthesis it directs its action. But the similarity of things must be sought by renouncing the "seduction of variation." The latter poses easy, immediate and temporary solutions, while similarity proposes more difficult and longer solutions but with more valid and long-lasting results". Scientifically based solutions on which to ground the project of the contemporary city.

However, the true place of the urban Oikos is the public space. Many of the texts collected in this volume deal, directly or indirectly, with public space. It is the first place of knowledge of the city, it is the place where the Urbs and the Civitas come together in their maximum expression, where the city is truly "lived and dreamed" and finds that "recognizable form" of which Gino Malacarne talks about, "capable of making a synthesis between utility and beauty". But, before anything else, urban public space is the preferential place from which to start the city project.

The need for a renewed unity of vision of the analytical and design tools for the city and the landscape is another focus developed during the conference. The concept of landscape has been discussed for decades and this is not the place to reopen that debate, but certainly the idea that "city and countryside are part of the same landscape"<sup>3</sup> which unifies them "becoming simultaneous in the spatial image, (...) in the ability that they have to give us back, in the heart of the present, the intense succession of their past"<sup>4</sup> is strongly decisive. The incredible technological-digital development of recent years seems to push, moreover, towards a new

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<sup>3</sup> Petruccioli, A, (2006), John Brinkeroff Jackson. A proposito dei Paesaggi. Dodici saggi brevi, ICAR, Politecnico di Bari, Bari.

<sup>4</sup> Assunto, R., (1973), Il paesaggio e l'estetica, Giannini, Napoli.



centrality of man, a sort of Digital Humanism, tending to simplify, reduce and above all unify the tools of human action towards an almost pre-modern dimension of everyday life. A few years ago, Peter Buchanan wrote an interesting article with the eloquent title "Back to the Future" in which he precisely investigated this progressive return to a holistic dimension of life (and the city) thanks to the digital revolution.

If the primary objective of modern scientific-technical progress was, in fact, that of providing man with tools capable of simplifying and speeding up anthropic processes, digital growth pursues the same goals, with more efficiency, reducing, up to cancel them, every device. It is the return to a "pre-modern physicality" of life and the city, through digital technologies.<sup>5</sup>

It is scientific research, with its ability to read those phenomena of complexity, dynamism and resilience, which characterize every aspect of urban life, that opens up new dimensions of knowledge aimed at transforming traditional logical-compositional processes.

It is the world of knowledge that plays a decisive role, not only in the understanding of urban phenomena, but, above all, in the ability to define new "horizons of meaning", new syntaxes, and new "utopias", for the construction of the city of the 21st century. Designing the city of the 21st century requires then a broad scientific awareness, capable of dynamically understanding its phenomena, "historically establishing them" and "semantically translating them", into a new form. A form that is changeable and complex in its contents, but simple in its syntax finding, from time to time, its own meanings "always the same and always different", within a single creative and knowledge process. Urban Studies will have to become active and aware interpreters of all this.

Marco Maretto

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<sup>5</sup> Buchanan P. (1994), Back to the Future, in Canadian Architect, 39, 3 and (2015), The Big Rethink, in The Architectural Review, September.



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**N** | *New Methods & Technologies for the Urban Analysis*

**R** | *Reading the Changing Urban Form*

**D** | *Design a Sustainable Urban Form*

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## Type, Rule and Exception

Michela Barosio<sup>1</sup>, Martina Crapolicchio<sup>2</sup>

<sup>1,2</sup>Dipartimento di Architettura e Design. Politecnico di Torino. Torino. Corso Mattioli, 39. 10125 Torino.

E-mail: <sup>1</sup>[michela.barosio@polito.it](mailto:michela.barosio@polito.it); <sup>2</sup>[martina.crapolicchio@polito.it](mailto:martina.crapolicchio@polito.it)

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Conference theme: *Communities and Governance*

**Abstract.** *The evolution of the urban form and structure reflects the generative processes of the city morphology which is strongly influenced by political, social, cultural and economic factors (Caniggia, Maffei, 1983). Following this approach, the present research is grounded on the concept of transitional morphologies (Trisciuglio et al., 2021) stressing the continuous character of the morphological process. The research aims at improving the awareness of the transitional mechanisms and attempts to drive them to improve urban governance and urban quality. The specific case studied presented here consists in an operative investigation committed by the municipality of Rimini asking for the definition of a new set of urban codes. The new regulations are intended to manage the urban transition of the historical city centre in coherence with its urban morphological characters but to encourage a limited development of the consolidated and morphologically homogeneous urban fabric of the district so-called Borgo Mazzini. The objective is not to replicate existing forms but to apply the morphological types selected by the transitional process as parameters for future developments. In this sense, both ordinary types and urban exceptions become generators of the rule and measure of urban design. The research aims at setting flexible and interactive urban codes based on the dynamic interaction between form, rule and time. In this perspective, integrating the principles of administrative and private law is essential to define a new paradigm able to manage and respond to unforeseen and unpredictable urban dynamics (Bergevoet, van Tuijl, 2016).*

### Transitional morphologies and urban codes

Urban morphology studies mostly focus on sequences of morphological stages (Muratori, 1960), analysing the differences between the initial stage and the final one. However, the study of the dynamic of changes in urban form, focusing on incremental metamorphosis/assemblages of urban elements and spaces, not only on specific stages, but on continuous dynamics connecting the single steps in between, can make an important contribution to the field in operative terms. In this frame, the transitional approach to urban morphology can support urban morphogenesis, urban regeneration processes, design processes and decision making systems processes as well (Trisciuglio et al., 2021). The *Transitional Morphologies Joint Research Unit*<sup>1</sup> tries to overcome the merely analysis of the permanent elements of the city, seeking for a transitional paradigm in urban morphology, aiming at grasping the dynamics in urban evolution and providing operative tools for urban regeneration design through an adaptive approach (Trisciuglio et al., 2021).

In this sense, considering the post-industrial city as the main focus of urban regeneration processes of the last decades, it is urgent to set a methodology, in the frame of morphological analysis studies, able to grasp the transitional character of urban phenomenon to and interpreting the above mentioned post-industrial city as a stage of a continuous transition in urban form and not as a final step. In this perspective urban regeneration processes can be based on impermanent configurations originating from the historical traces and types, anticipating future morphologies people centred. To implement this approach there is a need for regulatory tools enabling multiple scenarios according to the dynamic growth of the city (Barosio, Di Robilant, 2020). Urban codes, affecting the design and placement of buildings, streets and public spaces, have a profound influence on urban form (Marshall, 2011) and they are part of the 'hidden language of place-making' (Eran, 2005). They have a direct influence on 'the structure of the ordinary' – where ordinary connotes something not insignificant, but rather something representing the vast majority of the urban fabric (Eran, 2005). In recent years the significance of urban codes has been brought into sharp focus, as incumbent instruments ripe for reform, or new tools for shaping the future (Talen, 2009). Within the field of urban morphology, the relationship between form and codes is a debated issue. Urban morphology within a geographical and historical tradition focuses on the objective, rigorous and systematic description and explanation of the city (Oliveira, 2021), while urban code 'was primarily in support of an urban vision' (Dutton, 2000). The present research uses the typo-morphological analysis to highlight parts and components of the built environment as well as their arrangement, thus establishing what variations and changes are possible in the urban environment. The objective is to formulate guidelines to forecast urban development from the observation of the urban dynamic presently going on on the site.

This research on the relationship between urban morphology, transitional morphologies and urban code, found an ideal case study in the collaboration, started in 2020, between the Municipality of Rimini and the *Transitional Morphologies Joint Research Unit*. The opportunity was given by Emilia Romagna Regional Law no. 24 of 21 December 2017, which envisaged simplifying the legislative system of territorial government by merging municipal plans (Municipal Structural Plan, Operational Coordination Plan and Building Regulations) into a single General Urban Plan by 2023. The approval of this law led to a virtuous political process in the city of Rimini that, first and foremost in the figure of the former mayor<sup>2</sup>, focused on promoting urban regeneration through the drafting of the General Urban Plan. In this context, the role of the

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<sup>1</sup>The Transitional Morphologies Joint Research Unit is a research group founded in 2018 between Politecnico di Torino and South East University of Nanjing.

<sup>2</sup>Andrea Gnassi was mayor of Rimini for two terms, from 2011 to 2021.

research conducted by Transitional Morphologies Joint Research Unit is to develop guidelines that allow the formulation of innovative urban codes (General Urban Plan), able to trigger urban regeneration mechanisms, based on the concept of continuous evolution of building types and urban morphology.

The research is focused on the study of Rimini's historic centre, its structure and composition in terms of formal evolution and regulation development. The morphological relationships emerging from the analysis of the historic centre ground the definition of the transformative potential of the site as well as the starting point for formulating guidelines for the development of consolidated urban fabrics. The formulation of guidelines has to deal with the so-called *ambiti consolidati* which in Italy are the subject of Article 17 of the Ponte Law, which specifies that if the urban agglomeration has a historical, artistic or particularly environmentally valuable character, only consolidation or restoration work is permitted, without volumetric variations. Despite numerous variants of this general law in force throughout Italy, local regulations (part of the hierarchical regulatory system) are referred to for the protection of these assets. This regulatory trend demonstrates a general tendency towards conservation with absolute regard for the undisputed protection of artefacts. The regeneration of historic urban fabrics is a complex operation in discordance with existing regulations. This system does not have a solid track record of consistently producing high-quality development. It sometimes succeeds in blocking the construction of the worst projects, but, with the exception of a small number of exemplary planning authorities, it tends not to be proactive in ensuring high-quality urban regeneration. In this context, two main questions are arising. How to formulate transformative guidelines for the historical centres? What role does urban design and planning can play in urban regeneration processes within historical contexts?

The topic's discussion is structured around three main points: starting with the analysis of the relationship between urban form and regulation in the context of the urban regeneration of Italy's historic city centres, the case study of 'Rimini as a laboratory' introduces then the investigation methodology based on the dialogue between academia and municipality, as well as the main objective of the study and the operation carried out to analyse the historical centre, and finally the focus on the topic 'Toward a dynamic growth: the case of Borgo Mazzini' shows a specific example of the possible operative outcomes of the coding methodology set by the research. Measurements and analyses of data on the urban fabric arranged in-line with a focus on urban design as a research tool, are displayed and a matrix based on the urban morphological analysis allows to investigate the rule as a guideline and to propose adaptive regulation vision for urban regeneration of compact historical urban fabrics. The analysis of limits, opportunities and open questions of the study concludes the discussion.

### Rimini as a laboratory

Rimini is a privileged field of observation because it is an opportunity to examine an ongoing process and to connect the links between theory and practice. Launched in 2020, the dialogue between the Transitional Morphologies Joint Research Unit and the city's municipal administration has allowed for an intense exchange of useful discussions to guide the research. Firstly, the mayor's urban vision of promoting the historic centre as a focus for urban development initiatives has allowed for a look back at a part of the city long forgotten in favour of the more productive seaside area. In this sense, the realisation of numerous projects for the redevelopment

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<sup>3</sup>Literally, consolidated areas, i.e. settlements or parts of settlements with notable or valuable characteristics, these include historic centres.



of public spaces has triggered the administration's desire to incentivise private initiative, with the formation of the new General Urban Plan, in order to restore a coherent image of the city (Lynch, 1960). Secondly, continuous communication has given access to numerous documents and cartographies useful for the diachronic study of the urban development of the historic centre from a descriptive perspective in the formal sense. The location administration had two main expectations from this collaboration: to promote private investment by increasing building capacity and to preserve local identity, which we suggested to do by enhancing the type-morphological structure.

The research is structured in four main study phases. First, the analysis of the evolution of the urban fabric of the historic centre to trace the permanences and permutations in the urban layout. Subsequently, the identification of formal clusters in today's urban fabric, which are useful regardless of the functional classification into built protection zones. Thirdly, the analysis of each cluster through a study sample with the definition of a flexible urban design. Finally, as a result, the setting up of a synoptic matrix for the definition of urban guidelines. The current image of the city of Rimini, especially of the historic centre, is the result of the overlapping of several processes that define the territory as a palimpsest being progressively reworked (Corboz, 1983). From this assumption, the analysis of the evolution of the urban fabric has revealed the presence of elements that remain in the different spatial configurations of the city through time. The structuring components of the current urban form derive from the composition of the street layout, the shape of the wall system, and urban expansion in three main directions. The street layout is a legacy of the Roman settlement, in fact it presents the typical *cardo-decuman* formation (Gobbi & Sica, 1982), i.e. two perpendicular streets at whose intersection is the main market. The streets, therefore, dictated the urban development in four main portions with development in closed blocks. The wall system also derives from the Roman foundation, but these have undergone several expansions over the centuries, especially during the Renaissance when they were enlarged to contain new buildings of power and worship (Castello Sismondo and the Malatesta Temple by Leon Battista Alberti). However, the last arrangement of the city enclosed by walls is represented by the first cartographic evidence of Rimini: the Gregorian Cadastre of 1811. From this date onwards, the expansion of Rimini took place in three main directions (north, south and west) in which the three extramural districts of historical interest (Borgo San Giuliano, Borgo San Giovanni and Borgo Mazzini) were formed. From the reconstructions and cartographies it is possible to read the changes in the city that evolved from a core surrounded by walls to a centre surrounded by extramural districts (Fig. 1). Today, the normative boundaries are considered to coincide with the historic core delimited by the path of the ancient walls and the three districts outside the walls. The street layout, the system of the walls and the three expansion districts were key components for the identification of formal clusters within the current urban fabric (Fig. 2). The clusters are defined as aggregates of buildings with similar morphological characteristics (e.g. a grouping of typologies belonging to the same matrix, such as the courtyard house). The grouping into clusters does not depend on the function or on the regulatory zoning but on the analysis of the evolution of urban fabrics that has defined the structuring elements of the city. Thus, the compact and dense urban fabric with blocks and stratifications (Identified as Cavour) owes its configuration to the road system of the Roman foundation. Just as the district of special buildings (named Alberti) and the urban fringe fabric (Tiberio) that is morphologically generated by previous elements (such

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<sup>4</sup>It should be specified that after the construction of the railway that divided the territory and the city into two parts, there was a break in the continuity of the landscape and also of the management of the two urban halves. In this paper we deal with the historic city and the expansion towards the hinterland.

as walls, rivers, etc.) are morphologically generated by the presence of important landmarks of power and worship and by the shape of the walls. The last two clusters refer to the expansions of the 19th century: the districts outside the walls are made up of urban fabric with buildings in line and row houses (Mazzini), regular patterns with irregular skylines (San Giovanni). For each morphological cluster, a sample was identified in order to be analysed in depth and in order to set experimental guidelines which can then be extended to the whole cluster because of its morphological similarity. In particular, the analysis focuses on the study of urban transition (Fig. 3), in order to identify permanencies and permutations. The result of each analysis allowed us to conduct planning considerations and to hypothesise possible regeneration steps and development guidelines, through the use of the project as a research and forecasting tool. In order to understand the kind of work conducted, one of the five study samples, located in one of the outskirts districts, Borgo Mazzini, is presented in the following section.

### **Toward a dynamic growth: the case of Borgo Mazzini**

The analysis of the study sample called Borgo Mazzini includes an in-depth study of a research area located in Via Lavatoio. This part of the sample has the greatest evocative and representative capacity of the urban fabric arranged in line with row houses.

The analysis has been summarised in three main steps. First there is a framing description that provides general information on the area; then there is the morphological analysis with the identification of repeated and special characters through the study of transition and the drafting of a typological abacus; a design hypothesis closes the analytical part in order to return a possible scenario of urban renewal and regeneration. An overview of some limitations or critical issues of the study concludes the analysis phase of the study sample.

#### *Urban context analysis*

*Borgo Mazzini* is an extramural agglomeration in which buildings are arranged in rows and face three main streets (from north to south: Via Montefeltro, Via Lavatoio and Via Aurelio Saffi). Until the end of the 19th century, being located on the outskirts of the city, it was not only a place of passage and trade, but also a working and service district. Unlike Borgo San Giovanni, which was the gateway to Rimini in direct communication with Rome through the Via Flaminia (continuation of the *cardo*), Borgo Mazzini was the gateway to trade with the countryside (continuation of the *decumano*). The imprint of a workers' district can be seen in the buildings that make up the district. While near the crossroads of Rimini's main thoroughfares the buildings are five-storey fourteenth-century palaces, in Borgo Mazzini the buildings are mostly single-family houses of modest size. The façade solutions are varied, but feature poor materials such as plaster or brick. Today, the district forms a filter zone between the historic city and the modern expansion inland. In fact, the boundary of the ancient walls is marked by the presence of Porta Montanara (one of the entrances to the historic city) and the westernmost part of the district is characterised by modern buildings rebuilt after the bombings of the Second World War (Copioli, 1982).

#### *Morphological analysis*

The layout of the district changed several times with the various waves of extramural urbanisation. Starting with the 1894 cartographic representation, the urban agglomerations of Borgo Mazzini densified and compacted with the fronts on the three main roads. The relationship between fronts and streets is evident as the layout of the buildings over time tends to stick to the perimeter of the blocks, leaving the internal space jagged between property boundaries. That the streets in this district represent an important polarity is shown by the opening of two new streets in the

northern blocks. Traces of these are still evident nowadays. The research area today presents a significant morphological aggregation consisting of a terraced arrangement of building types, i.e. two or three storey terraced buildings arranged along the street. It is a residential area with sporadic commercial establishments (e.g. restaurants, bars, hairdressers, grocery shops, etc.) on the ground floor. The blocks are not as compact as in the city centre. In fact, despite changes over time, buildings have been arranged along the perimeters of the blocks, leaving the inner courtyards as service spaces. Some courtyards are used for parking cars, others are empty and still others are fenced off. There are several visible entrances open to the outside, not private. There is no real morphological hierarchy of the three streets branching off in Borgo Mazzini, as they start from Porta Montanara. The variation in heights is not significant. Most of the buildings are two-storey residential (maximum five or six rooms) with different colours, which together with the ornaments represent the unique character of each house. Although Borgo Mazzini was in the past an agglomeration full of different activities, the form of the buildings is not very specialised in terms of building types, mainly terraced buildings with a rear courtyard are to be found. The particular building of the church of San Gaudenzio and some post-war buildings (thus detached from the urban morphological context) certainly stand out, but permanent terraced houses are the most widespread type. Particularly in the analysis of Via Lavatoio (east front) the housing units are distinguished by the number of floors and the material solutions of the façade. Looking at the floor plans, however, the layout of the property boundaries is not linear, but rather the regularity of the fronts is interrupted and fragmented in the setbacks and common spaces (Fig. 4).

#### *Dynamic growth*

In recent years, the concept of 'growth' has undergone a profound transformation, becoming the subject of careful analysis and redefinition (Wu, 2015). In urban planning and architecture, growth is a controversial concept, which has often generated phenomena that are difficult to reverse to the detriment of the territory and its values (Marshall, 2011). The concept of dynamic growth, which might appear pleonastic, is functional to setting innovative planning tools able to drive the growth of the city not to a specific stage but more to frame the growth into a last lasting dynamic process. Therefore to reproduce and project urban growth, dynamic modelling is needed to quantify the spatial and temporal patterns of urbanisation (Feng, 2022). The concept of 'dynamic growth' in the context of Rimini's historic centre is used to define a development programme for the Borgo Mazzini area, to define a path more than a final stage to achieve. In order to allow the urban regeneration and development of this specific cluster, the design hypothesis (based on morphological analysis) forecasts a progressive growth of buildings' height in relation to the adjacent building. The reasoning is concerning the eaves line. Given that the maximum height of buildings in this area should not exceed 5 storeys total (so about 24 metres high), a building can grow one storey higher than its taller neighbour. This strategy could preserve the variety of façade solutions and the homogeneity of the neighbourhood skyline as well, while encouraging private investments by allowing volumetric enlargements of the existing buildings (Fig. 5).

The approach presented so far certainly shows the potential for action on compact urban fabrics in search of possible improvements. However, it presents some limitations and critical issues to be deepened and investigated. Conflicts at the administrative level involving private law may arise in order to start a dynamic growth process. If a building in an in-line urban fabric does not belong to a single owner, conflicts of interest and lengthy legal processes may arise before a compromise is reached. Furthermore, it is important to understand how to stimulate

the triggering of such growth, which means that it would be useful to find a range of incentives to allow the process to begin. In addition, it is necessary to define a time window in which to consider requests for growth. If, for example, one unit requests the technical offices to grow by one floor compared to its taller neighbour, and the latter has a growth process underway, there is a conflict in terms in the construction of the guideline. This raises the question of whether urban coding can still play a role in contemporary urbanism, being able to capture some of the positive qualities of urban character while avoiding some of the disadvantages of conventional planning (Marshall, 2011).

### **A rule-generating matrix**

The division into five morphologically homogeneous clusters is a necessary operation to distinguish and analyse the diversity of Rimini's historic centre. In the inter-scalar reasoning, or sometimes in this trans-scalar analysis, the samples analysis is functional to verify whether the reasoning conducted a priori can be applied more or less effectively to the existing urban fabric presenting the same characteristics. Therefore, it is possible to set up a possible preliminary matrix (Tab. 1) to define the knowledge base to reformulate and sometimes go beyond the existing rules through the setting of guidelines. The synoptic matrix reports the morphological requirements of the intervention areas (IF), the possible actions on the urban fabric with the subject that can carry out the regeneration actions (IS ALLOWED), the benefits for the subjects involved (ADVANTAGES) and finally a draft of the quantity of the operations allowed in each situation (LIMITS/QUANTITIES). Reading the matrix which regulates the Borgo Mazzini area (and the sample of Via Lavatoio) the criteria of row housing's alignment on the street is a funding principle. Given this requirement, the owners are allowed to increase the building capacity of surfaces and volumes by addition, preserving the original building typology and its imageability (Lynch, 1960). The elevation of buildings is allowed through a dynamic index that is regulated by the height of the tallest adjacent building, with a maximum height of five floors above ground. The five storeys above ground as a constraint allows for an optimal relationship with the street and the buildings on the other side. Volume additions on the façade are permitted as long as they respect a maximum projection of one metre and do not occupy more than 20 percent of the façade. Volume additions on the ground floor are not permitted in order not to occupy public land. And lastly, volumes added to the existing roof can be partial or total in relation to the outline, for residential use and can include a dormer window. The benefits are twofold. Concerning the urban quality this measure favours urban regeneration while preserving the identity of places. Concerning investors and owners, the possibility of increasing the volume or surface area of the building increases the rentability of the properties. The guidelines for Borgo Mazzini, moreover, suggests an overall vision of indicators, which are used to rule quantities and limits of intervention not referring to absolute dimensional limits but in relationship to the progressive process of regeneration, to the transitional morphogenetic process.

### **Conclusion**

The methodology developed in the frame of the research, consisting in a set of form-based codes based on morphological analysis of the urban pattern, presents a high potential to be generalised to other contexts. As the form-based code proposed consists in a matrix summarising formal abacus, formal and dimensional criteria as well as suggested transformation's criteria strictly based and related to the morphological analysis of the site, these elements can be easily re-formulated for other historical cities centres. The main advantage of this process is that all the recommendations, all the codes' elements, are site specific and therefore able to foster

and promote local identity. More generally, the presented approach is suitable for any consolidated urban fabric as the main requirement is to have a preexistent built environment with a recognizable imageability to inform the abacus of the form based code. In this sense the methodology can drive not only the transformations of the more representative and symbolic part of the city, such as the historical city core, but also the regeneration of the more ordinary or peripheral areas recognizing their different urban role (expansion axis, outskirts, satellite suburbs, etc.).

The control capability embedded in this methodology has to be questioned. From a quantitative point of view the strategy matrix based on morphological abacus is not able to precisely control the building expansion as it allows multiple forms of expansion quantitatively related only to the closer building and therefore variable in time. Conversely, from a qualitative point of view the mechanism of the dynamic growth controle is able to ensure a quite effective control on the qualitative aspect of the city morphological evolution. Driving the transitional process of expansion of the built units maintaining both the homogeneity of the skyline and the volumetric alignment on the street, as well as the typological pattern, the matrix based code is a powerful tool to allow multiple scenarios to occur but all of them within a common frame of given morphological relationships.

Even if the outcomes of the research, namely the coding matrix but also the morphological in depth classification and analysis, had an important impact on the municipal staff in charge for the new town plan, it is still difficult to identify possible law displays to include those guidelines into the building permission process.

For these reasons, challenging future perspectives of this study would be to develop interdisciplinary research bridging urban design with public law and with parametric design. The field of public laws can help in developing specific regulatory instruments, supporting urban codes dealing with dynamic and non absolute criterias based on morphological types, while parametric design approach would offer effective digital tools to visualise and simulate the morphological multiple outcomes of the dynamic regulation of urban growth.

On a more disciplinary side, it might be interesting to test the morphogenetic approach combined with dynamic urban code to non consolidated urban fabric, such as the urban sprawl, or even to the generative process of new urban developments to test the potential of this combined approach in driving generic morphogenetic process not only related to historical consolidated urban fabric.

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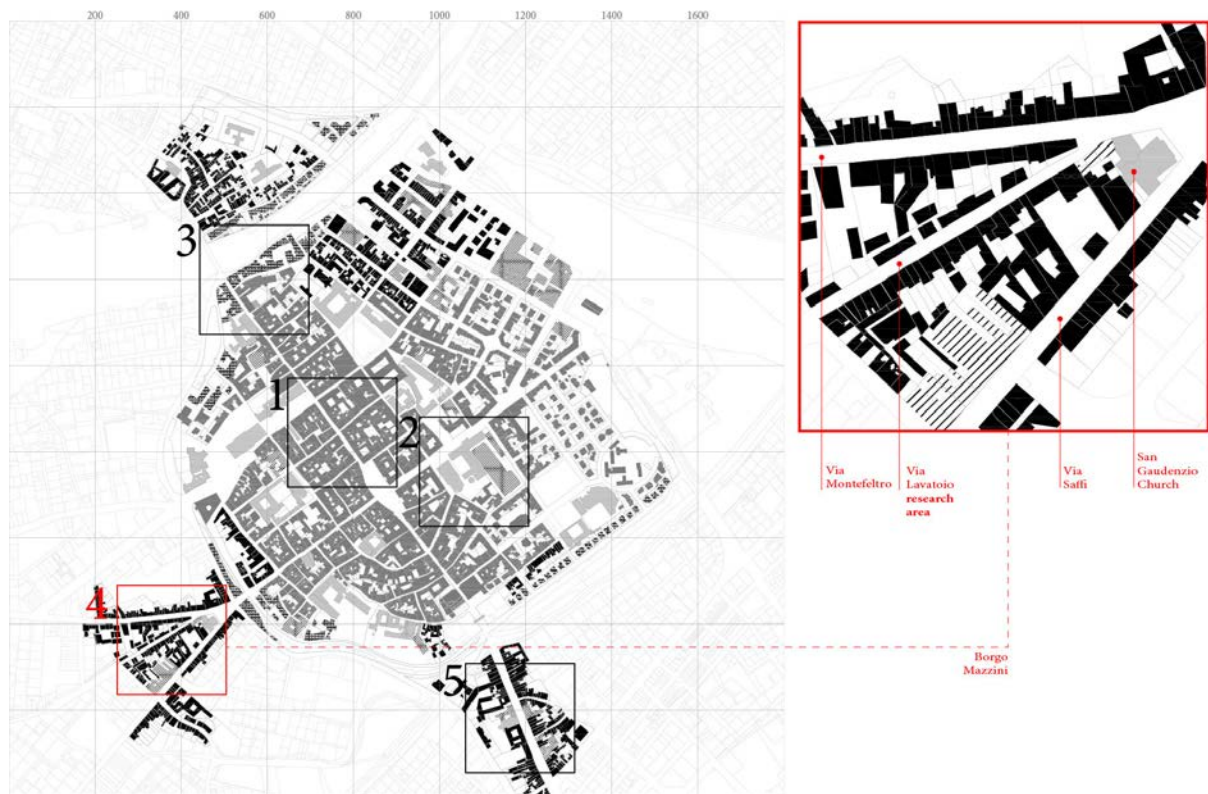


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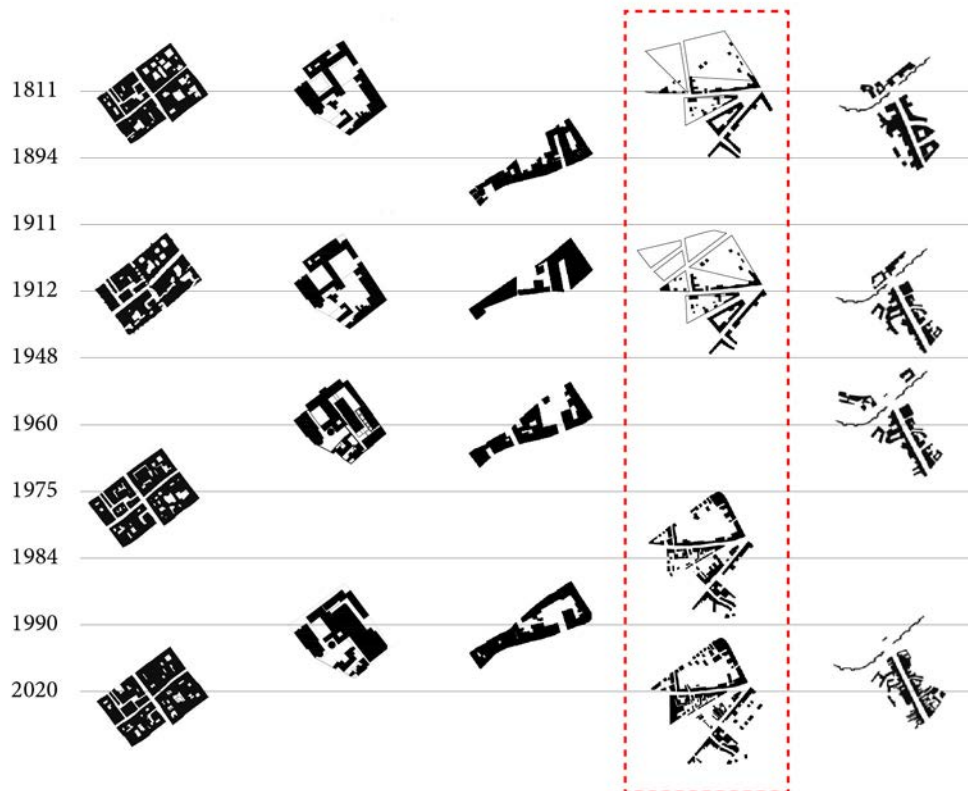
## Illustrations and tables



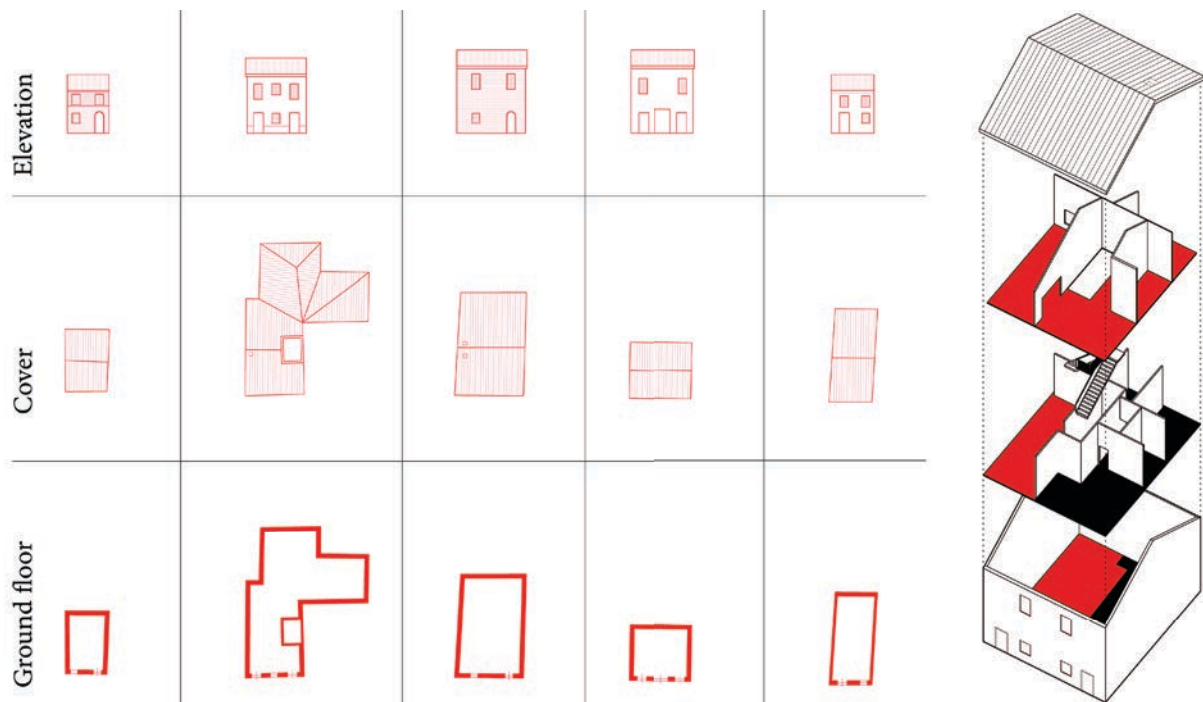
**Figure 1.** Overlay of the Roman layout (red) and the layout of the Renaissance walls on the redrawn cartography of the Gregorian Cadastre. The urban permanences present over the centuries are highlighted.



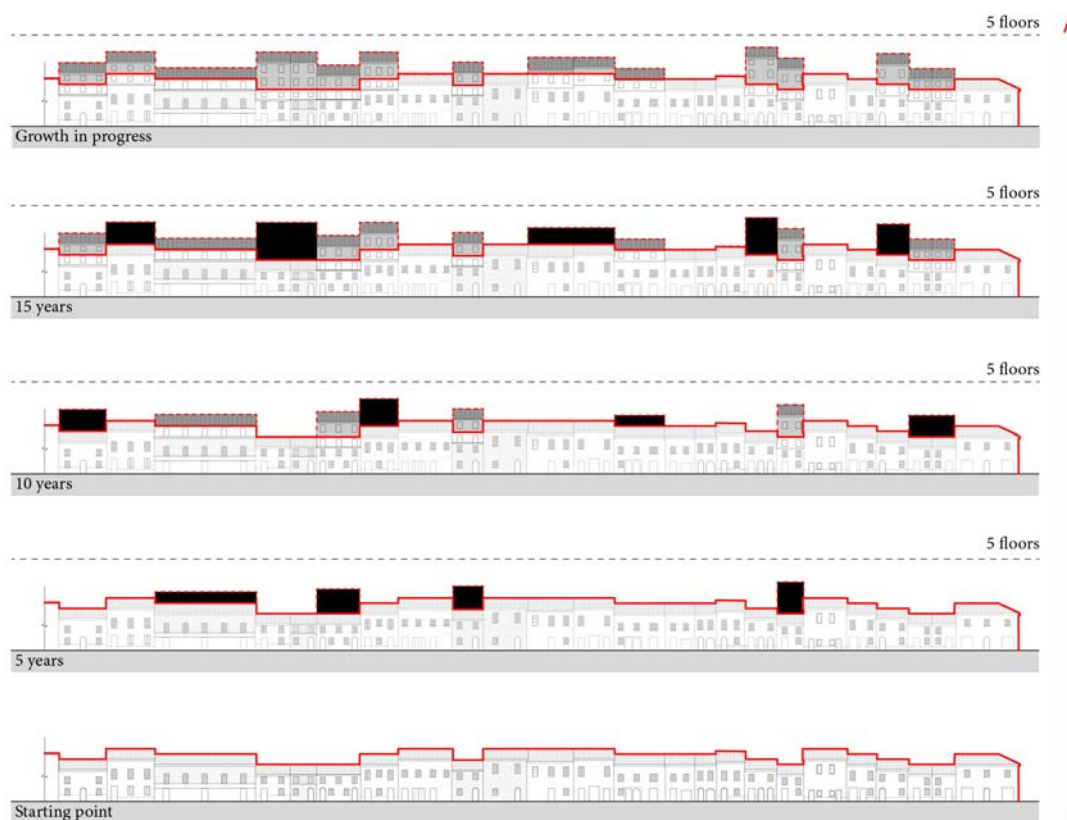
**Figure 2.** Historical Centre of Rimini with the identification of five morphological clusters and zoom in on the research area presented in this article. 1) Cavour - Morphologies of compact and dense urban fabric with consolidated blocks; 2) Alberti - special buildings district; 3) Tiberio - urban fringe fabric that is morphologically generated by previous elements (like walls, river, etc.) and it deals with different levels; 4) Mazzini - urban fabric with in-line buildings and row houses; 5) San Giovanni - the morphology with regular pattern with irregular skyline.




**Figure 3.** Formal urban transition of the study samples of the five morphological clusters in the historic centre of Rimini, with the Borgo Mazzini sample highlighted.



**Figure 4.** Typological abacus of some buildings overlooking Via Lavatoio, Rimini and an exploded axonometric composition of a typical building. The abacus includes ground floor plans, roof plans and elevations.



**Figure 5.** Diagram of dynamic growth on the east front of Via Lavatoio in Rimini. The figure depicts the current situation below and the possible configurations of volume addition over time. The continuous red line represents the current skyline, the dashed line the difference in height.

SAMPLE NAME	STRATEGY ICON	IF	IS ALLOWED	ADVANTAGES	LIMITS/QUANTITIES
<b>MAZZINI</b> Dynamic growth		<b>urban fabric with in-line buildings</b>	Extra building capacity: - the increase of floor surfaces and/or volumes by addition, preserving the original building typology and its imageability.  <b>PROMOTERS:</b> Private owners.	for the urban quality - preserving the local identity  for the investors - Gain of surface/volume	- <b>height raising</b> Dynamic index $h = h_{\text{neighbour}} + 1$ - <b>maximum height</b> Traditional standard 5 storeys - <b>volume addition on the façade</b> 1) Maximum protruding: 1 m 2) Coverage existing façade: max 20% 3) No addition of ground floor toward public street - <b>Roof outline</b> 1) Offsetting outline (partially or totally) 2) Residential destination 3) Dormer window addition 4) Partial removal max 20%

**Table 1.** Synoptic table setting guidelines for the development and urban regeneration of the fabric in line with terraced houses (Borgo Mazzini, Rimini, Italy).



## Città Giardino Aniene. A persistent experience of quality in urban design

Michele Bianchi<sup>1</sup>, Elena Ogliani<sup>2</sup>

<sup>1,2</sup>Dipartimento di Architettura e Progetto. Università degli Studi di Roma La Sapienza

E-mail: <sup>1</sup>mi.bianchi@uniroma1.it, <sup>2</sup>elena.ogliani@unroma1.it

Keywords: *urban expansion, Città Giardino Aniene, Gustavo Giovannoni, garden city, Roman typologies*

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**Abstract.** *Pandemic has enlightened unsuitability of strict urban models in giving response to different ways of living. In particular, the arising demand of quality in domestic and collective spaces calls for new questions on the future urban form. Starting from the case study of the Città Giardino Aniene, designed by Gustavo Giovannoni in 1919, we will argue that reevaluating the relationship between building typologies and urban morphology could be a right starting point to deal with the emerging urban changes. Our paper inquires the settling principles of this urban expansion experience, originated from the housing emergency occurred in the first decades of the twentieth century and gripped on the borders of Rome. Despite its assumptions, the proposal represented a qualitative response rather than a quantitative one and was based on a low-density urban structure, a service system and a large public park. We will focus on the original project and its transformation to retrace the role of these above-mentioned elements over their changing process up to the present time. In particular, we will deepen relations between built and non-built, considering the social scenario around. Through this analysis, we want to point out the importance of a qualitative approach in urban design, which is fundamental to recognize the identity value of a part of the city plot. Thereby, we aim at fostering the debate on this relevant topic for contemporary studies and at suggesting a possible reading key in urban transformation.*



## Introduction

Città Giardino Aniene is a project of urban expansion in Rome conceived by Gustavo Giovannoni in 1919 and it represents one of the most notable residential areas of the city, promoted as an example of garden city in Italy. It is located in the north-eastern area of the city, on a hill along the street Nomentana and beyond the Aniene river and the position of the street plan is characterized by curved and irregular paths, following the topography of the area. Today, the original neighbourhood is included in a larger area called Montesacro. Despite the project was an important urban design experience, it is not so well-known yet. It was dimensioned for 4.000 inhabitants in the extension of 150 hectares and built in an area out of the borders of the General Regulatory Plan for Rome of 1909. The project was born with the aim of a low-density housing decentralization and the area of this new settlement was reviewed with other five areas in a general intervention program of the Municipal Administration. Financing resources were low and only this area was chosen to be developed for many aspects: the low cost of the building land, its strategic position and the easy retrieval of construction materials. It had also the task to provide the housing demand in the reconstruction period immediately after the First World War. Giovannoni designed a low-density neighbourhood using the typology of villino (General Regulatory Plan of Rome, 1909) and the whole plan it was not conceived as a unique element but it was fragmented in many small quarters which followed the orography of the territory. He gave a great importance to the green areas, both private and public, and separated the principal square with the most important public services from different residential areas and the large public park. He also reinterpreted the variety of the elements in the traditional urban tissue and gave preference to the disposition of the private facades to generate variety and to design diverse collective spaces. The principles of the approach of Giovannoni in urban morphology can be also traced in other urban settlements in Rome such as Ostia Nuova and Borgata Giardino Garbatella. Regarding its construction programme, Città Giardino Aniene was not actually based on the idea of the "town-country magnet" developed by Ebenezer Howard in the last decades of the 19th century. Indeed, it can be more properly linked to the vision of the English working-class residential neighbourhoods. Today, looking at the Città Giardino Aniene, the effects of the massive building replacement during the second half of the twentieth century are evident. This operation transformed the relationships between the elements embedded in the urban form.

This paper aims at analysing the original project of the Città Giardino Aniene and then focusing on how the relationship between typology and morphology has changed to the present day, considering that from the moment of its completion in 1924 Rome has socially and physically transformed.

## Methodology

Starting from a selected case study, the research had encountered many difficulties in retrieving the original project. The only drawing was found in the Archivio Storico Capitolino of Rome, because of the unavailability of the Centro di Studi per la Storia dell'Architettura - CSSAr, where the main drawings are preserved. The facts involving the subsequent urban transformations come from secondary sources and the direct observation of the present situation during site visits. Many things have been written on the history of this project but barely few of them have gone into depth on the compositional aspect or into explaining the validity of certain insights. Thus, a key role was given to the redrawing phase, which has been used as a tool for testing and studying the original intents of the project and its transformation.

The first stage of the research has been held in archives seeking for the original drawings and

in libraries searching for reference and bibliographic sources, in order to set up a stable contextual framework as accurate as possible for a more precise and comprehensive understanding of the project. The research has been carried out by matching different and coordinated aspects, such as the international urban theories in place at that time and their transposal in Italy, the influence of the foreign studies of Gustavo Giovannoni and his own theory, the regulatory environment and the political strategies of the Government, the way of financing and carrying out the whole operation, the orographic conditions of the site and the persistent elements determining the settlement principles. Then, the second stage of the research focused on redrawing the original project, in order to grasp any hidden detail not deducible from the first one and to have a better comprehension of the original intent concerning the relationship between architectural type and urban morphology. It should be noted that this phase has been carried out as a critical process, which is different from the act of recopying a drawing. Subsequently, the third stage of the research has been carried out by observing and reconstructing the transformations of the area until today, in order to understand how the social scenario has affected the urban form and conversely.

An important characteristic of this method consists of its repeatability and applicability in studying other urban experiences, thus providing a more complex tool of reading this both formal and social phenomenon.

## Research work

The contextual framework

In 1898 Ebenezer Howard published his work with the Swan Sonnenschein & Co., titled "Tomorrow: a peaceful path to real reform" (Howard, 1898), in which he reported the problem of overcrowding in modern industrial towns and suggested a solution to the question of how to restore people to the land. He elaborated an alternative called "town-country magnet", which created new attractions combining the advantages of both town and country life. The new settlement would be based on a strong social pact with strict rules and would be built by the cooperative associations outside the city limits because of the low cost of land.

In Italy, the "town-country magnet" assumed the dimensions of a suburb with no agricultural values nor concept of a self-sufficient unit and the external farmland ring designed for the livelihood of the population was not put into effect or reduced in dimensions, thus becoming a filling area for future urban expansions.

The first experiment in Italy was the Milanino, an urban expansion of the city of Milan built around 1910 on the project of the architect Giannino Ferrini and meant for a middle class of employees and professionals. It was organized very similar to the schemes of Howard and it had a low-density structure, where only two-fifths of the plot area could be built and a maximum height of three floors was permitted. The main actor for its construction was the Cooperative Union, which built the infrastructures and had the role of supervising and authorizing the housing projects submitted by other associations and private societies. The main problem for its success was represented by the lack of efficient and rapid public transportation.

Another experiment was the Marghera Garden City, close to Venice, whose general plan was designed in 1922 by Emilio Emmer. Marghera was intended as an expansion of Venice in order to give a house to the workers of the harbour and to provide an alternative to the problem of damp and unhealthy life conditions of historical centre, creating also a green oasis among the grey of the factories. In compliance with the morphology of the territory, the roads were curvilinear, irregular and almost never perpendicular to each other. Each house could not have more than three floors and it should have been surrounded by private gardens four times

larger than the adjoining building. To obtain a comprehensive overview, it is also important to mention two other experiences in Rome.

The first one is Ostia Nuova, commissioned from the Municipality of Rome to the Associazione Artistica tra i Cultori di Architettura - AACAr and designed in 1916 by Gustavo Giovannoni, Marcello Piacentini, Vincenzo Fasolo and Giulio Magni. The project stemmed from the public space, which was structured in the main square with the terminal of the Rome - Ostia railroad, the square with the volume of the church, the palace of Governorate, the popular neighbourhood and the square which represented the access to the seashore. In the eastern part it was located the park area, while the residential areas were characterised by small villas. It is very important to underline these compositional aspects for understanding the similarities with the Città Giardino Aniene project of three years later.

The second one is Borgata Giardino Garbatella, promoted by the Ente per lo Sviluppo Marittimo e Industriale di Roma - SMIR and designed in 1919 by Gustavo Giovannoni, Massimo Piacentini, Paolo Orlando and Innocenzo Costantini. This is another project of urban expansion in Rome, conceived to give response to the workers of the industrial area close to the Tevere River. As for Ostia Nuova, the centre of the composition is the public space and the orography of the territory has a decisive role. It is important to mention that the maintaining of the property of the Istituto per le Case Popolari - ICP has preserved the neighbourhood from the urban transformations after the Second World War.

As is easy to understand, Gustavo Giovannoni had a role of particular importance in addressing the urban growth of Rome in the first decades of the twentieth century. More precisely, he had a strong influence especially on the morphological and typological aspects of the new popular quarters, which represented the main part of the urban expansions in Rome effectively built in these years. It is also important to mention the cultural approach of his method, considering that he asked for a compulsory and specific education of the consortium associations in charge of building the new urban interventions, thus securing the public interest from a speculative building intervention. Regarding his theory, he believed that there was not an absolute ready-to-use solution to be applied on every project, but the climatic conditions of natural environment and the artistic tradition in which we could trace the continuity of the lineage sense had to be considered.

Giovannoni searched for an aesthetic and civic unity, derived from a composition of superior order that was able to maintain the idea of the city in a long time. Regarding the expansion strategy and even in a completely new city project, he thought that the concept of a mono-centric city would have to be abandoned in favour of a poly-centric one, formed by many single units maybe opposite but all in balance to each other.

Furthermore, Giovannoni indicated how "...the district of factories and workers' houses must be built, as required by the Saxon building law and almost all the regulations of the German and Austrian cities, very far from the centre, in a position where the land is not expensive..." (Giovannoni, 1915).

The project of Città Giardino Aniene was the result of a set of urgent measures developed in the first decades of the twentieth century by the Government for the upturn in construction of the City of Rome. In 1919, thanks to the Royal Decree-Law n. 2318 of the 30th of November, it was instituted the Central Building Committee with the role of coordinator of these operations, declared of public interest. According to its technical report, there were three main purposes for the idea of garden-suburbs: topographic decentralisation in urban expansion to bring the new urban centres into the countryside; low cost of land and construction materials; short construction time of low density fabrics to promptly solve the housing crisis in existence at that

moment. Hence, the quarter was not included within the boundaries of the General Regulatory Plan of Rome, signed in 1909 by Edmondo Sanjust di Teulada. Furthermore, the Royal Decree-Law above mentioned stated that the market value of the land outside these borders would have been the rural value at the moment of its eminent domain. The idea was to ensure the access to property to a middle class of public employees and professionals, so the decision of the building site fell on the current Montesacro area considering the proximity to the Ministries district and the quick connection into the city centre through Termini Central Railway Station. Gustavo Giovannoni drew the urban layout in 1919 with the collaboration of Edmondo del Bufalo and Quadrio Pirani, and the intervention was built by many cooperative societies of state employees. In 1920 it was founded the consortium formed by the Municipality of Rome, the National Building Union and the Istituto per le Case Popolari. At the end of the construction process, all the areas for streets and squares would have been transferred under the property of the Municipality of Rome. In 1924, the Governorate took out from the Cooperativa Città Giardino Aniene the National Building Union, which had the role of legal representative and general supervisor of the Consortium and transferred all the areas and representation to the Istituto Case Popolari. On this occasion the borders of the Città Giardino Aniene were confined within the two main ring roads surrounding the area. In the same year the Città Giardino Aniene was completed.

The conformation of the territory was the initial assumption of the project. As in the principles of the urban morphology studies, the territory was treated as a material and its organization requires maintaining constant the orography, through the division in lots and the disposition of the buildings. (Figure 1. Figure/background) This clarifies the formative process of the buildings and the plan of the area, from which the ongoing process of transformation took form. The streets planning respected the orographic condition of the site, so the paths are mainly curved and irregular. The first action, similarly to the project of Ostia Nuova, was to set an infrastructural connection with the city through the construction of a new bridge crossing the Aniene river, positioned on the axis of the Nomentana street. The Tazio Bridge stepped on the main square, from which two road rings departed, one larger to the north and one smaller to the south. Piazza Sempione was meant to be the civic and functional centre of the new quarter and was part of the system of squares designed to break the continuity of the roads with common spaces of similar dimensions but different spatiality. All the special buildings such as the school, the church, the open-air theatre, the post office and the shops were located along this system. There were also a sport district and a large public park, typical of the English garden cities and today incorporated in the Natural Reserve of Aniene. For what concerned the choice of the main typology, the Regulatory Plan provided mainly for a low-density urban fabric made of villino, a single or two - family villa, isolated or in groups no more than eight, equipped with a private garden. These buildings could have a regular, semi regular or irregular plan and could be aggregated in several units as paired or terraced houses for best responding to the economic reasons. It is important to recall that Giovannoni treated the villino as a typology which could find its meaning only in a higher-order composition of a uniform mass. The different variations of this typology had common characteristics such as the little tower, the highest part with the entrance and the stairs for the upper floors, the layout on two floors covered by a sloping roof and a basement. Between 1925 and 1928 semi-intensive economic buildings were built around Piazza Sempione. Another important aspect of the project is the relationship with nature, because the whole part of the quarter should be treated as a vivid organism. There should have been an intense connection among natural and artificial elements, emphasized by the relationship among voids and volumes, road lines, visuals and the composition of the

little groups of buildings, both private and public ones.

### **Redrawing the original project**

The redrawing stage has been carried out by looking for the general in the particular, trying to find aggregative principles, looking for the unit, base type or module, attempting to define the process that follows principles that are recognizable through abstraction. As a result, some important aspects for its interpretation are worthy of note.

First of all, it is possible to compare some of the plan solutions with the European urban layouts that Giovannoni himself reported in the atlas "Costruzioni Civili" (Giovannoni, 1910-12). In this didactic book we can find guidance both for the urban plans and for the architectural types, in which he underlines that the whole conformation of the city should be studied as a big piece of art.

In regard to the relationship between typology and orography, it is important to notice that the plan drawing, characterized by curved and irregular paths, does not communicate the different levels of the terrain, barely visible in the stairs. This is a characteristic strongly adherent to reality that should be studied more by means of sections and elevation profiles and could add important elements on this intervention.

Furthermore, concerning the morphological comparison between public and private spaces, it is notable the repetition of the house and the lots, which does not apply to the service and public unit. This work underlines how the element of the residential unit can be used in design of the contemporary city because it constitutes its history and its original structure that we must take as reference. Nevertheless, the redrawing makes it clear that the project was conceived starting from public space and not from the housing problem. This explains the theory of Giovannoni, because it means that the importance of the public space is fundamental, for without it the city itself would not exist. The social interactions are fundamental in building a city and this was the basic idea of the garden city as well. Moreover, it is of great interest that in the Italian garden city model the centre of the public space is represented from a main piazza while in the English one it is represented by a five hectares garden. Lastly, in the projects of Giovannoni for urban expansion like, for instance, Ostia Nuova and Città Giardino Aniene itself, the central public space hosts the infrastructural connection to the city. It can also be observed that only the buildings with a public role stand directly on the road to define the spatial hollow of the piazza, such as the church and the intensive buildings in Piazza Sempione, while the housing buildings are always recessed from the road, with a separation wall between the garden and the sidewalk.

Lastly, the little squares along the roads and the intersections always generate a corner shape of the buildings, which is always different in the formal results.

### **Transformations**

This model of low-density structure and houses, proposed in an urban environment, came soon into collision with the high cost and the will of exploiting land. Even before, Istituto per le Case Popolari - ICP modified the taxonomy with buildings of three and four floors for economic housing, divided into rented apartments. (Figure 3. Comparison-plan) (Figure 4. Comparison-elevation profiles)

Then, after some modification of the building regulation, Città Giardino Aniene began to enlarge and at the end of the Second World War its limits of development were represented by the completion of Tufello quarter and the progressive urbanization of the surrounding areas. The free space of the original sports district between Viale Tirreno and Aniene River has been



completely saturated within its margins by new residential buildings. Furthermore, the replacement of the typologies started to be implemented on a speculative operation, while the new residential areas around were increasing the population density of the neighbourhood. A process of building transition from the villino to the palazzina endured as an overcrowding operation during the years 1950 and 1960 and continues until now. In this phase, almost 35% of the original building has been lost (Galassi and Rizzo, 2013).

The morphology relationship with the street changed because the void spaces between the building and the road were occupied by the palazzina typology, standing in front of the street and presenting the shops at the ground floor.

Thus, the morphological system has been preserved in its almost entirety on the base plan but really changed in the extension and the conformation of the buildings, more dense and different in some point from the original one. While in the original plan only the public buildings faced the streets, we can observe that now the relationship between private and public space, privacy and togetherness has been completely modified with a loss of its quality.

In the comparison between the original project and the current situation, we can observe that there are no more large public parks and the relationship between built and open space has considerably changed. It is interesting to notice that, while the original project was based on the use of the a punctual and central building instead of a block type surrounding the lot, the social dynamics have carried out a reverse process that gave shape to an interim solution, the palazzina typology. All public spaces, designed for relationship and ambivalent as private and urban spaces have actually been occupied by parking lots. Among the streets where villas or buildings of the original or 1930s are still standing, the urban dimension is perceptible.

## Conclusion

This research shows the evidence of the constant relationship between the social and architectural transformation in urban context. In this particular case, it is important to underline that the base plan has remained almost steady because it can be still recognized in its initial setting. However, the changes have affected the possibility of capturing the intents of the whole project and the quality value that instead it is still significantly perceptible, especially in some built excerpts. Moreover, the replacement of the villini with the new typology of the palazzina in the preexistent lots reflects the social and identity changes of the area and of the city itself.

The perception of being in a completely different place, separated from the city, embodies the principles and the generative expectations of these spaces. By the way, the settlement is still conditioned by the presence of all the geographical and topographical aspects, even if in some parts, the direct contact with the natural landscape and the view of the river, especially from the sport district, is denied by the recent heavy construction operations. In fact, the picturesque dimension disappears almost immediately in the view of the buildings that lean on each other and especially when we realize that all the small squares, thought by Giovannoni to be a public spaces for the community, have become areas for car parking, thus losing its essential character. The urban dimension also suggests a problem of land use and urban design in proportion to the amount of people who are living there at the moment, and it is no longer suitable to respect the basic functions. This example is not, in fact, an example of social restructuring, but it was just an operation directed by the idea of urban expansion, utilities and saving money, not external to socio-economic problems, it was a question of redistributing, reshaping.

Furthermore, the transformation phase has been not exhaustively documented. This could be

an important starting point to carry out the research work in the direction of getting more in depth in the processes of change that have affected and continue to affect this area.

This area is at this moment reactivating the attention for different reasons: probably after the crisis due to the covid the importance of the open-air spaces. It is becoming well appreciated and the houses are becoming more expensive.

However, it is extremely important to understand the real intents of the original project in order to lead the future transformations and to avoid misconceptions, because an improper redevelopment project could risk to create a problem instead of solving it. A proper way could be to consider what comes from the past and reuse it to understand the future, defining guidelines in the flow of transformations. (Figure 5. Urban transformation) (Figure 6. Public space and parking lot).

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## Drawings

Archivio Storico Capitolino, Piano Regolatore della Città Giardino Aniene scala 1:1000, Rip. X (1907-1920)  
B. 122 f. 12 All. 12 Piante 3 opuscoli "Piante schematiche"

### Archivio Storico Capitolino - digital drawings

<http://www.archiviocapitolinorisorsedigitali.it/piante/547.htm> (Piano di Roma del 1908 di Edmondo Sanjust di Teulada)

<http://www.archiviocapitolinorisorsedigitali.it/piante/560.htm> (Piano di Roma 1909)

<http://www.archiviocapitolinorisorsedigitali.it/piante/584.htm> (variante del 1926)

[http://www.archiviocapitolinorisorsedigitali.it/piante/588\\_01.htm](http://www.archiviocapitolinorisorsedigitali.it/piante/588_01.htm) (Roma 1928)

<http://www.archiviocapitolinorisorsedigitali.it/piante/590.htm> (1928)

<http://www.archiviocapitolinorisorsedigitali.it/piante/592.htm> (1929)

<http://www.archiviocapitolinorisorsedigitali.it/piante/600.htm> (post 1930)

<http://www.archiviocapitolinorisorsedigitali.it/piante/618.htm> (Piano di Roma 1931)

<http://www.archiviocapitolinorisorsedigitali.it/piante/619.htm> (Piano di Roma 1931)

### Illustrations and tables



Figure 1. Figure/background.

Figure 2. Redrawing the original project.

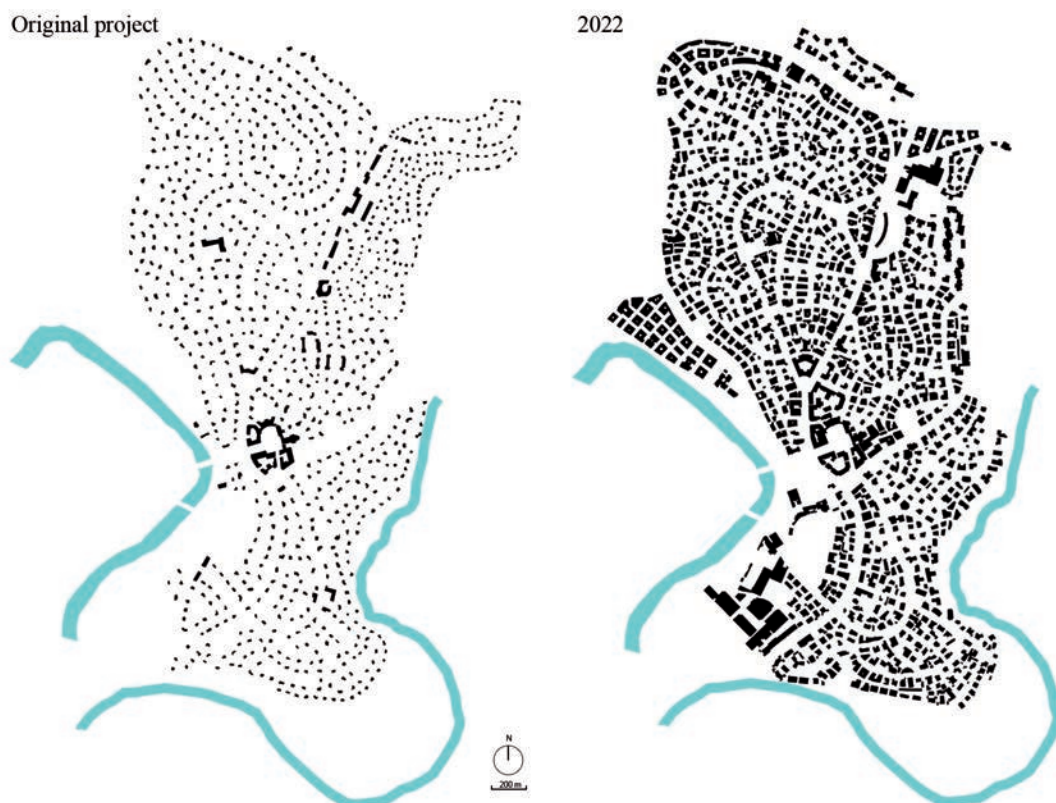
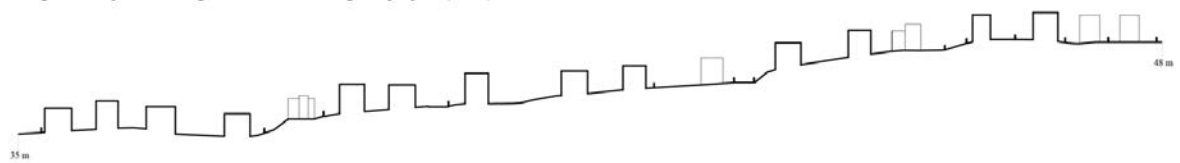
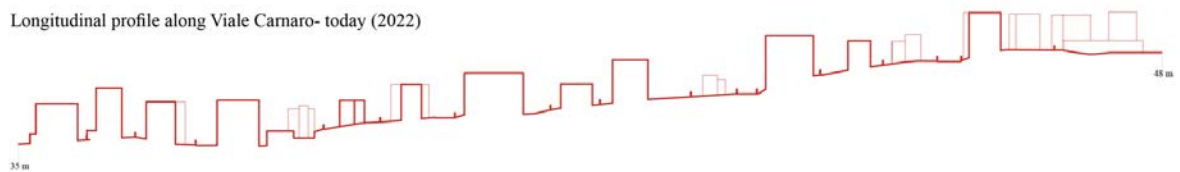


Figure 3. Comparison-plan.

Longitudinal profile along Viale Carnaro- original project (1920)



Longitudinal profile along Viale Carnaro- today (2022)



Longitudinal profile along Viale Carnaro- comparison

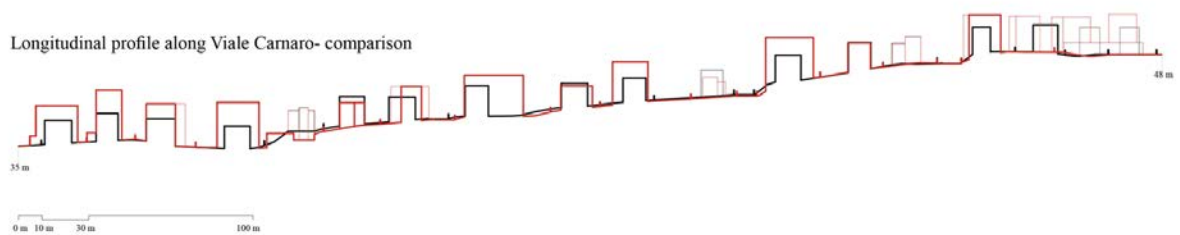


Figure 4. Comparison-elevation profiles.





**Figure 5.** Urban transformation.



**Figure 6.** Public space and parking lot.





## Ethics, Resilience and Legacy. Some observations on the concept of territory defined by Saverio Muratori

Pina (Giusi) Ciotoli

Dipartimento di Architettura e Progetto. Università degli Studi di Roma "La Sapienza", via  
Flaminia, 359. 00196 Roma

E-mail: pina.ciotoli@uniroma1.it; ciotoligiusi@gmail.com

Keywords: *Territory, density, theory, Muratori, ethical metamorphosis, urban form*  
Conference theme: *Communities and Governance*

**Abstract.** *This paper aims to analyze the ethical and aesthetic structures present in the concept of territory defined by Muratori, highlighting its legacy and modernity. The notion of territory, as expressed in the volume "Architettura e Civiltà in Crisi" and the subsequent "Civiltà e Territorio" anticipate an entire season of theoretical architecture (think of Gregotti and Rossi), outlining concepts that over time will become topical issues. We refer to the "civil crisis" as a "crisis of judgment", to the "moral and critical judgment" towards history and to the territory understood as an "earth-man symbiotic process" analyzed and enhanced in its aesthetic as well as productive and ethical values. Almost sixty years after, it is necessary to highlight the centrality that these issues – although not always recognized – have in scientific research: terms such as recycling, reuse, entropy, sustainability do not have their own autonomy if not inserted within an organic understanding of the productive and economic dimension of the territory. In recent years, precisely as a response to the widely diffused green sensitivity, many designers have tried to put the concept of "ethical metamorphosis" of the territory at the centre of the landscape project. It is therefore timely to consider Muratori's ethical conception of the territory in the light of new design attitudes, such as those of the Turenscape studio, which are part of a practice of architecture that seeks to integrate the morphology with massive interventions, typical of a hyper-dense city, with the most current environmental needs of this last urban season.*

## Introduction

This paper is a part of an ongoing research that focuses on Muratori's definitions of crisis, criticism and territory. Muratori's writings and drawings are analyzed by trying to find convergences with the historical and cultural period in which they were produced, seeking to trace possible links with the cultural climate of the 1960s. In particular, this paper aims to analyze the ethical and aesthetic structures present in the concept of territory defined by Muratori, highlighting its legacy and modernity. To understand his idea of territory, it is necessary to refer to the concepts of crisis and civilization and, in particular, to the definition of "aesthetics" of the territory (of which Muratori was the forerunner). Precisely in the rediscovery of the organic nature of the territory (in terms of production and referring to its ability to create fabric and to its environmental individuality), it will be possible to define a key moment concerning the issues of crises, addressed several times by Muratori in his writings.

After all, the territory, in its totality and complexity, constitutes the turning point for awareness of man's life in the world, going beyond any naturalistic or, on the contrary, technical drift. The era of ecological transition is characterized, especially in the field of scientific research by issues such as sustainability, resilience, adaptability, entropy, reuse, etc. First, it is necessary to reaffirm the centrality of the role of Saverio Muratori and his intuition, brilliant for the time in which he is been produced, concerning the organicity of the territory.

Within the hierarchical and a priori theoretical-design system of the Modenese architect, in fact, the territory is defined as «(...) a concrete and tangible reality, unequivocal in the sensitive relationship between man and nature common to all, open to promptly record every development real happened, but also to welcome every new development». It «participates in the same dynamic plasticity of human thought and consciousness, but in the inexorable control of the relationship with natural and historical reality, it requires and affirms, like all functioning organisms, a discipline and a productive hierarchy of autonomous structures of the parts, but organic as a whole; in short, it reflects all the attitudes of man and society on the conditioning and concrete limits of physical reality» (Muratori, 1967: 52-53). Almost sixty years after, it is necessary to highlight the centrality that these issues have in scientific research: terms such as recycling, reuse, entropy, sustainability, resilience, etc. do not have their own autonomy if not inserted within an organic understanding of the productive and economic dimension of the territory.

## Methodology

This research begins, first of all, with the study of the drawings developed by the Modenese architect for the volume "Studi per una operante storia del territorio" (which was later left unfinished) and the numerous theoretical essays published by the architect. The theoretical-critical approach of Muratori's intellectual work is then compared to the centrality of the theme of the "territory" concerning the Italian architectural culture; after all the notion of territory, as expressed in the volume "Architettura e Civiltà in crisi" and the subsequent "Civiltà e Territorio" anticipate an entire season of theoretical architecture (think of Gregotti and Rossi) (Boeri, 2016), outlining concepts that over time will become topical issues.

In the last paragraph, an attempt was made to propose a comparison between Muratori's theoretical approach with the work of Kongjian Yu's studio, Turenscape, particularly involved in some central issues in the definition of the relationship between man and nature. Franco Purini was the first academic to have rediscovered the inseparable link between crisis, criticism and territory. In the essay of 1989 "L'ammirazione che all'arte si deve": impressioni, interpretazioni, riflessioni su Saverio Muratori, sulla sua opera interrotta", Purini focuses on Muratori's "obsessions",

stating the following: «At their centre, the strongest obsession, his moral will rather than aesthetic, to remove from the project that much of the arbitrary that it naturally possesses and perhaps requires» (Purini, 1989: 5).

The moral component of the project (free from personalistic references and ever closer to an almost objective “rational” dimension of architecture) is the goal that leads Muratori to analyze not only the limits of knowledge, but also those of logic, production and architectural realization. Nature must be taken into consideration; for this reason Muratori identifies the crisis as a recurring element capable of appearing cyclically and inserting itself as a fracture within the civil structures. Civilization thus acquires the role of a «(...) self-sufficient and self-regenerating civil entity» (Muratori, 1967) capable of finding and managing its own energy so as to provide concrete answers to crises. The latter are cyclical and recurrent, usually following the phases of growth and stasis as «creeping catastrophes» (Purini, 1989: 5). Purini thus captures a fundamental passage from Muratori’s theoretical perspective: «If architecture is necessary, architects are not so necessary, who, in an attempt to face the crisis, internalize it, opposing their limited time to the eternal time of the city, placing themselves at the center of contradictions (...). The task of the architectural theorist, Muratori seems to say, is to demonstrate the need for the absence of the architect as a subject who presumes to grasp the totality and be invaded by it. (...) He laid the foundations for the primacy of theory but also the premises for the relative practical sterility of architectural culture and its marginalization from the daily management of the city. Indeed, only the moment of the “catastrophe” appears to be controllable because in it, theory and reality can overlap: but if this is true, it is even more true that it is precisely the catastrophe that undermines a knowledge. All that remains is to further theorize on the continuity of the critical moment, on its condition of normality» (Purini, 1989: 5).

Muratori focuses on the study of concrete reality: emphasizing this passage is by no means trivial, because he intends to highlight the concrete will to define the centrality of the man-nature relationship.

It is probably for this reason that Muratori, in the book “Civiltà e Territorio”, traces the processual phases of the relationship between man and agricultural production, between the city and the industrial economy. Territory is not a concept, it does not refer to an abstraction attributable to theoretical or cultural aspects, it is real, concrete, tangible, verifiable, quantifiable, measurable. This aspect is repeatedly emphasized by Muratori and is of great importance: the measurability of the territory counteracts its real nature as a natural organism; moreover, it subjects the territory itself to the possibility of being measured, or of “undergoing” the various steps of scale which, from an anthropic point of view, are part of taking possession of the territory itself and from a purely design point of view, stimulate the ideation and projection, typical operations of the architectural world. Furthermore, as «(...) central and resultant phenomenon that can be read with the naked eye in true size» (Muratori, 1967: 196), it implicitly admits its own manipulation through interactions, inter-scalar processes and approaches of the human scale. The act of numbering transcends from its practical side and acquires more and more the character of a cognitive action: «(...) the crucial point lies in the way in which the operator’s categories of succession are applied to a natural world consisting of a multiplicity that is always ambiguous in its overall organicity and continuity and at the same time in its heterogeneity particular discontinuity» (Muratori, 1967: 101). To count means to interpret sensible limits, as well as the complicated real situation in which we find ourselves, thus providing a reading, a possible explanation to phenomena of which we are otherwise unable to give a proper evaluation.

Muratori provides an accurate definition of this cognitive process, stating the following: «In

particular, counting is of this experiencing the moment of recognizing as succession (...). The autonomy (not arbitrariness) of the subjective act of consciousness is manifested in the autonomy of counting with respect to the real, that is, in an increasingly rich experience of evaluation and relative deduction, without leaving the concrete framework of reality» (Muratori, 1967: 101-102). The territory is the answer to the meaning of the crisis and its overcoming, and in its totality and complexity, it constitutes the turning point for an awareness of human living in the world, going beyond any naturalistic or, on the contrary, technical drift. The measurability of the territory is also central because it underlies two other fundamental aspects: the planning of the territory (allowed by scale transitions) and its being a natural organism (Lombardini, 2017). Precisely to highlight the adaptability of the territory to be transformed, Muratori speaks of the act of numbering because counting means interpreting the sensitive nature, the limits and possibilities of the territory.

Interpretation is thus a fundamental point of the ethical vision of the territory provided by Muratori and, in the most recent studies, is one of the most interesting elements in scientific research (Maretto 2012, Tagliazzucchi 2015, Ieva 2018). The cartographic tool, in fact, is the means through which to "measure" the territory; it is the first step toward the process of knowing the territory, thus toward its transformation. Cartographic reconstruction has its own operativeness, recognized by Muratori as a design tool. Starting from the study of urban fabrics (from a large-scale but decidedly more contained and maybe more consonant dimension than the urban studies already conducted in the 1950s and 1960s), the Modenese architect understands the need to find answers to crises by analyzing the entire global situation. Muratori's "storia operante", therefore, becomes design action on a global scale, thus reflecting Muratori's attempt to find the methodological support to intervene in a "civil crisis" situation. Within this theoretical vision, cartography becomes the macro-scale project tool par excellence. In fact, Muratori believes that solutions to crises can only be concretely sought after reflection on a global scale. Therefore, spatial forms are the way through which to reveal and interpret a macro-scale structure that, otherwise, we will not be able to understand.

The architectural scale (related to the design of the building) and the urban scale (close, instead, to the concept of urban fabric) seem insufficient to operate in a condition of crisis, re-establishing the man-nature relationship. By dealing with the territory on a global scale, Muratori manages to deal with a whole series of fundamental aspects, such as land occupation, the productivity of the territory itself, all in a logic of sustainability and ethical relationship between man and nature. Precisely for these reasons, there is an extraordinary innovation in having given space to the link between form, geography, and culture as the foundations of a possible new civil system. Furthermore, through the cartographic reconstruction we can focus on the study of the structure of the territory; for Muratori, in fact, the territory is sensitive to time, but not labile in its structure. This duplicity, if we can call it that, between modification and unchanged substance of the territory, is probably one of the central issues of the problem. And it is also the reason that allows us to talk about the ethicality of territory and "moral and critical judgment" toward history. «The territory thus becomes the body of man, not only natural, but self-conscious and historical: that is, it becomes the home, the environment, the heritage of man not only as sensitive consciousness, but as self-conscious intelligence and memory: in the territory, the world then becomes architecture, humanized space on the proportional and central modes proper to man and in its gradual limits of expansion up to the maximum extension that can be drawn from his organic consciousness in space and time» (Muratori, 1967: 486-487).



### The ethical conception of the territory in some recent projects

In recent years, precisely as a response to the widely diffused green sensitivity, many designers have tried to put the concept of “ethical metamorphosis” of the territory at the centre of the landscape project. It is therefore timely to consider Muratori’s ethical conception of the territory in the light of new design attitudes, such as those of the Turenscape studio, which are part of a practice of architecture that seeks to integrate the morphology with massive interventions, typical of a hyper-dense city, with the most current environmental needs of this last urban season. Among the many contemporary designers working in the macro-scale dimension of the project, Kongjian Yu shares Saverio Muratori’s idea of the territory conceived as an “earth-man symbiotic process” and enhanced in its aesthetic as well as productive and ethical values. In the words of William S. Saunders, Yu «addresses the greatest need of our time: transforming human interaction with the Earth from something suicidally indifferent to natural forces into something that responds to those forces with respect and cooperation» (Saunders, 2002: 8).

With his firm Turenscape, Yu deals, almost predominantly, with the Chinese landscape: this was an important choice on the part of the architect, who sought to give a cultured and design response to a whole series of issues that this area is experiencing. Reference is made to the epochal changes resulting from the massive urban policies pursued in recent years, as a result of which there has been an abandonment of the countryside with poor maintenance of China’s vast agricultural land (Bonino, Carota, Governa, Pellecchia, 2020).

Turenscape is today one of the few firm able to give voice to a whole series of problems due to the hyper-production of agricultural land on the one hand, and the abandonment of the same on the other: two different sides of the same coin that show, more and more, the need to consider the territory as a natural organism. Therefore, it is necessary to focus on the adaptive processes of the environment, placing the concept of “ethical metamorphosis” (Muratori, 1967) of the environment at the centre of architectural and landscape design, whereby «the territory is in fact a concrete, homogeneous and continuous field, which gathers all the stresses gravitating on the plane of relations between nature and society (...)» (Muratori, 1967: 195).

Over the years, Kongjian Yu has tried to categorize his projects within a theoretical research that has as its ultimate goal the realization of an ecological city. Yu, in fact, constantly experiments with the integration between public spaces, Chinese megacities, and the protection of natural systems. This is an issue of great importance for the Turenscape study, since the macroscopic growth of the city is a topic very dear to Yu; although the size of urbanized areas can be seen as a mutable factor (especially in China) (Bonino, Carota, Governa, Pellecchia, 2020), it is good to reconsider the relationship between urban development and nature.

In this regard, it is necessary to underline what Antje Stokman says about the massive land use resulting from the construction of new megacities in the Chinese areal: «This urban development approach treats nature as an enemy that can only be defeated by increasingly aggressive cosmetic and technological interventions. (...) Nature is reduced to an abused servant of culture. In their need to present landscape as controlled, the engineers do not respond to the existing natural and other unique features of a place. Processes and patterns such as changing water levels, the form-making effects of water movement, and water-adapted vegetation are not integrated into design but rather suppressed by superimposed forms and structures» (Stokman, 2012: 35).

This paper aims to propose a comparison of Muratori’s theoretical approach with Yu’s design practice, as both share the role of “forerunners” with respect to related issues: the ethical conception of landscape, the rediscovery of the territory as a natural organism and finally as a

«balancing resultant between natural and human processes» (Muratori, 1967: 199). Both, in fact, never isolate the territory from its own capacity to be transformed and from the productive implications it has always had for civil society. Probably among the projects of Turenscape that best express such proximities is the 2008 master plan “China National Ecological Security Pattern Plan” (conceived by Turenscape in collaboration with Peking University). Here the crises of civil society mentioned by Muratori can be identified in the many environmental crises (disasters, flooding, etc.) that have been testing China’s resilient capacity for years. The plan drawn up by Yu with Peking University sought to bring to life a large-scale master plan capable of providing concrete answers to the issues of sustainability and productivity of both rural and hyper-urbanized areas. An ambitious project that, starting from the coastal regions, addressed the most organic integration of environmental and anthropogenic changes. The masterplan was developed at a far larger scale than required by the Chinese Ministry of Environmental Protection, to classify all areas affected by flooding as part of a common ecosystem protection strategy. This was done through a nationwide analysis of annual rainfall and flood-prone areas, so as to develop a “simulation” system for future natural disasters integrated with respect to a water regulation and management system. Acting on the changes that men, over the past decades, have harshly imposed on their natural environment is therefore more than necessary in a scenario such as the present one; and such situations, as Yu mentioned several times (Yu, Padua, 2006), are particularly evident in today’s China.

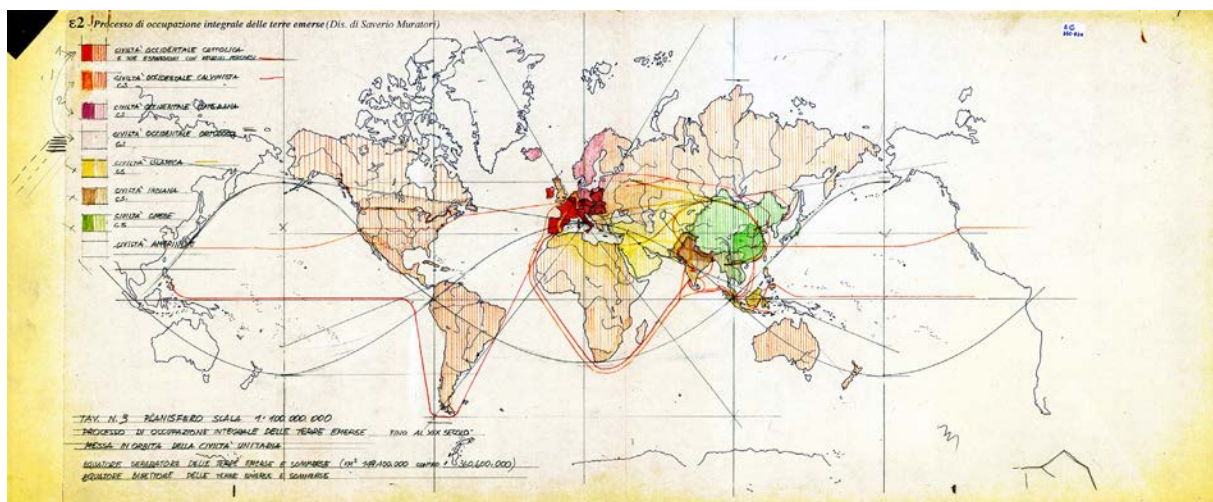
## Conclusion

The comparison between some themes shared by Muratori and Yu is just one way to demonstrate the great relevance of the theoretical approach of the Modenese architect’s studies. In fact, talking about sustainability and integration between the hyper-technological model and respect for the natural world (issues that are nowadays very much addressed even outside the scientific debate) is fundamental in order to be able to design integrated systems on a large scale in which city, man and nature know how to start from a common will. In this sense, Muratori was the first scholar to warn, in an unsuspected moment, that the man-nature relationship was beginning to become unbalanced, leading increasingly to attrition. After all, the attitude of the society detected by Muratori in 1963 (“Architettura e Civiltà in crisi”) and subsequently in 1967 (“Civiltà e Territorio”) was already fragmented, detached from an ethical and aesthetic approach and increasingly unable to establish “positive”, constructive and interacting relationships with the territory. Precisely, both for Saverio Muratori and Kongjian Yu, the ethical and aesthetic prerogative are two fundamental points that the project must have, so as to be able to trace new paths in the certainly complex relationship between man and the environment.

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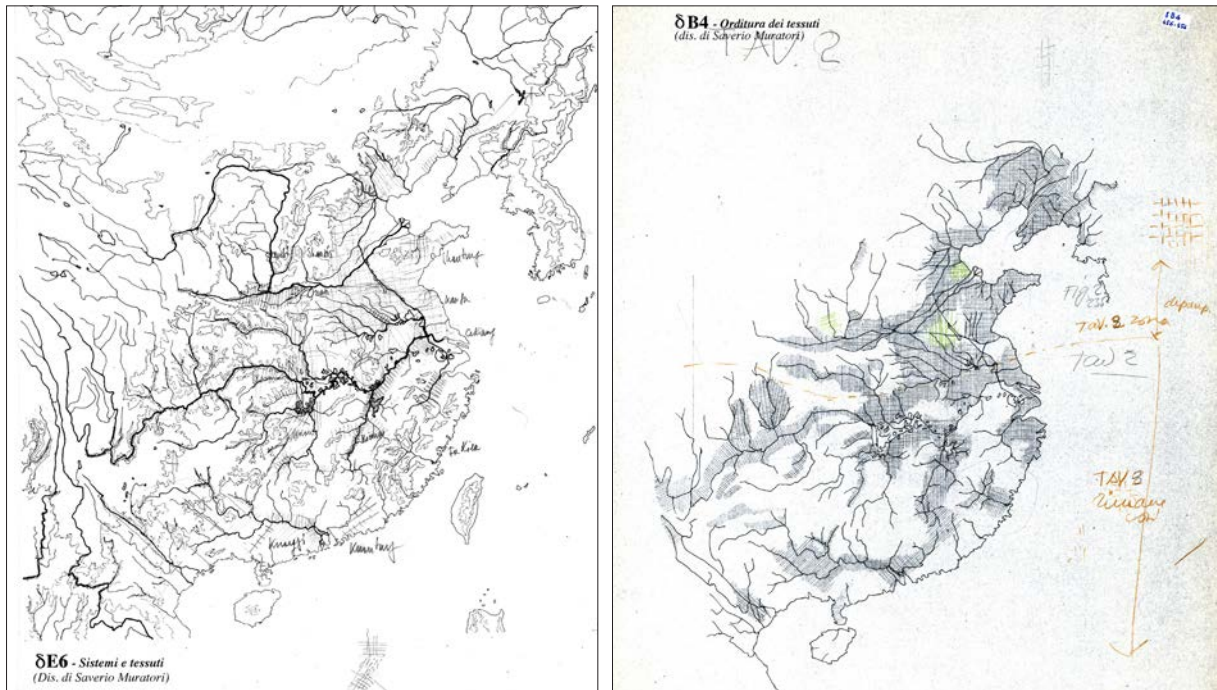
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- ## Illustrations and tables



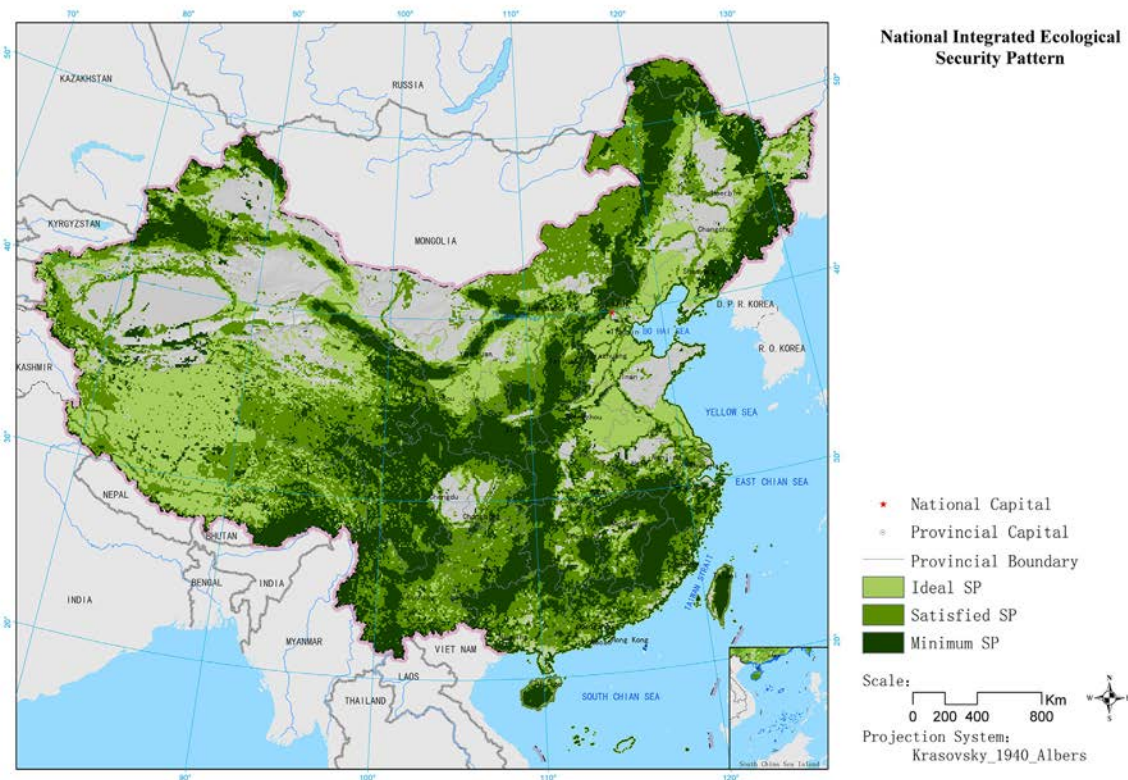
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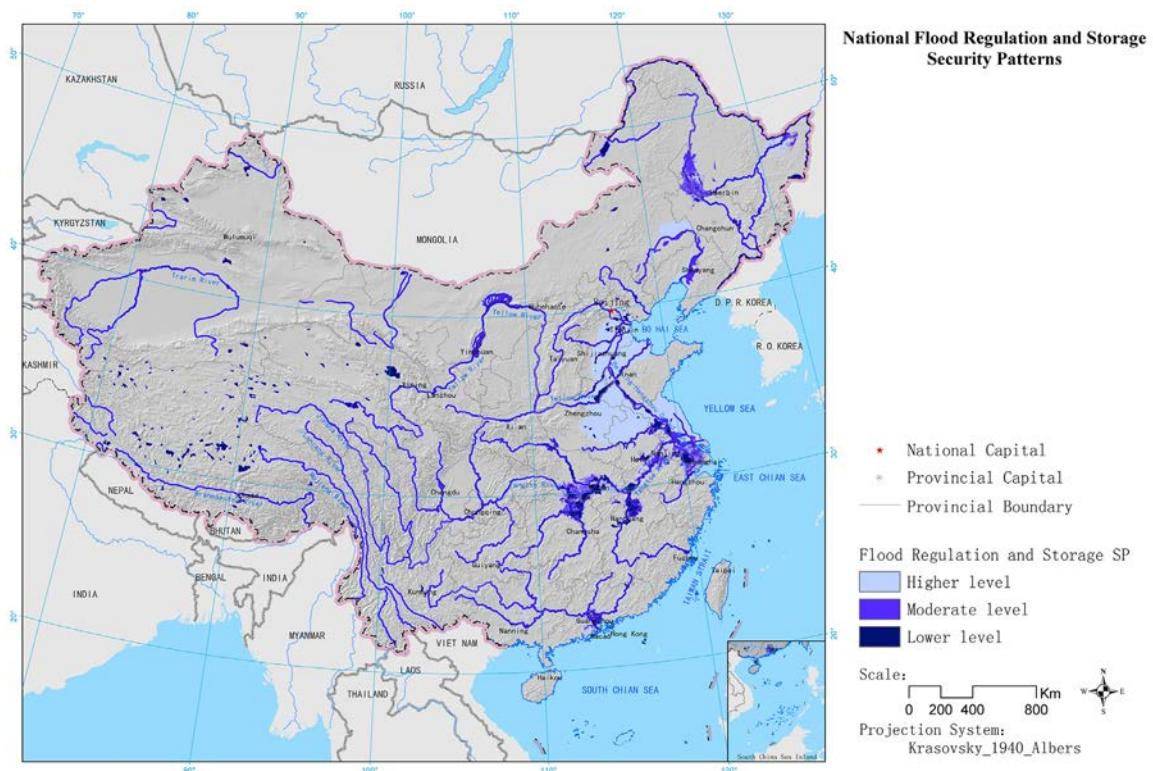


**Figure 2.** Systems and fabrics (China). Drawing by Saverio Muratori.  
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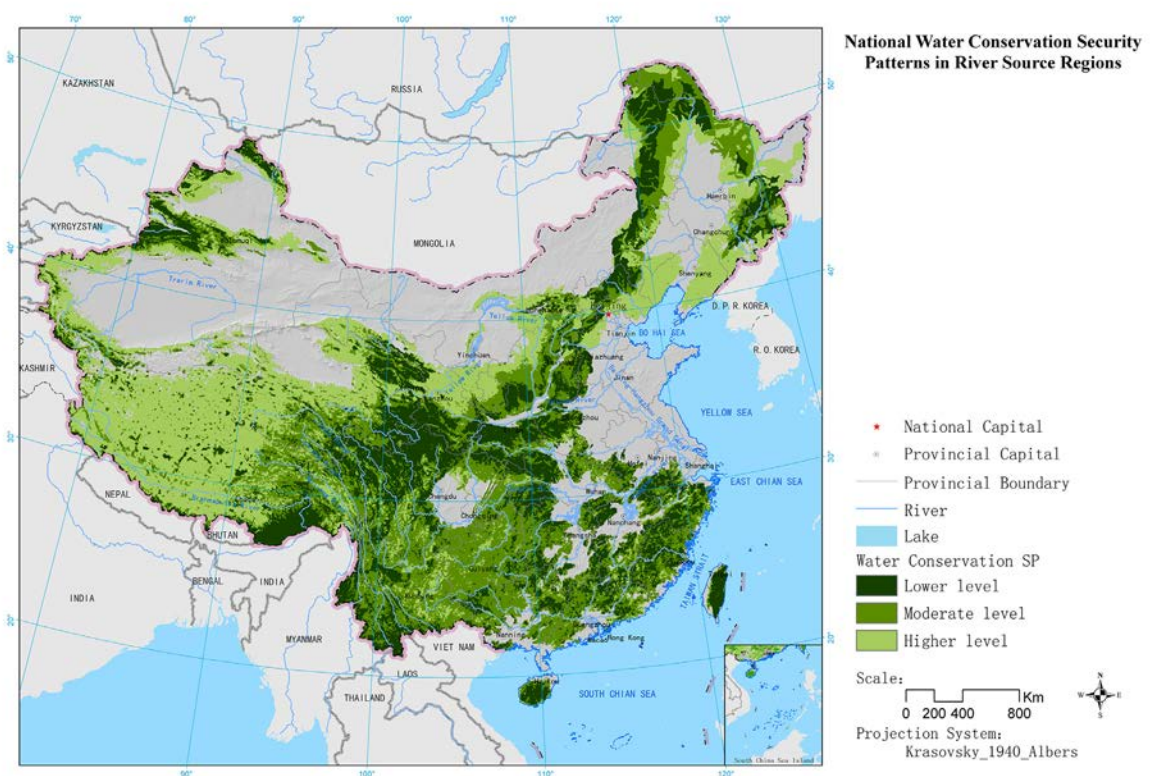
**Figure 3.** Fabrics (China). Drawing by Saverio Muratori.  
<https://www.comune.modena.it/biblioteche/poletti/muratori.php>



**Figure 4.** Areas affected by ecosystem protection strategies. The project is part of the China National Ecological Security Patterns Plan. Courtesy of Turenscape Studio.



**Figure 5.** Regulation and management system, on a national scale, of the China National Ecological Security Patterns Plan. Courtesy of Turenscape Studio.



**Figure 6.** Proposal of different environmental regulation and protection patterns of the China National Ecological Security Patterns Plan. Courtesy of Turenscape Studio.





## The definition of borders as a possibility to shape the open space of the city

Ermelinda Di Chiara

Sapienza Università di Roma, DiAP (Dipartimento di Architettura e Progetto), via Flaminia 359, 00196, Roma, Italy

E-mail: [ermelinda.dichiara@uniroma1.it](mailto:ermelinda.dichiara@uniroma1.it)

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**Abstract.** *The contribution intends to investigate a theoretical-operational proposal in the disciplinary field of urban morphology and the study of the phenomena of the city, starting from the themes that the author is investigating in her research activity within the DRACo\_ Doctorate of Architecture and Construction at Sapienza University of Rome. The occasion for reflection arises from the problems of the city that have emerged from the state of emergency (health and environmental) in recent years, which seem to have called into question the adequacy of the spaces of the historic cities we inhabit and emphasised the need to find, even within compact fabrics, rich in history and theory, a different relationship between the forms of the built environment and the forms of natural open space. This is also the context for the reflections of a staunch defender of densification, Richard Sennett, who proposes an inversion of the city-building paradigm, moving from a "closed system" to an "open system" in which it is possible to reconcile the city in terms of healthfulness and habitability through the inclusion of pieces of nature: this relationship between the built and natural elements clearly requires a rethinking of the "architecture of density" that underlies the logic of compact cities (Sennett, 2019). The new "physical forms of density" can be achieved by redrawing the "boundaries" of the city in order to achieve that "finiteness" of relationships between urban parts that Giuseppe Samonà mentions when he states that cities must have a boundary and the need for urban studies to return to dealing with these boundaries (Samonà, 1984). Assuming these theoretical premises, the contribution turns to the transformation of the city of Palermo through the redrawing of the "borders" of its various parts, applying the natural element as a means of distinguishing and enhancing the different morphologies that make up, according to Claude Lévi-Strauss' well-known definition, "the human thing par excellence" (Rossi, 1966).*

## Introduction

In the essay *The Territory as Palimpsest*, first published in the French magazine *Diogenes* and later in *Casabella*, Swiss architect and lecturer André Corboz states that «Territory is not a datum, but the result of different processes. [...] These different translations of territory into figures refer to an indisputable reality: that territory has a form. Indeed, that it is a form. [...] The territory, overloaded as it is with traces and past readings, rather resembles a palimpsest» (Corboz, 1985). It is with these words that Corboz introduces the concept of “territory as a palimpsest”, emphasising the idea of the uniqueness of a place as the result of “different processes” of writing and overwriting that have taken place over time. Each transformation is a kind of rewriting of the form of the soil, and each “new sign” that is put in place to meet the needs of the contemporary world makes it a sedimentation of traces. The metaphor of the “palimpsest”, used by the Swiss architect with reference to the natural territory where the phenomena of stratification are the result of spontaneous events or human actions, can equally be applied to an urban context, with reference to that set of traces at the basis of the identity of places. This same set of signs, visible and concealed, confers a character of distinctiveness on the city as the repository of the past and of the identity values of the community. A territory that has experienced a close relationship with the human vicissitudes of a community is a composite territory, steeped in multiple heterogeneous elements that have entered into relations with one another according to principles of continuity, overlapping, juxtaposition, but also discontinuity and, at times, demolition. In this sense, the city of Palermo is a veritable “palimpsest city” with new forms that overlap the pre-existing ones, sometimes ignoring them, sometimes taking on their structure. The ancient city in fact welcomed numerous peoples who settled in the area and soon impressed their culture and their way of “making a city” on it. The study makes use not only of a continuous and close comparison between the extensive iconographic apparatus, descriptions and cartographies available, but also of the consolidated tools of urban and spatial analysis – respectively the Figure-Background Plan, the Void Plan and the Red and Blue Plan – with the aim of understanding the urban parts, the compositional logics and laws underlying the city and introducing into it those natural spaces capable of connecting, and distinguishing, the urban matrices still recognisable in its morphological layout.

## Morphologies

The first image of the city of Πανόρμος (Panormos) – the Greek name for ancient Palermo, meaning “all port”, recalling the particular geography of the place – dates back to the Phoenicians, to whose ships approaching the north-western coast of Sicily appeared a green basin sloping down towards the sea located in the Conca d’Oro, enclosed by a mountainous system (Mount Pellegrino), where the relationship between the “form of the soil” and the “form of the water” was significantly relevant as the sea sloped down to lap a rise flanked by two watercourses, the Papireto river to the north and the Maltempo river to the south. This was the geography of the place that housed the city’s oldest nucleus, Palepolis, located at the highest point of the rise and furthest from the sea and surrounded by walls that limited its expansion. This “urban part” was then implemented with a new nucleus, Neapolis, which, surrounded on three sides by water, was also delimited by an exact boundary that was defined on the basis of geographical conditions and the theory that the territory on which a city could be founded was a finite and limited resource. The iconographic documentation from this period thus allows a clear reading of the form of the city during the Phoenician-Punic period. It is characterised by the significant presence of the element of water, which settled in the city as far as the hinterland of the Conca d’Oro surrounding the urban fabric, which, in turn, was delimited by a

double order of fortifications: the first, external, defending the entire urban core; the second, internal, separating the two “urban parts” of Paleopolis and Neapolis. With the exception of the area relating to the ancient Paleopolis, it can be stated with certainty that the first nucleus of the city’s formation is characterised by a dense and compact fabric devoid of “unbuilt” spaces, an image that contrasts with the landscape outside the walls where a condition of natural openness prevails. This formal description is also reflected in the spatialist reading (Schröder, 2015) of the city of Palermo, the Plan of Red and Blue in fact identifies a single built-up area – represented in light red – that settles between the banks of the two rivers, but, more generally, in the “exterior space” represented in light blue – of the Conca d’Oro (Figure 1).

While the structure of the city did not undergo significant changes during Roman and Byzantine rule, not insignificant was the Arab conquest of Panormos, datable to around 840, which began the expansion of the city beyond the “limit” of the walls. In the first decades of the 10th century, in fact, the Arabs decided to build an autonomous urban nucleus, beyond the River Maltempo, also surrounded by walls, which was of fundamental importance as it represented the city’s first expansion outside the urban perimeter in about sixteen centuries. However, this first expansion did not change the image of the city’s land, which continues to preserve its naturalistic character, once again expressing a strong relationship that underlies the formation of the city of Palermo: a relationship between the forms of orography, between the forms of hydrography and the forms of construction (Figure 2).

In the Norman period, and then in the Swabian period that was its heir, Palermo did not undergo significant architectural and urban transformations, since the city had already reached, in the Arab period, exceptional dimensions for the time. However, this was the period in which the progressive canalisation of the rivers began, which slowly led the ancient city to lose the formal identity and distinctiveness that had characterised it from its origins. In fact, the Papireto and Maltempo riverbeds became increasingly thinner and thinner until they became faint traces that, as can be seen in 18th-century cartography, were completely overtaken by new buildings. The consequence of this “expansion” of the city “on the waterways” was the loss of any significance of the internal “borders”: these no longer fulfilled defensive functions as in antiquity and were no longer necessary to separate the different “urban parts” as had been the case during the period of Arab domination. The result was the demolition of the city walls that, from the very beginning, delimited and protected the ancient core of the city, and the subsequent construction, on the traces of the urban boundary, of palaces, churches and convents that not only “concealed” the delimitation of the built-up area, but also reduced the river section, leading to its final canalisation over the centuries. The outer walls – those surrounding the “urban part” of the Arab matrix – represent the only physical “sign” of containment of the drawing of the forma urbis which, until the eighteenth century, would prevent the development of Palermo, preserving, at least outside this limit, the naturalistic character that had characterised the city since its origins (Figure 3).

While in the 15th century Palermo substantially preserved its mediaeval structure without any significant interventions, the 16th century saw the development of an idea and form of city that still conditions its development today. This was in fact the decisive century for the definition of a new urban drawing that included the reconstruction of the city walls and the definitive channelling of waterways. The city therefore grew and the urban form was “completed” within the drawing of the new walls, the only limit that prevented urban expansion towards the Conca d’Oro plain, which in this way continued to preserve a distinctly 16th-century character «as an image still uncontaminated, not emptied in its forms by the values they implied» (Giuffrè, 1976). The need of this century, in continuity with the previous one, led to the definition of new urban

spaces that, although not characterised by a purely naturalistic aspect, had the ultimate aim of restoring the relationship with natural spaces. The first operation consisted in the rectification of the pre-existing road that corresponded to the centrally located axis: this became an element of union between the parts of the city, but at the same time a connection, albeit only visual, between the sea and the territory, attempting, in some ways, to preserve that relationship between the natural and built elements that had always characterised the form of this singular city. This axis, however, was not the only intervention imprinted on the structural system during the 16th century: in fact, a new road was planned which, intersecting with the pre-existing one, divided Palermo into four urban parts. It was certainly a significant decomposition, since it did not operate within the sphere of a building or a district, but involved an entire city. At the same time, however, it was an operation conceived with the aim of "making space" but without taking into account the morphological fabrics and principles of the city of history. Among other things, in order to recall the historical relationship that Palermo has always had with the "form of water", this urban drawing, in continuity with the canalisation of the rivers, laid the foundations for a development of the city contrary to the original sea-territory trend, since it cancelled any visual relationship that had hitherto been attempted to preserve (Figure 4).

During the 17th century, the city also began to expand outside the city walls: here, the construction of "primary elements" (Rossi, 1966) began, such as churches and convents, around which the urban fabric that would define the urban landscape of the Conca d'Oro would develop. These first cores outside the walls would represent the beginning of subsequent expansions and, although they were not planned as part of a programmed urban development, they would in fact become the fulcrum of the expansion that would affect the city over the following centuries and that would cause the slow and progressive reduction of natural open spaces. The new urban complexes, although built outside the walls, nevertheless sought to establish a connection with the pre-existing built-up area, made possible by the tree-lined avenues that connected the two built-up areas; it was, therefore, nature that acted as a "connecting element" between morphologically distinct urban parts.

The fruitful cartographic production continued into the following century, the 18th century, describing very well the image of the city outside the walls, which was always characterised by a naturalistic aspect and thus of natural openness, of "exterior", in fact «[...] even if the gardens within the walls have disappeared – it is the image of a city of gardens that prevails in those who set out to describe Palermo» (De Seta, Di Mauro, 1980). In the context of the original urban core, however, it is significant to note how some of the collective spaces built in this period, such as the Botanical Garden, were initially placed on one of the bastions of the ancient urban "border": a choice, this one, charged with significance, because it in fact sanctioned the total uselessness of the ramparts from a defensive point of view and the consequent realisation that the walls and bastions were nothing more than an obstacle to the city's development. However, no thought was given to transforming the route of the ancient city walls into a natural promenade, a useful expedient not only to include open spaces in a dense and compact context but also to separate the different parts of the city.

The first half of the 19th century finally saw the start of that process of transformation of the urban image that would form the face of the contemporary city of Palermo. In the cartographic production of the first half of the 19th century, in particular, the expansion of the city outside the city walls and the consequent reduction of the "exterior spaces" is clearly visible. The walls have now lost all meaning and the city grows without taking into consideration the ancient urban "border"; expansion continues in a major way outside the original core and new "urban parts" are incorporated into the pre-existing plots without a clear compositional logic.



Nevertheless, the extraordinary naturalistic richness of the Conca d'Oro, and thus of the unbuilt landscape surrounding the expanding city, is still evident. The following century (20th century), also as a result of the bombings of the two wars, definitively marks the transformation of Palermo: the city appears increasingly built-up, losing that primordial relationship between the form of the soil/form of the water and the form of the construction and thus becoming a "interior spaces" devoid of "exterior spaces" (Figure 5).

## Conclusion

The city of Palermo, due to its history and conformation, is often at the centre of the reflections of those interested in urban phenomena. In a relatively recent time, the magazine *Architettura Civile* dedicated a double issue (Aprile, Di Benedetto, 2019) to the city of Palermo with the aim of studying its form and denouncing the crisis of the contemporary metropolis and of all those disciplinary apparatuses that have the urban project as their ultimate goal.

In the essay *Quanto vale Palermo?*, Angelo Torricelli, editor-in-chief of the magazine, tells of a "mythical and mythicalised" Palermo, but above all of «a stereotype, emblematic of the destruction of a landscape – the Conca d'Oro – and of the processes of uncontrolled urbanisation that have broken the link between *civitas* and *urbs*» (Torricelli, 2019). The richness of the ancient city lies, in fact, in the relationship between the forms of construction and natural forms – and, in particular, the "form of water" that copiously etched the landscape of the plain of the Colli – that has been lost due to the continuous and uncontrolled metamorphoses that have led to substitutions of values and loss of meaning and significance. Incidentally, as Carlos Martí Arís states, «the study of historical experience shows us how cities were never built by turning their backs on nature, but in open dialogue with it [...]. If there is something permanent in the city, that transcends any vicissitude or transformation, it is the presence of places that, while being fully urban, manifest a strong bond with geography [...].» (Martí Arís, 2007). The example of the city of Palermo is absolutely fitting as it is not possible to understand its "value" without framing it in the singular landscape that was once dominated by the verdant basin crowned by mountains and furrowed by watercourses. Therefore, to "build" the city of the future by disregarding its geographical conformation is to deny the essence of the city itself. It follows that a study of the morphology and spatiality of the site is indispensable in order to understand the city's permanent features and transform its present history by bringing back the singular conformation it had assumed since its origins. An interesting experiment not only to "rediscover" the principle of city building, but also to adopt a model of inclusiveness and sustainability in line with the challenges that the world poses to all those who study the city and its phenomena.

The city of Palermo, due to its morphological singularity, which is still recognisable today, can be considered a clear example of the construction of the "city by parts": its urban form appears to be the result, over the centuries, of a continuous juxtaposition of parts of the city, with the intention of not cancelling the existing urban layout, but of considering it a fragment, a part waiting to be added to another new one, equivalent to it. In the morphological evolution of Palermo discussed above, rather than an overlapping of urban fabrics, one recognises a succession of city types – Phoenician-Punic, Arab, Norman-Swabian, Aragonese, 18th-century, 19th-century – identified through a series of "urban limits" with such complexity as to "cross" two built parts that differ in terms of form (as well as belonging to non-contiguous historical periods). This peculiarity also emerges from the analysis of urban spatiality, used in terms of historical evolution, which proposes, at the large scale investigated here, a reading of the city as built as opposed to the natural exterior. The "exterior space", assimilable to the condition of

the natural open, are absent in the city of Palermo to date, since it has structured itself over the centuries through the formation of dense and compact fabrics that are still clearly distinguishable today. The recognisability of the different urban systems is due to the faint trace that can be identified at the city's boundaries: each boundary identifies a certain region of space, and this in turn accommodates a specific type of fabric. The boundary, through its perimeter, identifies not only the city it surrounds, but also the one it excludes. As can be seen from cartographic documents from the Phoenician-Punic period, in ancient Panormos, the Papireto and Maltempo rivers marked the natural boundaries of the peninsula on which the ancient city was built. In the Middle Ages, these boundaries still defined – together with the double fortified walls – the separation between the founding settlement and the first expansion beyond the riverbanks, on the two opposite bends. The “form of the water”, still imprinted in the “form of the city” that had been modelled on those sites after the channelling of the rivers during the 16th century, represents that element capable of making the two parts of the city distinguishable, the Phoenician-Punic one characterised by a regular layout and the Arab one characterised by a sinuous weave typical of the urban culture of this people. “Figures” – represented in white – which stand out against the “background” – represented in black – of the city of Palermo in a clear and defined manner and which, as the spatialist reading renders, are made distinguishable thanks to the presence of the “exterior space”. This spatial condition, however, takes into account both the natural open space of the Conca d’Oro and that of the sea that penetrates the built-up area. And it is precisely the “form of water” that offers interesting points for the development of a reflection on the possibility of open spaces in a compact context such as the city of Palermo. The ancient drawing of water, by analogy with the Japanese technique of kintsugi, corresponds in fact to that golden artery capable of merging the parts of the city, making them always recognisable by virtue of its nature that welds, and at the same time defines, the fragments.

During the last decades of the 16th century, Palermo lost its original and extraordinary conformation with the channelling of the Papireto and Maltempo rivers: the city was separated from the “exterior space” by the city walls, but “interior space” prevailed within it. However, the trace of the ancient watercourses is still imprinted in the urban fabric as later constructions have been superimposed on it. In this respect, the contribution imposes itself not only as a verification of theoretical positions, but rather as a feasible operation, since one acts by demolishing a block whose morphology is very clear precisely because it perfectly reproduces the beds of the ancient watercourses. The trace drawn in gold on the figure-ground plane of late 16th-century cartography thus re-proposes the ancient “form of water”, demonstrating not only how it is still clearly visible in the city's structure, but how its redefinition makes it possible to re-establish the sense of the parts in the city of Palermo. Through the rewriting of the city's boundaries, the sinuous spine of the building that imposes itself on the traces of the ancient streams is replaced by a “void of nature”, a pause between the meshes of the built-up area to signify the different moments, and the different modes, of construction of the parts of the city that face onto it. The morphological and spatial structure of the city thus defined is also well configured in a comparison with the current plan where the sinuous trace of golden water meets, extending its form, the nature complexes of the Parco d’Orleans first and the University of Palermo later (Figure 6). In these terms, the city of Palermo is thus an exemplum not only of urban heritage with a high cultural-historical value, but also of the Italian metropolis, which has been structured over the centuries mostly through the formation of dense and compact fabrics, still clearly distinguishable today. The definition of “voids of nature” – spaces with which the city has always been enriched – is a necessity that arises as a structural and transformative condition

to make the “city by parts” model intelligible and, at the same time, allows us to take up the challenges that the world poses to us in terms of the healthiness and sustainability of the places we inhabit.

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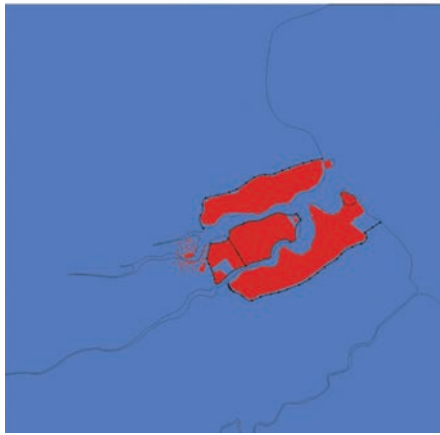
## Illustrations and tables



**Figure 1.** Evolution of the form and space of the city (6th century) through the figure-background Plan and the Red and Blue Plan. The nucleus of Paleopolis and the added nucleus of Neapolis settled in the natural space between the ancient foundation core and the sea. Author’s drawing.



**Figure 2.** Evolution of the form and space of the city (12th century) through the figure-background Plan and the Red and Blue Plan. The city grew during the Arab period and its form was delimited by an additional wall that prevented its expansion towards the Conca d'Oro landscape. Author's drawing.

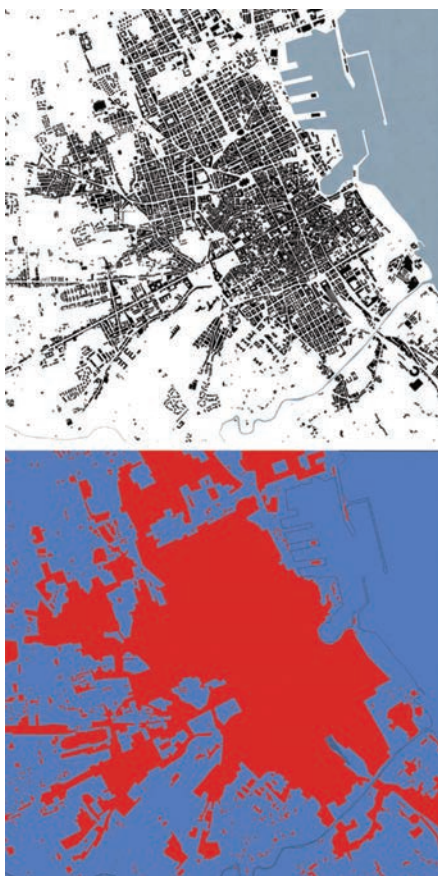


**Figure 3.** Evolution of the form and space of the city (13th century) through the figure-background Plan and the Red and Blue Plan. The thinnest urban fabric, building on the banks of ancient watercourses, and the demolition of the inner walls are the most significant changes in the Norman-Swabian period. Author's drawing.





**Figure 4.** Evolution of the form and space of the city (last years of the 16th century) through the figure-background Plan and the Red and Blue Plan. The reconstruction of the city walls, the canalisation of the rivers, the rectification of the west-east axis and the construction of the north-south axis dividing the city into four urban parts are the most significant transformations of this period. Author's drawing.



**Figure 5.** Evolution of the form and space of the city (20th century) through the figure-background Plan and the Red and Blue Plan. (20th century). The city continued its expansion, beginning to take on the image of modern Palermo. Author's drawing.





**Figure 6.** Design evolution of the background figure plan and the red and blue plan based on the current plan of the city of Palermo. In gold, the natural element of water re-emerges from the urban fabric and settles into the dense and compact city, regaining the form of the past. Author's drawing.

## Four points for a genealogy of the in-between starting from post-war CIAM reflections

Elena Giaccone

Dipartimento di Architettura. Storia e Progetto. Politecnico di Torino.

Torino – Viale Mattioli, 39. 10125

E-mail: elena.giaccone@polito.it

Keywords: *in-between, relational space, threshold, genealogy of terms*

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**Abstract.** *The paper deals with the concept of in-between and the way it entered the architectural discourse from the post-Second World War period through a series of specific occasions of its discussion.*

*Positing the postwar CIAM cultural milieu as a reference one, the research identifies nodal moments of the concept's emergence within a constellation of diverse professionals, disciplines, and audiences.*

*Observing diverse but cross-contaminating platforms of knowledge production and networks of protagonists involved, the paper aims at retracing possible trajectories of a discourse in-evolution that can still have transformative potential, both in its utopian message for a city shaped for human encounter and in regarding the in-between as an element allowing cities' transformations in time.*

*Focusing on the experimentations of the British artistic collective Independent Group, the Smithsons' research for a Relational Theory of urban forms, and Aldo van Eyck's philosophical reflections, the in-between concept is regarded as one both having a specific meaning in relation to the socio-political and historical conditions of postwar Europe, and still being relevant within contemporary urban design discourse in dealing with psychological and symbolic needs of re-identification and belonging of communities.*

*In its final part, as a first conclusion, or better as a way to catch a glimpse from the described events, the paper opens a reflection on the concept of liminality and the possible role of the in-between space in the contemporary city, questioning its contribution to cities' adaptative capabilities and in engaging people in an active relational public life.*

## Introduction

This paper<sup>1</sup> aims to present a preliminary investigation of the concept of in-between and the particular way it emerged within the architectural discourse during the postwar years in Western Europe. Indeed, starting from the end of the 1940s, the idea of in-between acquired specific meanings as an object of discussion, primarily in the framework of CIAM meetings, also acting as a key term in the process of critical questioning of its ideology and being conceptualized and re-conceptualized several times<sup>2</sup>.

Within that framework, the in-between concept has also been discussed using different expressions, such as threshold and doorstep, revealing a continuous process of terminological shifts, which from time to time could also imply different spatial references and epistemological approaches. The concept has been central to the definition of crucial ideas developed by many Team 10 Group's members, notably, as part of the philosophical theory of twin phenomena for Aldo van Eyck and of the Smithsons' research on the Scale of Human Association and Reidentification Process. More generally, on a meta-level, the idea of the in-between also constituted a widespread approach within the specific postwar context, since the figure itself of the architect at the period had to mediate in-between several aspects: in-between trauma and reconstruction, in-between the willingness to build a new better world and a certain nostalgia for the community dimension<sup>3</sup>, in-between the growing reality of a mass society and consumerism and the call for preserving local identities, in-between ethical and aesthetical principles.

This paper aims to retrace possible trajectories of the emergence and influence of that in-between idea within the postwar architectural discourse, identifying some nodes when protagonists and reflections significantly coalesced around the concept. Those occasions work as epicentres<sup>4</sup> whose punctual manifestations reflect the slipping values and evolving knowledge in postwar Western society and whose subsequent reverberations can be observed in the terminological, rhetorical, and epistemological shifts that the concept encompasses.

Despite the choice to present them following a chronological order, the intention is to suggest a constellation of episodes where different ideas, professionals, and disciplines intersect, exchange, and cross-pollinate rather than pretend to portray a linear evolutive description. In

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<sup>1</sup>The paper is based on a reflection exposed during the 6th ISUF International Conference held in Bologna in June 2022. The issue has been discussed under the title "Mapping a Genealogy of the in-between from Postwar Ciam Reflections." The following text broadens the initial contribution on the basis of the comments and conversation born on the occasion of the Congress. Moreover, it benefits from the privilege of a certain temporal distance, thus reframing it within the author's ongoing research about the migration of urban design concepts in postwar Western society.

<sup>2</sup>Concerning the word history within the context of architecture and urban design, the two main references are: Forty, A. (2000) *Words and Buildings a Vocabulary of Modern Architecture*. (Thames & Hudson, London), and Topalov, C. (2010) *L'aventure Des Mots De La Ville [à Travers Le Temps, Les Langues, Les Sociétés]*. (Robert Laffont, Paris).

<sup>3</sup>Considering the figure of the architect at the time as one mediating in-between a differentiated set of geographical, linguistic, cultural contexts the publication of Reto Geiser, Giedion and America *Repositioning the History of Modern Architecture*, framing the figure of Sigfried Giedion as perfect example of those dynamics has been particularly inspirational.

<sup>4</sup>The term Architectural Epicentres is used quoting Petra Čeferin, but undoubtedly simplifying the theoretical complexity of the original formulation of the concept, to a reductive, albeit very expressive rhetorical figure. Čeferin intends with AE the architectural productions that [...] correspond to the definition "architecture is architecture". [...] These are productions that are organised around the moment X, and that work as epicentre - that is, as (what appears to be) the centre-point - of an architectural tremor, which has effects on both the architectural and wider reality, and triggers and produces various changes within it.

Čeferin, P., Požar, C. (2008) *Architectural Epicentres Inventing Architecture, Intervening in Reality*. (Architecture Museum of Ljubljana, Ljubljana), 14-15.

particular, the paper intends to explore the migration of the in-between concept from anthropological, biological, and ecological studies to the architectural discipline, questioning the shifts in meanings, epistemologies, and approaches it acquired traversing and, especially, laying in-between these different kinds of borders. For each of the identified moments, there exists a vast iconographic apparatus which at the time constituted an essential part in representing the multilayered, ambiguous concept of the in-between. Although many of the images coming from exhibitions, publications, or urban surveys will be mentioned (and, as far as possible, also included) within this paper, those few pictures, abstracted from their original contexts, could evidently not contribute to nuancing the meanings of the in-between, as they did at the time. However, as for the oral presentation in Bologna, where the weight of words and images could probably have found a better equilibrium, the intention is to sketch a network of mental correspondences, where images of biological organisms, architectural diagrams, and evocative drawings are displayed as found<sup>5</sup> without specific captions justifying their juxtaposition - a practice and methodologies shared by many of the figures whom the paper will address.

#### **Point one**

##### **In-between the cogitating mind and the emotional expression**

The first significant postwar moment when it is possible to observe the presence of the in-between concept within the architectural discourse is the Bridgwater VI CIAM, in 1947. Held in a little village near London and led by the English MARS Group, the most active and participated CIAM delegation at the time, it was the first CIAM meeting after the war<sup>6</sup>.

On this occasion, Sigfried Giedion, secretary of the Congress at the time, introduced a reflection that questioned the allegedly too rationalistic principles of Modernism, calling for the reunion of logic and emotions and, more broadly, of the object and the mind. Exposing his concerns, he referred to a reconciliation that already occurred, for instance, in the field of modern physics, where the experiment and the experimenter were regarded as deeply interdependent<sup>7</sup>. Building his considerations on the in-between theory of the philosopher Martin Buber, he intended to overcome the so-called one-sided rationalism that widened the gap between the cogitating mind and the whole sphere of emotional expression<sup>8</sup>.

Martin Buber was the father of a philosophical theory grounded on the notions of relationships and dialogue and based on human encounters, whereby the sphere of the in-between was considered the primary category of human reality and the fundamental condition of human beings. Buber himself declared that architects must be tasked to build for human contact, shaping an environment that encourages human meeting and exchange.

Less than ten years after the Bridgwater Congress, Giedion himself wrote a book, *Architecture You and Me*, first published in 1956, with explicit reference to Buber's masterpiece, *I and Thou* (1923). With these reflections, Giedion inaugurated a period of burgeoning critics of the

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<sup>5</sup>The reference is to the as found aesthetic approach developed within the Independent Group, as one observing the objects of reality as they were, appreciating the rawness of their material aspects and without the intention to assign them any pre-conceived meaning or interpretations that could transcend their actual existence and encounter with a subjective observer.

<sup>6</sup>For a detailed and comprehensive reconstruction about the CIAM (Congrès Internationales d'Architecture Moderne) history and protagonists see Mumford, E. P. (2000) *The CIAM Discourse on Urbanism, 1928-1960*. MIT Press, Cambridge).

<sup>7</sup>Giedion, S. (ed.) (1951), *A Decade of Contemporary Architecture*. (Editions Girsberger, Zurich), 40-41.

<sup>8</sup>*Ibid.*, 41.

functionalist assumption based on relation theory and in-between concepts, which the Dutch architect Aldo van Eyck, present at the Bridgwater's Congress as one of the youngest participants, would further explore.

In a first step, Giedion applied that approach of re-conciliation to the idea of synthesis and cooperation of the Arts. Also influenced by the British philosopher and mathematicians Alfred North Whitehead, he considered that art would be able to reconcile architecture and life, giving both a concrete and symbolic form to the emotional world of human beings, thus sewing the connection between inside and outside, between the individual and his environment.

In particular, Giedion regarded Modern Art, Primitive Art, and the World of Childhood as all forms of art characterized by transparency, simultaneity, superposition, and abstraction, elements conferring the capacity to transform emotions into symbols and signs<sup>9</sup>.

This first branch of reflections profoundly influenced Team 10's subsequent focus on the forms and modes of associations and the favorable spaces where these encounters could occur. In search of those which will be considered the most vivid examples of those processes, many of Team 10's members attentively regarded primitive, traditional, and vernacular cultures, far away from the Western context.

## **Point two**

### **In-between photography, biology, and mathematics**

The second episode, identified as of particular importance in grounding the discourse about the in-between, occurred four years after the VI CIAM Congress. This time, the in-between topic entered the architectural and urban design discourse mainly from the fields of science and biology, suggesting to observe the shapes and functioning of the world's natural objects of the world through the lens of analogical theories.

In 1951 the Institute of Contemporary Arts (from this point in the text, ICA) in London organized an exhibition titled Growth and Form. The name was in honor of the book of the Scottish mathematician and biologist D'Arcy Thompson, *On Growth and Form*, a scientific study on animal morphology, which was rising its popularity in those years, even outside its specific disciplinary field.

D'Arcy Thompson's book was an invitation to regard objects' shape as resultant of reciprocal relationships between different forces and thus representable through mathematic diagrams . Therefore, for the Scottish scholar, the study of morphology should address and privilege the dynamics aspects and effects between forms rather than looking at forms (and objects) in themselves.

Among the others, Giedion again played a central role and was a partisan for this exhibition, while it was the artist and photographer Nigel Henderson who introduced D'Arcy Thompson's book to the colleague and artist Richard Hamilton, another revelatory exchange of the growing interdisciplinary crossover and cooperation at the time. Hamilton, from his side, had a penchant for photographic reproduction and diagrammatic depiction, which he regarded as a scientific and objective way of representation. Consequently, as the leading exhibition organizer, he explicitly promoted the collaboration between artists and scientists .

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<sup>9</sup>Deyong, S. (2014) 'An Architectural Theory of Relations: Sigfried Giedion and Team 10', *Journal of the Society of Architectural Historians* 73.2, 226-247.

<sup>10</sup>Thompson, D'Arcy W. (1948) *On Growth and Form*. (Cambridge UP MacMillan, Cambridge New York).

<sup>11</sup>Haram, K. (2017) *Growth and Form Exhibition 1951* (<https://medium.com/@hhkim/growth-and-form-exhibition-1951-7561090e91d5>) accessed May 2022.



### Point three

#### In-between intimacy and the outside world

The third identified moment is the ninth CIAM congress in Aix-en-Provence, France, in 1953. The objective of this congress was to create a Charter of Habitat, which would embrace the legacy of the famous Charter of Athens but overcome its allegedly reductionist functionalist perspective<sup>12</sup>. Conceiving a Charter of Habitat (whose precise meaning would continue to be the object of discussion for years to come) required, first of all, a shift from the topic of dwelling as an isolated function to one of the thresholds between the human beings and its living environment.

This means from the focus on the space of the dwelling to the one of the dwelling and its extensions and the spaces in-between, where relations with every other kind of interacting organisms could be observed<sup>13</sup>. The premise was that while engaging in relationships with their habitat, human beings directly shape and transform the spaces where they live, not only adapting to them.

This other genealogical branch of the in-between concept, as part of a growing ecological approach in the field of architecture, had its origins in the biological, sociological, and ecological pioneeristic studies of Gilbert White, Thomas Huxley, and Patrick Geddes. As for D'Arcy Thompson's publication, the works and ideas of those latter not only rose their popularity within the architectural debate in the second half of the twentieth century but also affected the architectural practices and modes of representation.

There was, in fact, an emerging branch of sociological research building the idea that the success of a rebirth of urban architecture would begin with the fostering of meaningful encounters at the threshold between intimacy and the outside world<sup>14</sup>. From the first half of the century, sociological movements of those kinds, such as Mass Observation, were using field research techniques to record and investigate people's daily activities, particularly in the places in-between their habitations. Indeed, the conception of the human habitat as an in-between space preannounced Team 10's research on the shape of the in-between in the 1950s and 1960s.

The most popular and mediatized document presented at the Aix-en-Provence meeting, directly engaging with the theme of the threshold, was Alison and Peter Smithson's Urban Reidentification Grid. Here, communities and human settlements were analyzed as constructed through a hierarchy of association on different levels. Entirely in line with the profound reflection on the in-between concept, the Smithsons were convinced that the relations shaping a community begin precisely at crossing a threshold. In fact, in those places, neither inside nor outside, individuals engage in voluntary and involuntary relationships with others, and those relationships shape urban forms. This also consisted of an in-between condition of the subject, experiencing the threshold between his emotional world and the world outside: for these reasons, participation in the life of the city requires multiple crossings of those thresholds<sup>15</sup>.

Starting from their 1950s reflections and works, the Smithsons developed an entire doorstep philosophy whereby the psychological condition of in-between places constituted also a decisive moment in the expression of fundamental continuity across the various scales of association of a habitat. The grounding and analogies with the biological studies are evident

<sup>12</sup>Mumford, E. P. (2000) *The CIAM Discourse on Urbanism, 1928-1960*. MIT Press, Cambridge), 225.

<sup>13</sup>Zuccaro Marchi, L. (2020) 'Between Habiter and Habitat. CIAM and the Sigtuna Meeting of 1952', in van den Heuvel, D., Martens, J., Sanz, V. M. (2020) *Habitat: Ecology Thinking in Architecture*. (NAi Publisher, Rotterdam).

<sup>14</sup>Steiner, H. (2011) 'Life at the Threshold'. *The MIT Press*, October 136, 133-155.

<sup>15</sup>*ibid.*, 144.

here. The threshold has a very similar meaning for environmental biologists, constituting this crucial point at which organisms become aware of the subtle diversities in quality that differentiate the states around them<sup>16</sup>. In the Smithsons' hierarchy of association, if the threshold between the house and the street facilitates more instinctive social activities, each subsequent shift in scale negotiates transitions increasingly linked to the state of culture. Thus, individuals have different degrees of consciousness and control over social connectivity in different places in the city.

The Smithsons were interested in creating an architectural space that offers margin for individual appropriation and occupation by spontaneously emerging living patterns. They understood the contemporary city as a many-layered field, a heterogeneous, non-continuous space defined by non-linear interactions. In this framework, infrastructures (such as landscape and mobility) played a prominent role in the resulting design production, leaving room for growth and modification, while the new urban space would be the interstitial one. Therefore, for the Smithsons, the in-between not only represented an urban reality allowing to differentiate of the various levels of association but also an open and interstitial space to design and appropriate, which gave the occasion to shape permeable boundaries within the city and thus encouraging human interactions.

Those theories, which the Smithsons contributed to bring into CIAM's discussion, also converged in two influential publications. The first, *Team 10 Primer*, was intended, as evident, as a primer grouping the different theoretical and design contributions of Team 10's leading members and was published for the first time in 1962 on the journal *Architectural Review*, and then republished as a complete volume curated by Alison Smithson in 1968. The second, *Urban Structuring*, was published 1967 and displayed a significant quantity of schemas and diagrams representing diverse human settlements which were intended to translate in visual form the relations existing between the different elements of a habitat and the behavior of people within it and among each other.

It is significant to note that in the *Team 10 Primer*, one of the four thematic sections is devoted to discussing the concept of *Doorstep*, acknowledging the continuing centrality of the in-between theme in the period, as one leading different voices and protagonists to intertwine, confront, and hybridate.

#### **Point four**

##### **In-between the parts and the whole**

The fourth and last moment that this paper identified is the XI CIAM meeting, held in Otterlo, the Netherlands, in 1959. During that congress, which marked the end of CIAM, the Dutch architect Aldo van Eyck presented his theory about *The Greater Reality of the Doorstep* for the first time, a discourse on the need for architecture to reconcile spatial polarities. Van Eyck intended to propose a definition of a whole architecture of the in-between, developed from an array of heterogeneous literature, including ethnographers and anthropologists such as Franz Boas and Marcel Griaule and, again, the philosophical theories of Martin Buber<sup>17</sup>.

According to van Eyck's thesis, the in-between must be conceived in the image of man, understanding architecture as a living organism. To make clear his idea, the Dutch architect illustrated an analogy between the respiratory activity of human beings and the necessity of

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<sup>16</sup>Steiner, H. (2011) 'Life at the Threshold'. The MIT Press, October 136, 145.

<sup>17</sup>Teyssot, G. (2011). Aldo van Eyck and the Rise of an Ethnographic Paradigm in the 1960s. *Joelho-Journal of Architectural Culture*, (2).

architecture to be shaped by inhalation and exhalation processes, in which the openings (windows, doors, entrances, etc.) had not only the function to allow the passage but would inspire and guide the conception of the entire architecture. Space in the image of man implies the necessity for modern architecture to interiorize through its forms the perceiving, moving, and relating subjects inhabiting it, so that buildings themselves could be brought to life by their inhabitants.

Aldo van Eyck translated Buber's ontology of the in-betweenness into aesthetic and architectural terms with its famous issue of *Forum* journal *Door and Window* in 1960. In this text, he declared, *Whatever space and time mean / Place and occasion mean more. / For space in the image of man is place, / And time in the image of man is occasion. So, space was turned into place by being constructed in the image of man, and since man was conceived as dual and dialogical, places should be too*<sup>18</sup>.

For Aldo van Eyck to establish an architecture of the in-between was to create places where existing polarities, such as the individual and the collective, the outside and the inside, can be reconciled. Those places should transform from barriers to membranes that could be crossed and inhabited, providing important occasions for increasing human consciousness, both of oneself and the living environment. Architecture's task was then to extend that narrow borders (not regarded as delimiting elements, but as places of possibilities) and make them part of an articulated realm that can be inhabited. Similar to Smithsons' conception, van Eyck thought that from the scale of the house to the one of the city that kind of place of interaction would stimulate significant encounters between real people, thus increasing personal and community identity.

Taking the reflection on the in-between to its extremes, van Eyck conceived a whole architecture made of creative configurations of intermediary places. The notion of place and the idea of in-between have thus great affinity, both taking place between the polarities of inside and outside, here and there, small and large, part and whole, house and city, and so forth.

Nevertheless, unlike the Smithsons, van Eyck refused a hierarchical conception of the modes of association of a community, affirming the idea of a reciprocal determination between the part and the whole (the small and large, the house and city, etc.), as contributing on a same level of importance to the shaping of human environment. However, if there existed a difference in the quality of the relations (hierarchical on one side, mutual and peer-to-peer on the other), both Smithsons and van Eyck were crucial to shift the main focus on relations - that is, on the in-between<sup>19</sup>.

### **(A first) conclusion**

The few described points traced so far are but a small part of what would be a much more extended and intricate constellation about the in-between and its influences within the architectural discourse, starting from the postwar years. Yet they already provide innumerable insights still relevant to contemporary architectural design and practice, and they, in turn, seem to constitute promising nodes of numerous other ramifications, crossing disciplinary, geographical, and chronological boundaries.

Since it would be impossible to describe how the presented trajectories arrived in our contemporary discourse, this paper sketches a first conclusion opening two kinds of possible

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<sup>18</sup>van Eyck, A. (1968) 'Doorstep' in Smithson A. (ed.) (1968) *Team 10 Primer*. (Studio Vista, London), 101.

<sup>19</sup>Steiner, H. (2011) 'Life at the Threshold'. *The MIT Press*, October 136, 133-155. // Strauven, Francis. (1998) Aldo Van Eyck the Shape of Relativity. Amsterdam: *Architectura & Nature*, 345.

paths of reflection.

The first, on a more theoretical level, considers the concept of liminality as one able to shift the focus of the in-between from a prominently spatial dimension to a temporal one, characterizing moments of passage and evolution, and it mobilizes the in-between as a particular human condition during specific historical contingencies. Thus, the concept of liminality, referring to moments or periods of transition, during which the normal limits of thought, self-understanding and behavior are relaxed, opening the way to novelty and imagination, construction and destruction, enables us to take a step back, observing the four episodes described in the paper altogether, as symbols of an era, that of the postwar period, characterized in itself by crises, upheavals, and the need to re-adapt to a profoundly changed reality. Particularly during these in-between periods (these liminal moments), human beings experience changes that challenge their certainties, destabilizing the previous system of ordering reality but, in so, also allowing new interpretations of human life and expanding and redefining the boundaries of knowledge production.

The second path of reflection considers three stimulating concepts for urban design practice in suggesting the role that the in-between space could still play today, both in contributing to the adaptive capabilities of our contemporary urban environment and in engaging people in relational public life. Those are concepts taken from the reflections of Richard Sennet about the Open City.

The first one is the idea of ambiguous edges, underpinning a shift from the design of walls and boundaries to one of the borders, membranes, porous but resistant places which allow a visual and social exchange. The second is the concept of incomplete form, whereby a dialogue and a dynamic relation are always in place. Incomplete forms allow ambiguity, superpositions of functions, and mutating interpretations of the urban space. The third and last is the conception of the urban space and the people inhabiting it as part of an unresolved narrative, capable of embracing twin phenomena, non-rationality, and conflictual forces intended not as opposing polarities but rather in their potential to constantly question our reality.

In light of these last reflections, it could appear even more clear how, as the Smithsons affirmed, participation in the city's life requires and happens thanks to the crossing those multiple thresholds.

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<sup>20</sup>Thomassen, B. (2018) *Liminality and the Modern. Living through the In-Between*. (Routledge, London), 1-2.

<sup>21</sup>Sennett, R. (2017). *The open city*. In *In the Post-Urban World* (pp. 97-106). Routledge.

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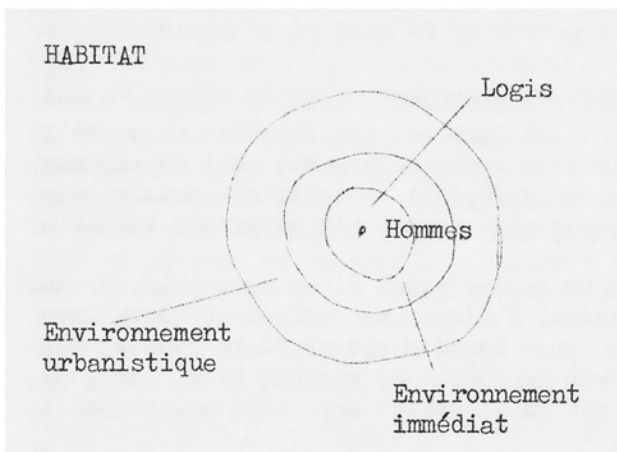
## Illustrations and tables



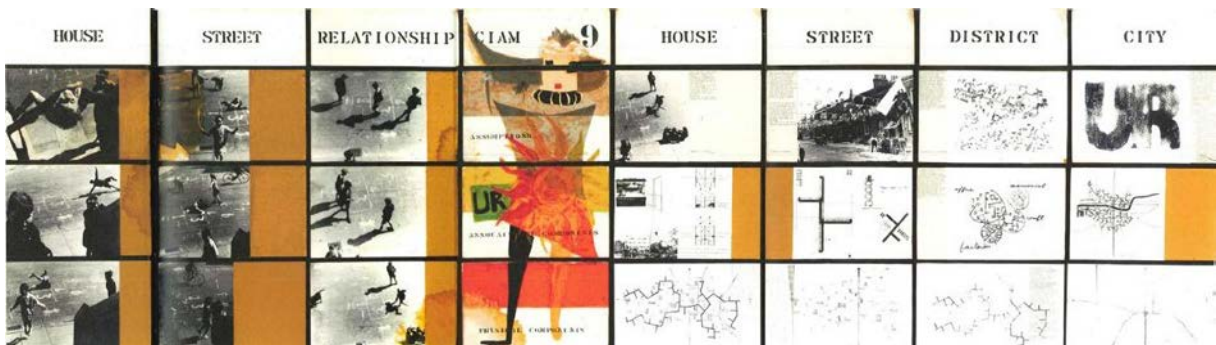
**Figure 1.** (Richard Hamilton et al., Growth and Form Exhibition 1951, London at ICA. Retrieved from <https://medium.com/@hhkim/growth-and-form-exhibition-1951-7561090e91d5>)



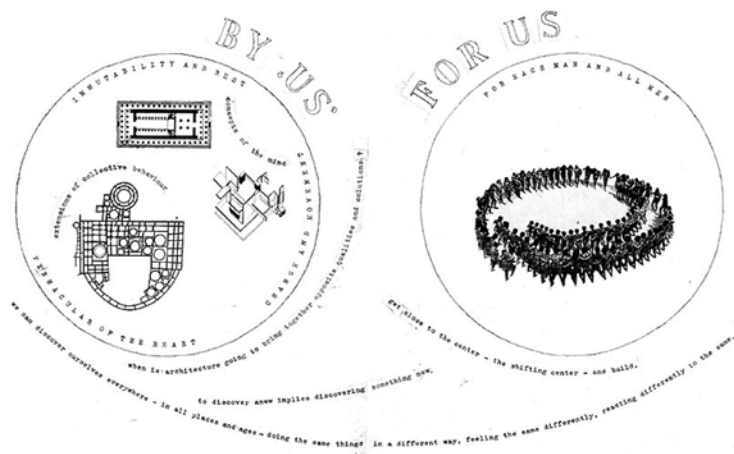
**Figure 2.** (Photograph of installation view of Parallel of Life and Art exhibition, September 1953–18 October 1953, Tate Archive, TGA 9211/5/2/89)



**Figure 3.** (G. Candilis, Habitat diagram for the 1952 CIAM meeting in Sigtuna, Sweden. CIAM Archive, gta/ETH, Zurich).



**Figure 4.** (A. and P. Smithson, Urban re-identification. Reproduction of the "Urban re-identification" grid, presented at the ninth CIAM congress in Aix-en-Provence, 1953. NAI Collection)



**Figure 5.** (A. Van Eyck, The Otterlo Circle, presented in Otterlo, Netherlands, 1959).

**Figure 6.** (Children in the Sculpture Pavilion from A. Van Eyck, 1965-66, in Arnhem, Netherlands).



## (In)forms of empowerment. The role of the project in inclusive urban transformation processes

Santiago Gomes

Dipartimento di Architettura e Design. Politecnico di Torino. Torino. Viale Mattioli, 39. 10125.

E-mail: [santiago.gomes@polito.it](mailto:santiago.gomes@polito.it)

Keywords: *Villa, Popular Habitat, informal settlements, Buenos Aires, Community empowerment*

Conference theme: *New strategies for a changing society*

**Abstract.** *Since the 1990s, the progressive contraction of public policies and the transfer of capital to the globalized private financial sector have subverted and radically transformed the processes of production and consumption (of the city), provoking cyclical international economic crises, reflecting a crisis in the political and social systems that had characterized the Societies of the post-World War II period. Phenomena of social exclusion and spatial segregation (never fully resolved) have gradually worsened in the last thirty years, affecting similarly not only the South of the World, outlining an urban context profoundly changed by new forms and new dimensions of urbanization. These emergent conditions have crystallized into the physical form of cities and appear most clearly in neighborhoods and housing complexes promoted by the welfare state, in “temporary” solutions for communities and ethnic groups, seasonal workers or migrants, or in the “informal” development of peri-urban fabrics. In this panorama, the paper presents some design explorations (didactic and field research) conducted on the popular habitat of the Buenos Aires metropolitan area in order to recuperate the operational character of the research on Urban Morphology as community empowerment tools seeking socio-spatial justice.*

## **Introduction**

Since the 1990s, the progressive contraction of public policies and the transfer of capital to the globalized private financial sector have subverted and radically transformed the processes of production and consumption (of the city), provoking cyclical international economic crises, reflecting a crisis in the political and social systems that had characterized the Societies of the post-World War II period.

Phenomena of social exclusion and spatial segregation (never fully resolved) have gradually worsened in the last thirty years, affecting similarly not only the South of the World, outlining an urban context changed profoundly by new forms and new dimensions of urbanization. (Soja, 2000)

These emergent conditions have crystallized into the physical form of cities and appear most clearly in neighborhoods and housing complexes promoted by the welfare state, in "temporary" solutions for communities and ethnic groups, seasonal workers or migrants, or in the "informal" development of peri-urban fabrics.

However, if the hierarchies overthrow and the crisis of political representativeness have determined or influenced the emergence of these issues, this upheaval, on the other hand, has generated a total change in the manner in which the city transforms itself (outside the disciplinary system of codified and established knowledge), stimulating the rise of social activism, participatory policies and involving an unprecedented multiplicity of actors and stakeholders.

In this frame, the paper presents design explorations (didactic and field research) conducted on the Popular Habitat of the metropolitan area of Buenos Aires in order to recuperate the operational character of the research on Urban Morphology, redefining categories, methods, and tools for the reading and design of complex urban dynamics, prefiguring a possible alternative to the dissolution of the discipline and material action of the project within eminently political and social processes.

## **Methodological approach. Definitions**

To understand the delimitations and scope of the investigation we present, from a methodological perspective, however, it is first necessary to make a disambiguation of what we call Popular Habitat for the purposes of the research (Connolly, 2014, Gassull, 2017). Although the prevailing interest of our studies concerns the capacity of the design disciplines to operate within the physical outputs that materialize the conditions of inequality in the accessibility to the urban space - and thus the more evident manifestations of such phenomena - in this work, we considered it important to investigate not only the self-produced, spontaneous, informal, or squatter city but felt it necessary to include other fabrics as well, which are the result, on the one hand, of the State intervention providing housing solutions (namely the large residential complexes) and, on the other, of the action of the middle classes in the configuration and concretization of housing models (in this case closely related to individual property), keeping in the background the omnipresent power of the grid as the main fabric-building device of the city of Buenos Aires.

Thus, what we call Popular Habitat gathered a multiplicity of realities that intertwine a multiplicity of subjects, situations, dynamics, and forms of construction of the urban fabric (of the space of the city). In this sense, the first necessary step in attempting to understand, read and interpret such spaces is to characterize them, organizing and systematizing the different configurations (formal, legal, economic, productive, and social) that they take on in time and space.

From such categorization, it is possible to carry out a mapping conducted on two complementary



levels: a diachronic reading on the one hand, which allows us to highlight the dynamics and factors that have influenced the fabric generation; and, on the other hand, a morphological investigation that allows us to identify, group and organize recurring rules and models of conformation and articulation of popular habitat spaces, territorializing the phenomenon (Raffestin, 1984).

The recognition we refer to gives us an overall image, a general framework, from which to select a significant sample of investigation that (containing within it recurring characters) can provide, at a later stage, specific disciplinary tools for the design and accompaniment of processes of transformation of the city space. It is a matter of rehashing the system of knowledge, 'adapting' the tools of reading and interpretation to the specific local and regional reality, identifying conditions and possible lines of concrete action to support the regeneration of the habitat (including the issues of housing, labor, production, and public and symbolic space) of the popular masses (Fernández Castro, 2007).

In this sense, we understand reading as an integral part of project action, as a tool that enables inclusive and participatory transformations, recovering a role, but above all, an operability for the discipline within the complex processes of socio-spatial generation and regeneration of the multidimensional contemporary cities (Soja, 1980).

As mentioned above, the general framework for the characterization and study of the popular habitat in the Buenos Aires Metropolitan Area (AMBA) includes a diverse set of urban forms with differentiated characters, generational dynamics, and socioeconomic and legal composition. Identifying and cataloging such particularities is important because it highlights how different land occupation mechanisms give rise to different patterns of urban fabric conformation.

The Villas (misericordia or de emergencia) are the type of settlement that best fits the established definition of Slums. In general, they arise as a spontaneous occupation of urban land, almost always of public ownership (Cravino, 2001), in which irregular forms of implantation transfer to the settlement system practices of individual self-construction perceived as a temporary and provisional housing solution. Despite being characterized by high density, due to their legal illegitimacy, they often lack essential basic services such as water and electricity connections, garbage collection, or sewage systems.

The Asentamientos, although often assimilated to Villas, are the consequence of a collective and organized occupation of land, generally privately owned, whose low commercial value (because they are floodable or polluted) makes them prone to abandonment (Cravino, 2001). This primitive mode of organization helps to explain forms of parceling and allocation that can be traced back to the block form and to a definition of layouts that replicates the characteristics of the urban grid of the planned city.

The so-called Barrios Populares, on the other hand, constitute a derivation of the planned urban system that is recreated and adapted to the need to house family and friends through the partial transfer of land not occupied by buildings (Borthagaray, 2005), promoting the illegal densification of the fabric, and altering the relationship between open and built space, with implications in the conformation of public space.

A similar dynamic can be found in the development and consolidation of 'temporary' neighborhoods that arose to respond to emergencies, which, having become de facto permanent, recreate city forms from the original layout and in which an overlapping of planned and spontaneous patterns takes place, always with high densities and overcrowding and eroding the original accessibility routes and open spaces.

The large residential complexes (Grandes Conjuntos) promoted by the State, on the other hand, constitute a phenomenon from the morphological point of view that is exceptional, not

only within the panorama of the popular habitat but also with respect to the settlement system of the planned city. Arising mainly between the 1960s and 1980s, they constitute alternative city models and interpretations that, based on their own rules, tried (at least in their intentions and in line with the terms of the international architectural debate of the time) to translate into the physical form of buildings the web of social relations among the inhabitants, eluding confrontation with the surrounding settlement systems (when present) and providing closed solutions with very low levels of adaptability. Even in this context, some practices of appropriation of common spaces and public spaces can be observed (especially along the jagged perimeters of the complexes and the surrounding urban fabric) that have produced spontaneous modes of articulation but also compromised habitability and usability.

Analyzing, in general terms, the development and formation of the urban fabric of the Buenos Aires metropolitan area, two complementary generating devices emerge powerfully: the grid, as a pervasive settlement rule, and the autonomous, individual action of the inhabitants. In this sense, the working-class sectors and middle classes have, over time, made an impressive contribution in quantitative terms to the definition of the city's space, introducing typological, morphological, and semantic patterns that have acted with greater force than planning activity or structural proposals such as the public housing complexes described earlier, which, although significant within the overall picture, quantitatively represented only a marginal phenomenon in terms of urban land.

### **Diachronic mapping**

A chronological analysis of cultural, political, environmental, and urban development events, although reported here in an extremely concise manner, allows us to situate the popular habitat, as a phenomenon, in the broader framework of the development of the urban fabric that it contributes to generate.

Founded in 1536, destroyed in 1541, and finally re-founded in 1580, until the last quarter of the 19th century, the city of Buenos Aires occupied a small part of the present metropolitan territory abutting the Rio de la Plata. The town grew very modestly in about 300 years, from the 16x9 block layout depicted in the 1583 'Plano de división de tierras', in fact, the 'Plano de la Ciudad de Buenos Ayres con la división Civil de 12 Juzgados de Paz' of 1862 reports a fabric consisting of about 28 blocks along the north-south axis and about 20 blocks to the west.

If the expansion of the city is hindered, until 1810, by the Spanish Crown to prevent processes of autonomous claims, even after the declaration of independence (1816) and for more than fifty years, the convulsive process of formation of the nation will also influence the economic and urban development of the city. In this context, the incipient expansion of the fabric slowly advances in continuity with the existing, following the traces of the orthogonal grid of regular blocks of the original nucleus in a northwest direction, while the flooded areas to the southwest, along the course of the Matanza-Riachuelo River, are preserved free of settlements or processes of transformation and occupation.

The relative political stabilization of Argentina and its integration within the framework of the international division of labor, in which the country assumes an important role as a producer of raw materials, are the triggers for the city's growth. The Port of Buenos Aires organizes and reinforces a system of radial connections by concentrating, channeling, and conditioning the expansion along the routes that connect the fertile lands of the interior with the exit to the Atlantic. Thus, while an extraordinary expansion of the urban fabric takes place, immense containers for the processing and elaboration of meat, wool, and grains surround the city, especially along the course of the Matanza-Riachuelo River, in the vicinity of the Port. It is

precisely near these, in flooded marshy areas vacated by the factory buildings, where the first workers' settlements appeared between 1890 and 1930.

The crisis of the agro-export model after the crisis of 1929 laid the foundations for the transformation of the productive system. It forced masses of workers to leave the countryside in search of employment in the incipient industrial activity, which, especially after 1944, received an unprecedented impulse. Along the east-west axis, on the southern edge of the conurbation, always close to the course of the Riachuelo, first, and then along the perimeter of the administrative limits of the Capital, large productive compartments emerged and were arranged, occupying portions of undeveloped land, in a fragmented manner, practically without planning and conditioning future developments. Once again, in the interstices of the productive fabric, more or less organized forms of popular housing appear, contributing decisively to the definition of the urban form.

The dismantling of the industrial apparatus promoted by the military dictatorships, especially since the late 1970s, and the tertiarization of the economy in the 1990s, resulted in the impoverishment of the living conditions of large sectors of the population, encouraging and multiplying precarious housing conditions, increasing the proportions of marginality and informality, and accentuating a dual development of the urban fabric and inequalities. In this context, disused infrastructures and industrial plants also provide new spaces for the expansion of the popular habitat.

After the great economic crisis of 2001, the economic growth, and the reindustrialization process that the country is going through coincide with a generalized expansion of civil and social rights, generating developments in two opposite directions: on the one hand, there is an expansion, densification, and precariousness of the popular habitat, while at the same time, concrete projects of redevelopment and socio-spatial inclusion are consolidated and widely implemented.

### **Morphological mapping**

The mapping of the variety of fabrics that, for the purposes of this research, we have included under the expanded definition of popular habitat in the Metropolitan Area of Buenos Aires (AMBA) allows us to outline a general framework from which to identify - in the morphological articulation of the urban plots that characterize them - certain recurrences in the ways in which they emerge and develop. In particular, it is verified that the different forms adopted by the popular habitat follow settlement logics closely related to the presence of three nearby elements: watercourses, mobility infrastructures, and large voids.

Agglomeration on the banks of rivers and streams is a constant in territorialization processes. In the case of the AMBA, particularly regarding the emergence of precarious, more or less informal and spontaneous settlements, the courses of the Matanza-Riachuelo and Reconquista rivers are among the first areas affected by this phenomenon. Swampy, subject to cyclical flooding, polluted and therefore abandoned and of little market value, they constitute "available" soils for occupation, giving rise to forms of fabric strongly conditioned by orographic conditions. The low value of the land also conditions the location of many public housing developments and gives rise to an important development of the action of a lower middle class in search of housing solutions in individual property.

Mobility infrastructures constitute a second attraction factor with unique characteristics with respect to specific situations. Railroad lines and freeway tracks delimit and interrupt the urban fabric, generating inaccessible and residual spaces that tend to become saturated and, especially in the case of the road network, offer advantageous possibilities of accessibility to

the transport system. The numerous dismantled railroad tracks and abandoned shunting yards in the metropolitan area also represent an important catalyzing element, giving rise to forms that, organized from the infrastructure, develop going to completely occupy the available space (in established contexts) or 'jagged' in peri-urban contexts.

The third element of proximity that seems to favor the formation of concentrations of informal settlements is the large voids outside the major axes of urban expansion, flooded or agricultural land, areas whose buildability is not foreseen by urban plans, or spaces surrounding large industrial complexes. While the former lead to a gradual development of the popular habitat with forms that disintegrate as one moves away from the consolidated fabric near large industrial complexes, we often find, on the other hand, phenomena of concentration on edges where the built-up area assumes and reproduces by expansion the forms of the generating element.

### **The line of popular habitat. Conditions and categories**

Superimposing the temporal reading and the morphological survey, it clearly emerges that, although they are distributed in an archipelago along the AMBA territory, along the east-west axis, and parallel to the course of the Matanza-Riachuelo River, there is a concentration of the different forms of popular habitat, condensing variegated fabrics, formed in parallel to the urban growth of the City, which defines what we have called the line of popular habitat. In this sense, it seems pertinent to concentrate in this area of study a deep analytical effort in order to identify, with greater precision, recurrences, rules, and patterns of formation of functional fabrics to the formulation of specific proposals of transformation, actions of spatial justice and activation of inclusive processes that, far from wanting to 'normalize,' conform, or order, try to investigate innovative forms of intervention in the physical and social fabric of the City.

Along the Matanza-Riachuelo river basin, which occupies an area of some 2,300 square kilometers, some 5 million people reside, slightly more than 10% of Argentina's total population. Of these, several hundred thousand live in critical economic conditions, below the poverty line, and in a precarious housing situation. It is estimated that 500,000 people live in the slums and settlements on the banks of the river, and the area concentrates almost half of the total population living in precarious settlements in the entire conurbation.

These data reflect quantitatively the growth processes of the AMBA briefly outlined above and, together with the data on environmental pollution, underline the urgency of channeling efforts, studies, and transdisciplinary and transcalar planning for the formulation of specific policies and for the activation of citizenship.

The localized analysis carried out on 14 enclaves along the orographic and infrastructural axis of the Riachuelo made it possible to morphologically investigate a sample of 22 neighborhoods: A Liniers, the conformation of alternative fabrics, framed in the checkerboard logic; the large residential complexes Soldati, Ciudadela I and II, Piedrabuena and Lugano I and II, promoted by the State; and the villas, asentamientos and barrios populares Villa 31, Villa Rodrigo Bueno, Villa Inflammable, Villa Tranquila, La Cuernito, Isla Maciel, Villa 21-24, El Fortín, Villa Puente Alsina, Barrio Pampa, Villa 1-11-14, Villa Jardín, Villa Las Achiras, Asentamiento Sarmiento, 9 de Julio, Barrio 17 de Noviembre and La Cueva.

The choice of investigation instruments to which the case studies are subjected is based on the definition of certain conditions that define the Urban and to which the project is called upon to respond: accessibility, reference, habitability, exchange, demarcation (Fernández Castro, 2007). These conditions are related to the various forms and modes adopted by the city space. Thus, the analysis tries to recognize and record the characteristics of the examined fabrics

according to 5 major categories that try to identify the forms and relationships between Flows, Containers, Clusters, Nodes, and Boundaries.

The identification of Flows, paths, and continuity does not refer exclusively to the idea of a linear succession of the collective space but includes the meaning acquired by connecting paths as links between points, even distant ones.

The highlighting of referential elements, recognized by the community on a local, metropolitan, and regional scale, includes places to which collective cultural, symbolic or functional values are attributed, as well as Containers defined by mass consumption practices.

The identification of Clusters aims to overcome the idea of a more or less homogeneous neighborhood or place of belonging, going on to detect, even in the presence of typomorphological heterogeneity, conditions of continuity or unification derived from the presence of limits and edges.

The notion of Node includes intersections, crossings, and exchanges between flows in the two meanings referred to above, which define both exceptions and spaces of reference or structuring of the fabric, as well as alterations in the system of restrictions.

The recognition of Boundaries responds to the notion of edge between homogeneous fabrics and clusters but also to the materialization of the separation, barrier, or expulsion of alternative or antagonistic 'different' parts of the city.

By subjecting all the case studies to a systematic project-oriented reading, we were able to describe individual realities (useful for working in individual contexts) but, more importantly, to identify behaviors, dynamics of development, generation, and modification of the form of these parts of the city.

In particular, and as a first general synthetic result, it emerges that the popular habitat fabrics grow by: concentration and condensation, along the infrastructural axes, adjacent or parallel to them (Villa 31, Villa 1-11-14, Villa Jardín, or Villa Cuernito); embedding, occupying disused railroad tracks and around lakes and reservoirs (Puente Alsina, Isla Maciel, Villa Tranquila, or Villa Inflamable); completion and expansion, completely occupying interstitial spaces between boundaries or barriers (part of Puente Alsina and Villa Inflamable, or Villa La Cueva); and protecting and surrounding centralities, mainly public spaces or collective buildings (practically in specific areas of all the cases reviewed).

At the micro-scale, the identification of articulation mechanisms between the built fabric and the open space allows the elaboration of abacuses of recurrent behaviors capable of orienting specific design proposals on an architectural scale, acting on the built system and the public space through key and paradigmatic actions of reconnection and reorganization on the one hand, and diffuse and typified on the other.

Obviously, it is not a matter of building catalogs from which to choose solutions to be used in design proposals but of constructing informed project scenarios, weighing variables and constants. In this sense, it is not only the forms and typologies identified that contextualize and nurture the projects but also the thematic precedents, external references, and transdisciplinary contributions (Fernández Castro, 2010).

In this line, the reading work carried out on the popular habitat of the AMBA has resulted in design elaborations for a specific area and the formulation of strategic proposals that attempt to investigate the possibilities of rethinking a part of the metropolitan territory, involving the compartments of Barrio José Hernández, the villas Las Achiras, La Cueva and 17 de Noviembre and the Mercado Central complex, between the route of the Buenos Aires-Ezeiza highway and the Riachuelo.

Working on the conditions of accessibility, reference, habitability, exchange and demarcation,



the projects propose modes of hybridization both at the physical and the practices levels that strategically orient interventions on the precarious residential fabric, the heritage of unbuilt spaces, the system of connections and accessibility, and the spaces of production and work, outlining an 'open' scenario from which to initiate punctual, widespread and structural actions and around which to articulate actors, competencies, interests, and responsibilities.

In this sense, the project is situated in the furrow traced by the numerous Latin American experiences (e.g., Villa Tranquila, Villa 31, Favela-Bairro Program) in which strategic prefigurations based on the interpretation and valorization of the starting conditions served for the progressive drafting of projects, the activation of the associative fabric, the formalization of interest and power groups, and facilitated the identification and involvement of the inhabitants in inclusive processes that far exceeded the pretensions of improving residential conditions (Gomes, 2018).

### **Hopeful conclusions**

Rooted in studies on urban morphology, the design research conducted on the Buenos Aires metropolitan area works on a field, that of popular habitat, which is, in its modes of production and reproduction, almost completely outside of disciplinary elaboration. Without planning, without design.

Intentionally, in epistemological terms, these explorations are constructed, precisely from the recognition of such territories as urban facts, in an action that carries with it the rejection of the definition of 'informal'. The slums, the sprawl, the Villa have a form. If they did not have it, it would mean that they do not possess materiality, nor organization rules, nor systems of production of their own, nor meanings. It would mean that they do not exist. From the work on the AMBA, on the contrary, it emerges, in fact, that they are part of the cities, with their own rules and forms that exist and that, as we have seen on several concrete occasions (Fernández Castro, 2005, Segre, 2000), in the optics of activating, accompanying, sustaining and giving strength and concrete possibilities (even technical) of implementation, they require to be investigated, classified and systematized. They require moving from a traditional approach to a transitional one, turning the gaze toward the study of the dynamics of change in urban form and the incremental metamorphoses of urban elements and spaces, identifying recurring patterns in the processes of reproduction and modification of space, and then, redefining categories, methods, and tools for reading and design complex, multi-scalar, and multi-dimensional realities.

In this sense, the projects and research carried out over the past two decades by the Centro de Hábitat Inclusivo of the Universidad de Buenos Aires, within which our study has developed, highlight the pivotal role of the project as a prefiguration of possible scenarios of inclusive transformation, anchored in the meanings and values that the community validates, recognizes and exercises and as an empowerment tool for citizenship.

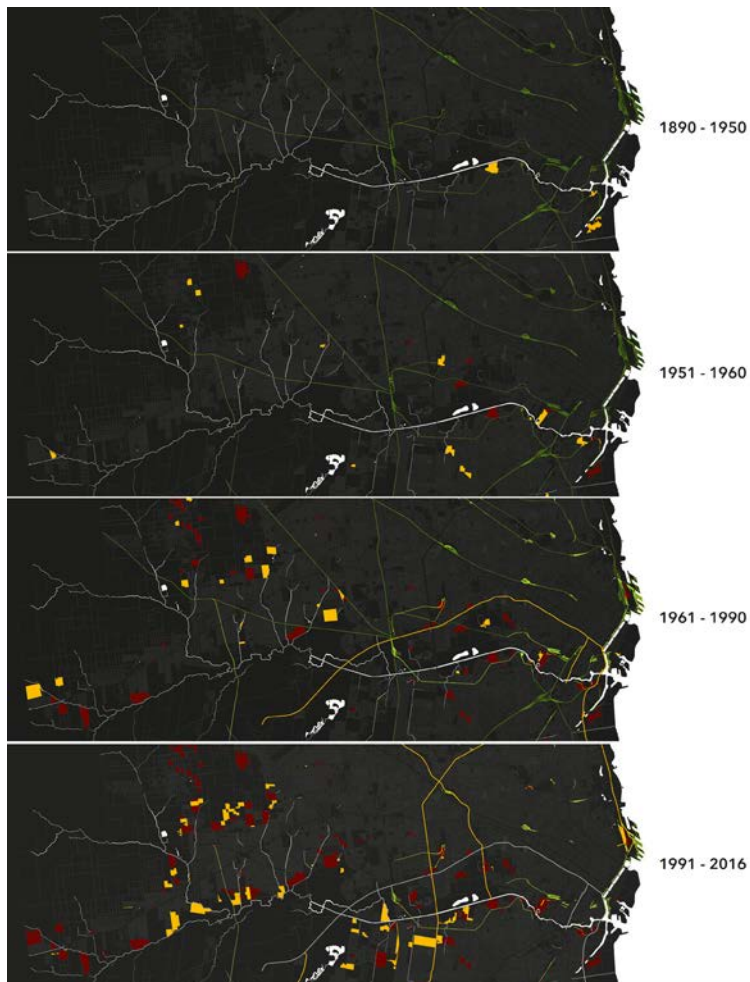
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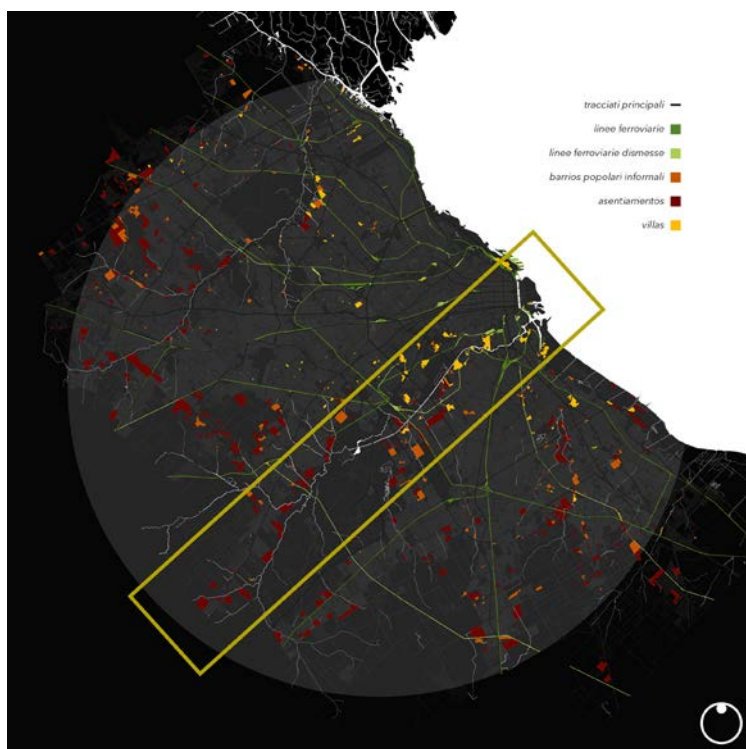
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**Figure 1.** (Dual City. The northern border of Buenos Aires central area) Image courtesy: Instituto de la Espacialidad Humana, Universidad de Buenos Aires

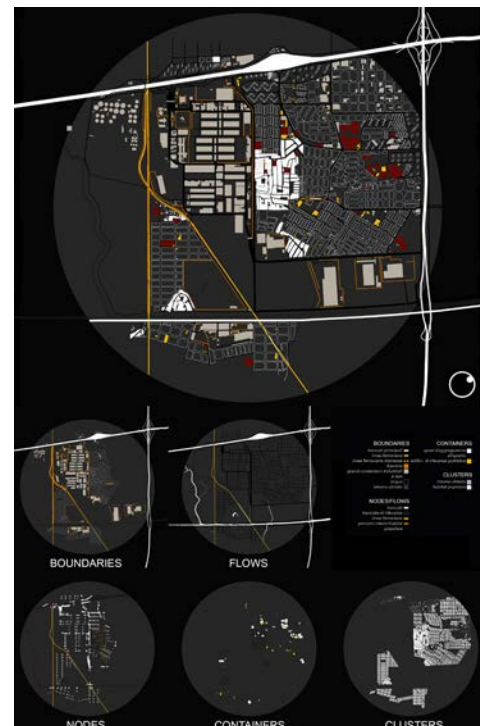


**Figure 2.** (Popular Habitat. Diachronic mapping) Image courtesy: Mattia Croci



**Figure 3.** (The Line of Popular Habitat) Image courtesy: Mattia Croci





**Figure 4.** (Behaviors, dynamics of development, generation and modification of the form of Popular Habitat: 1. Concentration and condensation; 2. Embedding; 3. Completion and expansion; 4. Protecting and surrounding centralities) Image courtesy: Mattia Croci

**Figure 5.** (The Mercado Central area: Reading) Image courtesy: Mattia Croci



**Figure 6.** (The Mercado Central area: Project strategy) Image courtesy: Mattia Croci





## The concept of venustas in the current design practice

Andrea Guidotti

Dipartimento di Architettura – DA- Alma Mater Studiorum - Università di Bologna

Viale del Risorgimento, 6 - 40136 - Bologna

E-mail: andrea.guidotti@unibo.it, ing.andreaguidotti@andreaguidotti.it

Keywords: *Collective perception and assesment of spscialised media, figurability, Modulor, CQAP (Commission for Quality Architecture and Landscape)*

Conference Theme: *Communities and Governance*

**Abstract.** *We live in times of change and, consequently, of doubt and bewilderment. Architecture, is (should be) a reflection of an idea of the world. If the 'dominant' idea falters, so does the consensus on built architecture. Much research shows that the mass opinion on the 'new' buildings diverges from the assessments of specialised media and the Academy. Times have changed: the attitude of the Modern to be 'innovative', not mindful of the past, 'enthusiastically disrespectful' seems to be less and less welcome. Contextualisation and 'figurability', the characteristics of all historical architecture, are absolutely absent in the epigonic manifestations of Modernism. Achieving figurability requires an orderly, comprehensible arrangement of the compositional elements. The elements must therefore be ordered according to a layout. Architectural Order also is a formidable tool for pursuing the figurability of a construction. The Modulor (LC 1946) was an ingenious invention by which the designer would generate harmonised constructions from the golden number. Discussion on Venustas today is therefore more relevant than ever in the profession and consequently in teaching. With regard to the compositional aspects, it would be appropriate to recover the above-mentioned instruments. The CQAP (Commission for Quality Architecture and Landscape, an advisory body provided for by regional laws) should be able to open a confrontation between professional classes and the user public by seeking a common shared feeling, recovering, in these troubled times, the basic principles of perception in pursuit of order/beauty to which we humans tend, have probably always tended.*

### **Introduction: Venustas today**

We live in times of change and, consequently, of doubt and bewilderment.

Now the consensus that accompanies the Modern is faltering, assuming it ever had a popular consensus. All mainstream narratives are losing credibility. Why this crisis of the West is -must be- a matter of reflection. I make here a summary that I consider necessary.

The western classical tradition originated in the Mediterranean where climate and culture allowed the development of agricultural civilisations that perceived the world to be governed by Causes. The world is logical, ordered: world as Cosmos.

Imported into northern Europe, classical culture spreads. Deep in the north, however, the tradition of the wandering hunter peoples perceives the world as generated by the creative force of Chance: World as Chaos.

Malthus, Darwin, Spencer make up make up an intellectual path that has led to 'social Darwinism' with all the aberrations of the 20th century and ultimately to the apologia of liberalism, not only economic. Since the 1980s (this reference is not by chance ) liberalism has accelerated. Waning social solidarity, uncertainty for the future impossible to plan because it is entrusted to the randomness of events, generate panic. The mainstream narrative is thrown into crisis.

Architecture, in its 'formal resolution' is (should be) a reflection of an idea of the world. If the 'dominant' idea falters, so does the consensus on built architecture. Opposition and protest arise.

Much research shows that the mass opinion on the 'new' buildings diverges from the assessments of specialised media and the Academy,

### **Dissent on construction**

In my city, the public - at least those who enjoy the material conditions and time to engage in an intellectual exercise - writes letters of disapproval to newspapers, participates in protest committees at practically every unveiling of a new construction or even the simple 'innovative' colouring of a historic building.

It has to be acknowledged that 'urban monsters', as new buildings are called, do not do much to be loved. They are often built on the site of abandoned industrial plants: they rise four or five storeys above the historicised suburbs obstruct the view and the light from the neighbourhood, present white plastered surfaces with balconies or loggias jutting out to 'enliven the elevation'. They are therefore maximally discordant. They create disconcertment. They are epigonic declinations of a modern that does not consider the context at all.

Is this a local situation? No: Much research shows that the mass opinion on the 'new' buildings diverges from the assessments of specialised media and the Academy. The Academy and magazines actually talk about important buildings in terms of economic commitment, popularity of the designers, construction refinements, but the disregard for the context concerns important buildings and 'urban monsters' alike.

Taste must be educated, or does 'school' ignore the profound needs inherent in the human soul? Research has shown that first-year architecture students share analogous aesthetic judgements to a similar sample of students from other faculties. But in subsequent years, judgements progressively diverge.

On the other hand, albeit ignored by the generalist and even the specialised press, various websites and a few printed publications document non-'modern' buildings that call themselves 'traditional architecture', which seem - this claim should be verified - to gain user and public acceptance. One can say: "modern dissent", "tradition consensus".

What does this situation descend from? The motivation may depend on what I observed in general terms in the introduction. Times have changed: the attitude of the Modern to be 'innovative', not mindful of the past, enthusiastically disrespectful' seems to be less and less welcome.

Going into more detail in this 'dislike' I would highlight two aspects: contextualisation and 'figurability', the characteristics of all historical architecture, are absolutely absent in the epigonic manifestations of Modernism.

Contextualisation would require a very broad reflection. On figurability I think we can engage in some simple reflection, which is also supported by recent studies on vision in neuroscience.

The Treccani dictionary defines "figurabile adj.. [der. of figurare]. - That can be figured or imagined' I would add: Figurabile = an image that can be understood, and easily described. A figurable architecture does not fatigue us, it soothes us and pleases us. Neuroscience supports this concept. The act of looking activates various areas of the brain that process information. The 'seen' then becomes vision with emotional reactions of various types from liking to rejection. It seems that the measure of the liking how easily an architecture is 'figurabile' i.e. understood and easily described. Neuroscience tells us that unlimited checkerboards of squared perspectives lead to discomfort in vision. Over millennia of evolution, vision has been formed by accepting the infinite complexity of plants. The mental attempt to comprehend a geometric homogeneity generates fatigue and discomfort<sup>1</sup>.

Modernism, exasperated by the baroqueism of the 19th century eclecticism, swept away Architectural Order, ornamentation and, in general, all the rules honed over 2500 years and more of Architecture.

All pre-modern architecture pursued order and figurability. For more than two millennia, builders, master builders and architects of monumental works sought and handed down from generation to generation general and detailed rules to make buildings not repulsive, but, on the contrary, pleasing. In other words, beautiful. By rejecting tradition Modernism has destroyed this heritage.

### Regulatory Tracks and Figurability

The studies on "architecture without architects" and the claims of the "Italian Typological School" would seem to make Venustas dependent on the cogency of Utilitas and Firmitas. Indeed, architecture without architects<sup>2</sup> is born in a specific "geo-material area", is refined by "spontaneous consciousness" in trial-and-error cycles, and it is natural that it achieves and consolidates results, including formal results for architectural, building and urban types.

In this consolidation, the more broadly cultural aspects seem to disappear in a mechanistic and consequential proceeding. In reality, the history of minor architecture shows how the same architectural type, realised for centuries with the same materials, construction techniques and functional distributional organisation, presents different formal resolutions over the centuries. The 'Italian typological school', not fully grasping this mode, seems to be affected by the mechanistic climate associated with the temperament of Modernism.

But if 'formal resolutions' vary over the centuries, and venustas has its autonomy, the question arises as to what, in very different buildings, the venustas is founded on that remains recognised

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<sup>1</sup>A. J. Wilkins, Professor of Psychology, University of Essex, Internet: Looking at buildings can actually give people headaches - here's how

<sup>2</sup>Bernard Rudofsky, Architecture without architects, 1964, Doubleday and company, Ink and Company, Garden city, New York

over time. The simplest, though not exhaustive, answer seems to be “figurability”.

Achieving figurability requires an orderly, comprehensible arrangement of the compositional elements. The elements must therefore be ordered according to a layout. One can therefore try to identify these traces even in the most humble historical architectures.

The objection that on any building, by patiently and creatively investigating, one can find regulating traces is false. In fact, they cannot be found in buildings from the 1950s onwards, therefore non-historical, even if they have been subjected to careful analysis.

Did he who built adhere to the layouts we find? We cannot know, but it is evident that he sought or followed an order.

The work over many years of graphic survey/restitution of student engineers-architects on historical architectural types has led to the discovery of significant constants<sup>3</sup>. First of all, the use of local historical linear unit integers was found out. This is understandable: the construction often started from previously cultivated plots and defined the boundaries by non-random measurements.

More interestingly, in the plans and elevations, the measurements recorded were integer multiples of these units. Not only that, these numbers were not random, they were numbers or multiples of the well-known Fibonacci series numbers (0,1,1,2,3,5,8,13,21... ) - numbers that describe many phenomena of organic growth in which the new element grows larger by “being mirrored” in the previous one by specularity. As is well known, by doing the ratio between two numbers of the series, one very quickly reaches a very good approximation of the golden number<sup>4</sup>. So even just using the first numbers of the series, one can easily obtain rectangles whose sides have measurements that are close to the golden ratio.

There was a certain astonishment in seeing that buildings of absolute poverty of material and workmanship acquired dignity and undoubted interest from the simple positioning of the windows that made it possible to identify constructions *ad quadratum* or, if older, late medieval, *ad triangulum*: The regulating tracings. The Root of 2 ratio or the golden number can also be found. In the so-called basic, less noble construction, these tracings did not originate from a scale drawing, but, probably directly, on the building site through knowledge handed down from master builder to master builder. The compositional elements, essentially the openings, stringcourses, sill markers, and plinths were positioned by undergoing multiple measurements of reference numbers. Or through elementary tracing techniques carried out with ropes attached to nails by means of very simple constructions using circular arches so as to obtain rectangles with sides in proportion to the root of 2 or the golden number or, typically for porticoes, the semi-elliptical arches (a construction known as the gardener’s construction).

In the search for traces, the presence of a plinth, stringcourse, or sill marker, since they are relatively free elements in their positioning, suggests at a glance that the search for traces will be fruitful.

### **Architectural Order and Figurability**

Architectural Order is a formidable tool for pursuing the figurability of a construction.

Order implies first of all symmetry, i.e. the specularity of the left side of a construction in relation to the right and, in the vast majority of cases, the presence of openings on the axis of symmetry: openings in odd number, columns/solid parts in even number.

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<sup>3</sup>Andrea Guidotti, *Tracciato regolatori in edifici storici del bolognese*, in AAVV *Paesaggio costruito: qualità ambientale e criteri di intervento*, Alinea Editrice, 2008

<sup>4</sup>  $13/8 = 1,625$ . The golden number is 1.618....

Not only that. Following the etymological meaning: symmetry (συμμετρία, compound of σύν 'with' and μέτρον 'measure'), the submission of all measures to a module. In the Greek temple module is the name given to the diameter of the column.

The myth of the 'primordial hut' was evoked to give architectures a 'natural model' This reference of the lithic construction to a more intuitive wooden one is certainly a formidable aid to an understanding of the structure. The correspondence of every single element of the Order to the elements, even minute ones, of the primordial hut is meticulous. The first wooden frame corresponds to the 'architrave', the 'triglyphs' to the second, 'base' and 'capital' mediate the connection of the 'shaft' to the architrave and the ground, or rather the 'base.' Considered in more detail, even the carvings of the 'triglyphs' and the 'guttae' may have references in the wooden archetype, or rather, in the manner of its construction.

B. Berenson (1948) introduced 'tactile values' into art criticism and art history, 'which are found in representations of solid objects when they are not merely imitated ... but presented in a way that stimulates the imagination to feel their volume, weigh them, realise their potential resistance, measure their distance from us, and that encourages us, still in the imagination, to put ourselves in close contact with them, to grasp them, embrace them or walk around them'. The imoscape and the sommoscape give the perception of the deformation of the stem in contact with the load of the capital and the pressure exerted on the base.

The entheses of the shaft, in the most evolved orders, is a very important optical correction to give "tactile value" to the column. The swelling, at a third of its height –not at a half- plastically renders the image of the solid that 'labours', is fatigued, under load and therefore is deformed by widening.

In Bologna, the city of porticoes, there are admirable Doric columns. We can say that Doric is suited to the search for a 'medietas' that characterises or should characterise the culture of this city. Doric is particularly easy to understand visually and, not surprisingly, to realise on site; in fact, there is no need for a stonemason as there would be for the volutes and leaves of the Ionic or Corinthian capitals. All that is needed is a drawing that permits to generate a gouge to 'pull' the plaster as it rotates around the shaft, thus creating the shaping. Is it perhaps this form that invites the caressing that Berenson speaks of?

At the scale of the building, then, deforming the stereotomy of the construction, the 'optical corrections' facilitate perception by increasing its tactile value and thus its figurability. The tracing techniques used by ancient builders are documented in an archaeological case study on the temple of Apollo at Didyme<sup>5</sup>.

Architectural Order then has a more elementary declination when, reduced to pilasters and entablatures, the sub-elements merge by crasis. This is how 'unadorned Order' is defined.

By identifying the 'four zones of volumetric structuring' in buildings (base zone, elevation zone, unification zone, conclusion zone), the Italian typological school reminds us of the most elementary way in which historical architecture sought the 'figurability' of an elevation.

Golden Section, the Modulor, Le Corbusier.

LC realised that his first modern buildings were hideous. The conception of the 'toit terrasse' and the 'pilotis' improved the figurability of the elevations. These two ways of treating the ground floor and the roof can be interpreted as the 'base zone' and the 'end zone'.

LC also realised that the 'volumetric body' was without rules and hastened to subject the 'façade libre' to regulating tracings based on the golden ratio.

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<sup>5</sup>Lothar Haselberger, The construction plans for the temple of Apollo at Didymis, in *Le scienze*, - Italian edition of Scientific American- no. 210, February 1986



The Modulor (1946) was an ingenious invention by which the designer would generate harmonised constructions from the golden number. According to LC it would make the beautiful easy, the ugly difficult. The Modulor as it is known consists of two sets of measurements obtained by multiplying or dividing a basic measurement equal to the height of a man (1.75 m) by the golden number. Unfortunately, in a later draft, in an attempt to make the Modulor compatible with the English system of measurements (foot inch), LC increased the base height to 1.83 m. The Unité d'habitation in Marseille (1947-1952), for example, is designed with the preferred measurements of the 2nd Modulor. The result is that all construction details appear unnaturally 'inflated'.

### **Conclusion I : Considerations for teaching**

Discussion on Venustas today is therefore more relevant than ever in the profession and consequently in teaching.

"Beauty is in the eye of the beholder", "It's a matter of taste" are elusive tautologies that leave you without tools and should work as an a priori endorsement of what you will design.

Ignoring the holistic approach to design, i.e. contextually considering the outcomes of design -utilitas, firmitas, venustas- from the very first approach, the student defines the plans and stacks them by superimposition of planes. The result is a parallelepiped with random holes. This disconcerting image generates the effort to 'animate' the elevations: an unconscious search for figurability that, even with solid motivations, has devastating results.

In Italy, planning is (should be) focused on the redevelopment of post-World War II suburbs built in haste with poverty of design and materials. Demolition/replacement construction, possibly partial, would be appropriate. The construction of a new building with a classical design would bring an additional element of disorder, i.e. it would go in the opposite direction to the desirable one: creating order.

It seems, therefore, that suggesting punctual demolitions and insertions that are strongly related to the context and are themselves orderly and figureable could generate pleasing results.

With regard to the compositional aspects, it would be appropriate to recover the above-mentioned instruments.

In particular, consideration of the 4 zones of volumetric structuring would bring about significant opportunities. The pilotis ground floor would give much in terms of neighbourhood liveability, visual transparency, summer ventilation and would be perceptibly interpretable as a base zone. The roof with photovoltaic pergolas would contribute to energy self-sufficiency and would realise, with greenery perceptible from the ground, as a conclusion zone. The volumetric body, subjected to the rules of Modulor 1, would probably be pleasantly figurable.

### **Conclusion II: Considerations for town planning**

Building regulations that are too permissive with regard to contexts must be changed. In particular in relation to the currently excessive number of storeys.

Broadening the perspective, densification must arise from ambitious urban plans (which are, moreover, difficult to conceive/realise). In the urbanised territory, the planning sequence should identify central points in which services, interchange car parks and public transport stops should be concentrated. Around these centres, residences should be densified recovering volumes by demolishing buildings of very poor quality and invasive of neighbouring buildings. Not necessarily, therefore, by constructing buildings emerging from the context.

The 'zero land consumption' goal should not lead to building in height in historicised paucipian urban areas. A simple limitation on the number of storeys and prescribed pilotis for the ground

floor would be sufficient to reduce the 'monstrosity'.

As far as the judgement of 'venustas' is concerned, the CQAP (Commission for Quality Architecture and Landscape), formerly known simply as the Building Commission, should intervene.

The CQAP is an advisory body provided for by regional laws. It is made up of a number of experts in the various disciplines concerned with land management. The commissioners are appointed by the mayor or by the municipal council, who generally choose them from lists presented by the Professional Associations/Colleges.

At present, the CQAP in many municipalities is only consulted in cases of intervention on listed buildings or in protected areas, thus invalidating its function as a landscape protection body. Which 'venustas' do The CQAP Commissioners tend towards? The one that conforms to the stylistic principles of the specialised press or another one? The CQAP should be able to open a confrontation between professional classes and the user public by seeking a common shared feeling, recovering, in these troubled times, the basic principles of perception in pursuit of order/beauty to which we humans tend, have probably always tended.

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### Illustrations and tables



**Figure 1.** Bologna: a "urban monster".



Figure 2. Infinite complexity of plants and squared perspective - Wilkins,A J-

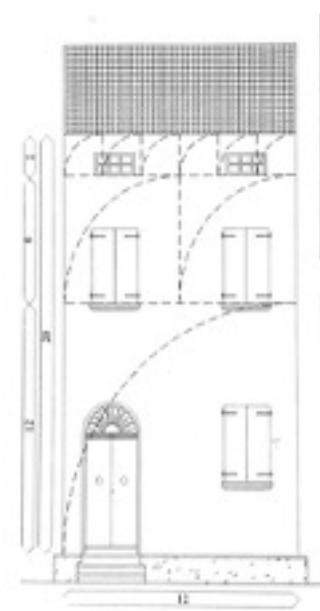


Figure 3. Medicina – BO – Via Coridoni. Constructions ad quadratum

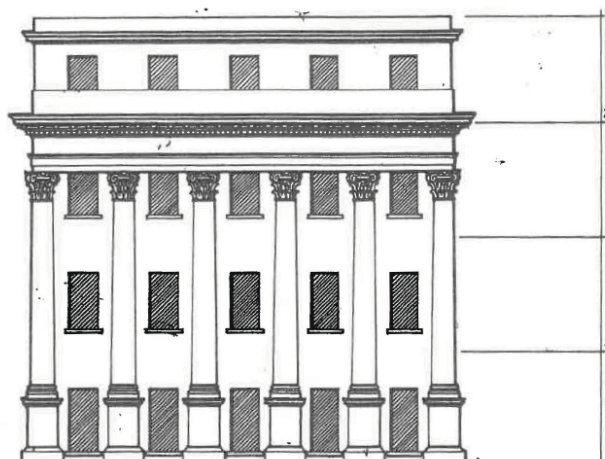
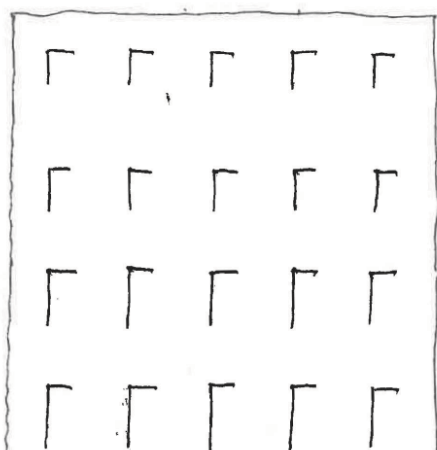
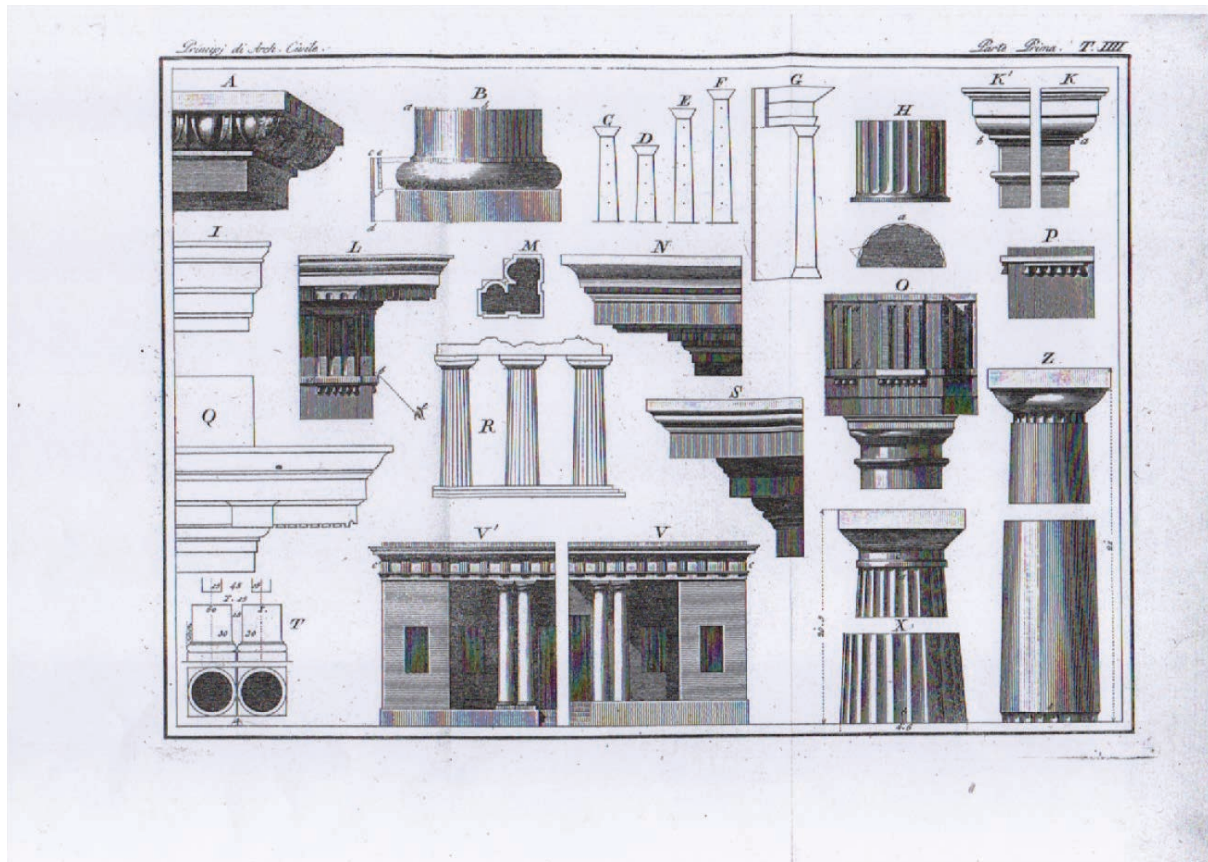
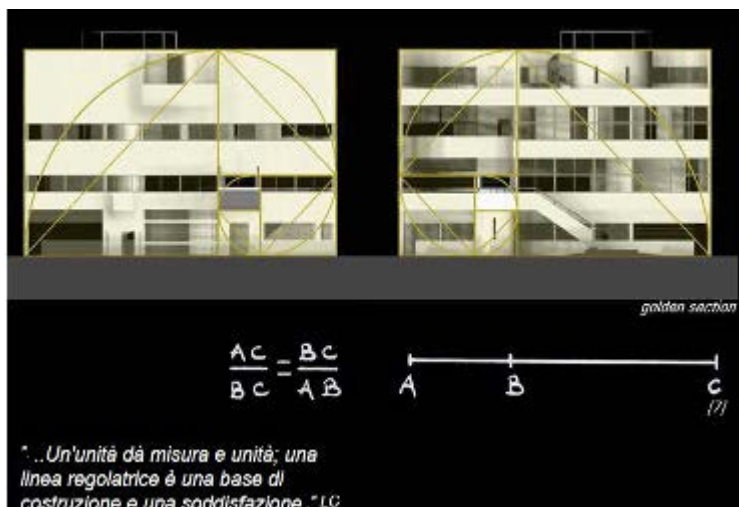


Figure 4. Stereometric volume and a image from Chitham, "Gli Ordini Classici..."



**Figure 5.** "Triglyphs" and "guttae" in the table of the Doric order. The vertical carvings of the triglyphs metaphor of the axe strokes of the wooden secondary structure (?). The guttae metaphor of the overflowing of the mortar inserted on the lintel to create regularity on the support (?) Tavola from F. Milizia



**Figure 6.** Le Corbusier Villa Stein (1927)





## Self-organized peripheries in Mediterranean cities. Examples from Rome and Jerusalem

Munir Khader<sup>1</sup>, Giovanni Fusco<sup>2</sup>

<sup>1,2</sup>Université Côte d'Azur, CNRS, AMU, Avignon Université, ESPACE, France.

E-mail: <sup>1</sup>munir.khader@etu.univ-cotedazur.fr, <sup>2</sup>Giovanni.fusco@univ-cotedazur.fr

Keywords: self-organization, urban planning, urban morphology, urban complexity

Conference theme: Communities and Governance

**Abstract.** A millennia-old urban history shaped Mediterranean inner cities (Hakim 1988, 2014, Caniggia and Maffei 1979), whereas overall weak regulatory frameworks and attempts of forced modernization produced patchworks of informal, deregulated neighborhoods and top-down planned urban projects during the last decades. The urbanization process within the self-organized context is a fruit of two (overlapped) processes: self-constructed popular urbanization (Streule et al. 2020) and informal but market-driven and developer-led plot-by-plot urbanization (Karaman et al. 2020), in which it could be combined in space and time.

The paper will focus on the self-organized system as a way for inhabitants themselves to build their own neighborhoods and fulfill their needs. Deregulated settlements from Rome (Italy), and Jerusalem (Palestine) have been taken as case studies to understand the resulting urban morphology and to formulate hypotheses on the self-organized system efficiency in responding to inhabitant needs, representing the human scale approach, and producing a more adaptive and complex system than the regulated plans and projects.

Questioning the advantages and shortcomings of self-organized systems brings to the table alternatives to traditional urban planning theories, norms, and approaches, especially when it comes to urban complexity and inhabitant satisfaction in a structural lack of public funding and intervention capacity.

Keywords: self-organization, urban planning, urban morphology, urban complexity

## Introduction

Building the physical city was always a question of shared responsibilities, as it includes different stakeholders, contexts, and factors to have the intended form and function. The resulting form of the physical city is the outcome of continuous interactions between three main coordination mechanisms: culture, market, and politics. The three mechanisms are path-dependent in the way that they interact with the physical form inherited from the past. The mutual interaction among the previous mechanisms results in the urbanization process. The sociotechnical process – which could range from spontaneous to the most controlled structure - leads to the actual fabrication of the city (what French scholars call *fabrique urbaine*, Noizet, 2009).

Self-organized systems in the urban peripheries are often described for their chaotic appearance, crucial lack of public spaces, amenities, public facilities, and access to reliable infrastructure due to limited urban planning. As a result, the system is frequently undervalued and viewed as an unreliable planning method. However, understanding it is important, as it might contribute to finding good urban-human planning practices.

What is particularly absent in self-organized urban peripheral growth is the political coordination of urban planning. Culture and markets are the most important coordination mechanisms of urbanization. Lacking the filter of professional planners, the self-organized system could represent a more direct and actual relationship between inhabitants and space. In other words, it reflects inhabitants' practices, preferences, culture, and lifestyle while respecting the space's limitations and opportunities. In the self-organized context, the system would keep adjusting itself until the whole neighborhood reaches the balance between "standards of quality of life" and "human preferences". The way the system adjusts itself and deals with different constraints reveals hidden methods and techniques for low-cost urban development and represents factors behind the resulting urban structure. Furthermore, inhabitants tend to construct buildings (residential, commercial, mixed-use... etc.) for their needs and daily life satisfaction, therefore, hypothetically, a human-scale approach could be intensely applied in these contexts unless different factors intervene.

The paper's objective is not to assume that the self-organized system is the perfect way for development and urban growth, but instead, it aims at understanding how the system functions, its factors, and what good practices could be derived from it. As the system already has the tendency to improve and adapt, it might present an opportunity for developers, authorities, and stakeholders, to work side by side with inhabitants, and practice bottom-up planning to achieve better living conditions for inhabitants.

## Case studies overview

The paper will discuss two main case studies, the first in Rome, called Borgate and the second is from Jerusalem called Kufr Aqab. Both case studies are urban peripheries within Mediterranean cities, sharing similar Mediterranean culture, mentality, and residential preferences (namely attachment to home ownership). Furthermore, both are self-organized and built by inhabitants themselves with the least to no urban planning regulations. In more detail:

### - Rome case study – Borgate

Between 1950 and 1980 the city of Rome experienced a huge urban expansion, the municipality, at that time, was unable to cope with the fast demanding urban growth, failing to provide land to meet future housing needs. As a result, spontaneous "irreducible neighborhoods" emerged in vacant lands, and poor families themselves (masons, carpenters, and other craftsmen) built their neighborhoods within a self-organized system taking the name of Borgate (Vallat, 1995). More precisely, we are focusing here on the 84 illegal Borgate of the second after-war period,

to be distinguished from the few legal Borgate which had been developed as social housing projects by the Fascist regime in the 1930s. The existence of the illegal Borgate neighborhoods in Rome was gradual, residents fought for their services and essentials (access to water, gas, electricity, transport, and even citizenship recognition). Between 1982-1997 the government accepted the official recognition of the districts and their inhabitants as full citizens. It is followed by providing them with the needed services, and infrastructure, through detailed master plans that foresaw a few essential public facilities. Nowadays, the 84 Borgate are legally recognized within Zone "O" in the communal boundaries of Rome (Vallat, 1995).

In favor of the main objective of the paper, the research will take four neighborhoods to focus on as they are different in terms of population, built-up area densities, street networks, topography, history, development process, building types, proximity to major access to the city center and to attraction points. This variation might help to understand the different cases in Rome, and find some general conclusions after all. The selected neighborhoods as shown in figure (1), are as follows: Colle Mentuccia, Valle della Piscina, Case Rosse, and Montesapaccato.

#### *-Jerusalem Case Study – Kufr Aqab*

The second case study is named Kufr Aqab - Jerusalem, which is located within Jerusalem municipality's official boundaries but separated from the city center by the Annexation and Separation Wall (constructed in 2003). After the enactment of the policy of "Center of life" in 1996, the households' increasing fear of losing access to the city, and the unaffordable housing supply, lead inhabitants to migrate beyond the Wall to more affordable neighborhoods located within the city boundary such as Kufr Aqab. Figure (1) shows the Kufr Aqab location and its characteristics.

It is worth mentioning that the "Center of life" policy means that Palestinians are required to prove that they are living within the official Municipal boundaries to maintain their "Residency Permits" - a permit to stay in or access the city. Therefore, inhabitants find their own way to fulfill their needs through a self-organized urban structure within the peripheral area of the city. Households and developers tend to construct illegal buildings to accommodate more inhabitants, and to still benefit from the proximity to the city as well as the "citizenship status". The resulting built-up area can be considered as a complex mixture of building use (commercial, residential, industrial use) accompanied by scant services and infrastructures that do not meet inhabitants' needs. The presence of the dividing line of Jerusalem's city boundary allows for some difference in observed urban forms, between a high- and a low-demand area, making the comparison with Rome's different Borgate even more pertinent.

## **Methodology**

In this paper, a comparative analysis methodology was applied to the research objects, which allowed for a thorough morpho-functional analysis within the local and historical urban contexts. It aims at understanding inhabitants' attitudes toward the space and the surrounding area. Besides, it aims at better analyzing the resulting urban form in the self-organized context, and the factors behind its functionality.

The comparative analysis does not seek to simply find similarities or differences between the two case studies (Rome and Jerusalem). Instead, it pursues to shed light on inhabitants' practices in the context of no regulations and find conclusions for best practices in urban planning, development, and resilience to some levels. In addition, the methodology aims at exploring the hypothesis of a relatively high level of complexity achieved, its' endeavors, and circumstances in fulfilling inhabitants' needs.

The paper analysis is based on remote observation of the case study areas, it counts on a

comprehensive consideration of statistical and administrative mapping by governmental or institutional entities, besides, a broad of local research and publications. The remote work will help to create preliminary findings about the two case studies, hence, formulate hypotheses that will have to be confirmed by further fieldwork.

### **Morphological analysis**

In favor of the paper's main objectives, an urban morphological comparative analysis was applied based on seven main pillars, which are as follows:

#### *1. Urban development process:*

The "popular self-urbanization" and the "deregulated plot-by-plot urbanization" presented by Schmidt et al. (2018) define a framework for the urban development process in self-organized systems. This distinction between "popular" and "plot-by-plot" urbanism is not clear-cut, while there are striking similarities in certain low-income neighborhoods, therefore, overlapped processes can be seen at the same time in a given area (Streule et al., 2020). However, the question of "for whom the inhabitants build" can differentiate between the two processes. Popular self-urbanization is mainly the fact of households building their own dwelling, in plot-by-plot urbanization build-to-sell practices become more widespread, and illegal developers are the main agents of urbanization.

From the two case studies, the key factor to shift from one phase to another is the market mechanism, as shown in figure (2). In other words, the existence of attraction points in the area, or the increase in the housing demand, could create a market cycle from the wave of supply and demand. The transfer from one urban development phase to another could happen through a gradual change in the urban form elements as shown in figure (2).

In the case of Rome, there are different urban development processes, and it differs from one Borgata to another. Some Borgate follows popular urbanism such as "Case Rosse", with a medium-low land occupancy rate, others plot by plot such as "Valle della Piscina", showing a much higher occupancy rate of the land. One of the hypotheses surrounding the Borgate case study is that: all Borgate had a 1st development cycle of individual houses in large plots used as utilitarian gardens, as a result of popular self-urbanism (the 1950s, 1960s). The best connected experienced an adaptive redevelopment through market-led plot-by-plot urbanism (the 1970s, 1980s). There is some evidence of this already in Vallat (1995) and a striking parallel with phenomena observed in Turkish cities (Karaman et al., 2020; Ünlü, 2021).

The urban development process in Jerusalem's low-demanded areas is comparable to that in Rome's Borgate neighborhoods. Residents frequently construct their own homes, businesses, and neighborhoods in accordance with their requirements and cultural preferences for individual houses with utilitarian gardens. Consequently, the urban development process tends to fill in popular urbanism, where development is mainly for inhabitants themselves, with a low land occupancy rate. It might gradually change into plot-by-plot urbanism based on the willingness of inhabitants to change to flat living under financial constraints, the market demand, and the availability of capital. However, in high-demanded areas, the urban development process approaches the plot-by-plot urbanism concept much earlier, as landowners or developers prefer to invest in land and build with a high occupancy rate for those in need of accommodation.

#### *2. Street Network:*

Based on the primary observation of case studies, street network structure follows four fundamental elements: topography, plot ownership, plot size, and the market (housing projects induce more uniform planned street networks). The street networks in both cases have a pedestrian scale in terms of block size and street width, but there is an overwhelming presence

of cars (traffic and parking). Figure (3) shows the characteristics of the street network in both case studies.

Large plots and single ownership were more prevalent in Borgate districts in Rome, allowing for a grid and regular street network system to increase occupancy rates and optimize the profit from each plot. In terms of street furniture and roadbed architecture:

- Major roads in Borgate neighborhoods serve as the main access to the city center and can connect different areas of the city, like in the case of Colle Mentuccia. In terms of sidewalks, there are no sidewalks, and the ones that do exist are typically narrow, dangerous, and not suitable for a major road, and most often, they are used as car parking lots to serve commercial and residential land use.

- Minor roads: secondary streets in Borgate areas tend to be small, one-way, and less heavily used than major roads. They also lack parking spaces and sidewalks. As a result, residents often park in vacant spaces on the street and stroll past automobiles.

In the case of Jerusalem, plots are relatively small compared to Rome's case study, and land ownership is different between adjacent plots, this increases the need to have specific access to each plot. As a result, and specifically, in the low demanded areas, more natural and organic street networks arose to serve the area. Over time, the densification process, and different land use induce more connections and junctions, see the illustration in figure (3). However, in the high demanded areas, investors and small developers tend to apply modifications on plots (merge or division) before the urbanization process, in favor of creating a profitable grid street network system first and then investing in bigger accessible projects (housing projects). As a result, a more uniform and integrated street network arises, see the illustration in figure (3).

In terms of street furniture and roadbed architecture:

- Major roads: the major road in Kufr Aqab is the direct access between the city of Ramallah and Jerusalem, passing the Qalandya checkpoint. The roadbed and furniture are not that much equipped for the high daily traffic. Despite the two lanes per way, the roads are most often occupied by both vehicles (private small cars, busses, taxis, and trucks) and pedestrians who struggle for sidewalks. The illustration in figure (3) shows the distribution of cars and land use on the major road in Kufr Aqab.

- Minor Roads: there are two types of minor roads, one in the low-demanded area which shares the same characteristics as minor roads in Borgate. The second type exists in the high-demanded area, where roads are extremely narrow compared to the number of people served and buildings' height, besides, residents suffer from the huge need for sidewalks and parking lots. The illustration in figure (3) explains the situation in high-demanded areas in Jerusalem.

### 3. Plot

Plots are a key factor in urban morphology, in the self-organized context, as they have a major role in the formation and later in the adaptation of the built-up form. The land occupancy rate, the urbanization strategy, and the variety of development used may all be driven by the size, form, and ownership of each plot. In the case of Rome, and more precisely in Colle Mentuccia, the small number of plot owners and the relatively big-sized plot allowed a systematic division of the land in a uniform way, this affected the distribution of streets and buildings after. Rome's rural peripheries were indeed characterized by widespread latifundia (Strappa, 2012) which, in the case of many Borgate, were subdivided for illegal housing during the 1950s.

In the case of Jerusalem, small rural ownership was historically more frequent. Plots are thus relatively smaller than Rome's, with non-uniform shapes, and different ownership, which creates more limitations and drives development to follow informality. Knowing that the area was



agricultural before, many plots took a longitude shape that is suitable for traditional agriculture activities, however, for the urban expansion seeks, inhabitants merged many plots to create suitable ones for construction purposes. The previous scenario happened quite often in the high-demanded areas where investors and developers apply modifications to the plot before going through their development. This allowed them to have larger plots suitable for bigger housing projects. However, in the low demanded areas, inhabitants adapt their buildings to the size and shape of the rural plots.

#### 4. *Buildings:*

Buildings are the smallest components of the urban form; they represent the image of the city or neighborhood by reflecting inhabitants' culture, identity, and preferences, and provide a space for various activities and land use. Analyzing both case studies reveals that despite the contexts' variances and the cases' differences, the building types are similar in many respects. Both cases are sharing three building types:

- Single houses: relatively compact one-floor structures, frequently gated off and surrounded by greenery;
- Pavilions: compact two-floor structures are often constructed over the course of several decades as an extension of the "single house" type, owing to the need for additional room and the availability of funding;
- Collective buildings that range from three to five floors. the collective building types eventually appeared due to, first, finding a place for a new family (married family member), hence, it is easier and cheaper for the owner to add another floor rather than to begin constructing a new house. Second, to respond to the housing demand in the area, small developers invest in new buildings, new floors, or apartments for tenant purposes.

Figure (4) describes building types in Borgate in Rome – Colle Mentuccia, and building types in Jerusalem – Kufr Aqab in low and high- demanded areas.

Single houses and pavilion types are usually fenced with more vegetation around, and less occupancy rate compared to other types. However, in collective building types, they are also fenced but with less vegetation around them as the occupancy rate is higher and the existence of mixed land use (commercial on the ground floor and residential above).

In the case of Jerusalem, building types in the low-demanded areas are quite similar to the one in Borgate, with some differences in building identity, material, and kind of vegetation, but overall, they are similar in terms of the gradual development of buildings, extensions, added floors, beside the privacy and security level preferences. However, the situation is completely different in high-demanded areas, where collective – high-rise buildings intensively appeared.

#### 5. *Public spaces and green areas:*

Together, they make up one of the most significant elements of the urban form. They bring livability, health, and aesthetic values to the area, by providing spaces for activities and green life (Jabbar et al., 2021). By analyzing the case studies, many vacant and green areas appear in the aerial photos, which could be green or public spaces. However, realities are completely different from expectations; as these open spaces are not actually open for public use, but instead, they are almost always fenced private plots, under-construction areas, or private gardens. See figure (5).

The previous induced some conclusion about the self-organized system; It is uncommon to find such features, as inhabitants have the tendency to ignore public benefits over private ones. In the context of increasing land demand, the issue becomes significantly worse, hence, streets, sidewalks, and junctions are used as parking lots or as public areas for daily life activities. In Rome, post-legalization plans did introduce some public green areas in the Borgate. However,

the examples of Parco di San Patrizio (Colle Mentuccia), Parco di Via Calimera (Valle della Piscina), or the Parco di Via Guglielmi (Montespaccato) show that these green areas are always located at the edge of the illegal settlement, disconnected from the main thoroughfares, and hence have a low potential of becoming local centers of public life.

Many different remarks can be made in the case of Rome and Jerusalem, first of all, inhabitants' propensity to prioritize their needs above others, and they are more concerned with their immediate surroundings than with the broader good of the community. On the one hand, it makes sense for a foreigner who seeks stability, security, and comfort, but on the other hand, this attitude prevents inhabitants from interacting with their neighbors or meeting new people in the area. From this point of view, the observable forms of the illegal self-organized neighborhoods seem to witness the hard reality of a hostile environment, creating a need for protection more than for interaction.

Once the settlement is established, it is hard for newcomers who sought affordable houses, or bought expensive land, to give some of their lands up for public use, especially, when there are no rules or guarantees to protect, take care of, or use it for public purposes. Post-legalization public gardens (as in Rome) tend to be located at the periphery of the settlements.

Second, public and green areas may characterize the neighborhood lifestyle, and they can add specific flavors to the neighborhood image. However, the question remains, do people in the self-organized system need these public spaces or not?

- At the very early stage of illegal urbanization (the 1950s and 1960s in Rome's Borgate, the 2000s in Kufr Aqab), big gardens were sought by newcomers from the rural countryside to grow their own fruit and vegetables.

- Less need for public and green areas if it is customary for each home to have a private garden, where most family activities may take place. Furthermore, in traditional Mediterranean culture, it is common to visit and extend invitations at home than to meet outside especially when there are social relationships between families, kinship, or they do trust each other.

- An urgent need for public and green areas if the neighborhood is saturated by built-up areas (ex. high-rise buildings), and a heterogeneous population. Hence, residents could ask for public and green spaces (to be verified by fieldwork).

The previous could explain why people in some self-organized systems are satisfied even if their neighborhood does not meet the least urban planning standards. Fieldwork research on neighborhood satisfaction will be needed to confirm this hypothesis.

Nowadays, even private gardens diminish, as the urban lifestyle is different now from before. With the increase in car dependency, parking lots surpassed private gardens and public spaces in importance. Therefore, compromising at some level is required and it is already happening.

#### 6. Human scale:

The human scale can be defined as the proportion of the space, elements, and features in relation to the human dimension and its physical capabilities (Radwan & Morsi, 2019). In the self-organized context, the Human scale means that the scale of buildings in the neighborhood is suitable for daily life activities, hence, inhabitants can practice their activities without resorting to technology. Additionally, it indicates that more varied land uses and less zoning planning are used in the development, and the main goal is to construct for people aiming to improve human interactions.

Finding out whether the self-organized system can create a human-scale urban form, and whether it may serve as a raw model for human-scale development or not, is one of the paper's primary hypotheses. The paper will take three main pillars to evaluate the human scale in the case of Rome and Jerusalem.

- First, walkability: in the context of the self-organized system, it is unfair to assess walkability using urban planning standards, while the built-up area grows “naturally” without being bound by any urban regulations. The level of walkability may count on the proximity to services and public buildings, street conditions, inhabitants’ age, slope, shades, shadows ...etc. However, in the self-organized setting, inhabitants’ attitudes are prioritized over the previous standards! Despite the heavy reliance on cars, a self-organized neighborhood can be considered walkable in the sense that residents can access their needs within a walkable distance (300–500 meters) or with the least amount of effort required, either on foot or by car;

- Second, enclosure: refers to how a neighborhood makes pedestrians feel while strolling through. It may transmit positive vibes (encouraging walking and other outdoor activities), or negative vibes (feeling imprisoned or feeling lost). Field analysis is needed to testify the walkability and enclosure pillars;

- Third: life between buildings: it reflects the street life and activities within “the public and green areas”, even when they are reduced to the minimum. The difference between self-organized systems and zoned-planned ones basically comes down to the ability of land use diversification to produce such a life inside the community. In the self-organized system, people may adapt their buildings, routines, and activities to suit their needs, cultures, and lifestyles, hence, life between buildings gradually appears.

The previous may differ from one street, section, or neighborhood to another, therefore, a more thorough analysis is intended to verify the hypothesis and achieve more specific conclusions, also taking into account inhabitants’ perceptions.

#### *7. Urban transect:*

The urban-to-rural transect is an urban planning model created by the New Urbanist Andrés Duany. The transect defines a series of zones that transition from sparse rural farmhouses to the dense urban core. Each zone is fractal in that it contains a similar transition from the edge to the center of the neighborhood (Deal, 2017). The urban transect in a self-organized context provides indicators about the built-up areas’ formation, limitations, and inhabitants’ preferences as well. Furthermore, it conceives primary conclusions about land availability, ownership, development history, and inhabitants’ lifestyle.

In the Rome case study, and by taking the Colle Mentuccia neighborhood, built-up areas spread in a leapfrogged way, where there is no continuity or gradual urbanization in the urban transect as it is supposed to be. Instead, neighborhoods are separated by pure agricultural lands with sharp edges, see figure (6). By going deep into the case study different scenarios can be concluded to describe the previous phenomena.

- Land ownership and size: the big-sized land and the few landowners allowed for regular land division and individual urbanization investment, even if the location of landlords ready to accept illegal subdivisions on their land is haphazard (hence the leapfrog development);

- Population trends: Rome’s population stability by 1980 lessened housing demand, and the Borgate growth as a result, freezing their tendency to coalesce;

- Allocation and proximity to services: being “isolated” and far away from attraction points, decrease housing demand, hence urban growth;

- The following regulations: governmental interventions, compact city approach, and Rome’s metropolitan boundary lessen horizontal expansion.

In the case of Jerusalem, the urban transect is completely different from Rome’s case study but also different from the “normal gradual” model of urban transects. Different urban densities can be noticed along the urban transect, as it gets denser in the highly demanded area within the Jerusalem boundary, and clearly, fewer outside the boundary, see figure (6). The rationale

for the urban transect is as follows:

- Political situation, and the continuing population growth: As long as the existent political and administrative situation remains, as long as people will keep dwelling in Kufr Aqab;
- Land availability, ownership, and size: small, limited, and hereditary lands constrain larger urban projects, land regular division, and promote condensed built-up areas;
- Close to attraction points and facilities: since Kufr Aqab functions as a connection point between northern Westbank cities and Jerusalem, the location attracts many investments and commercial activities, thus, continuous urban growth.

## Conclusion

Self-organized urbanization, and the context of deregulated urban growth, are usually labeled as unqualified urban growth. The stereotypical urban planning approach sees that urban development and expansion should follow strict norms and standards in order to fulfill inhabitants' needs. The inhabitant/space relationship inspired by human culture, lifestyle, preferences, and attitudes, could create a complex phenomenon within the urban system. In the case of low-income populations, planning standards and norms could just be incompatible with the purchasing power of inhabitants and their cultural aspirations (Bertaud 2018). The alternative would be massive government intervention in social housing, which often resulted in high standardization and thwarted people's aspiration to home ownership.

The urban morphological and functional analysis - done through this paper- states that despite the differences between the two case studies particularly in housing demand and land availability, the self-organized system "hypothetically" could produce a more adaptive and complex system than controlled plans and projects. In Both Rome and Jerusalem, inhabitants avoid the simplified forms and functional specialized projects and tend to construct multi-use forms instead. In addition, Borgate and Kufr Aqab started as extremely low-cost urbanization but have been able to adapt incrementally over time whether through the first or second development cycle. Consequently, they can be considered as an example of ordinary city growth through the incremental mechanisms of typo-morphological adaptation as explained by Muratori (Trisciuglio et al., 2021).

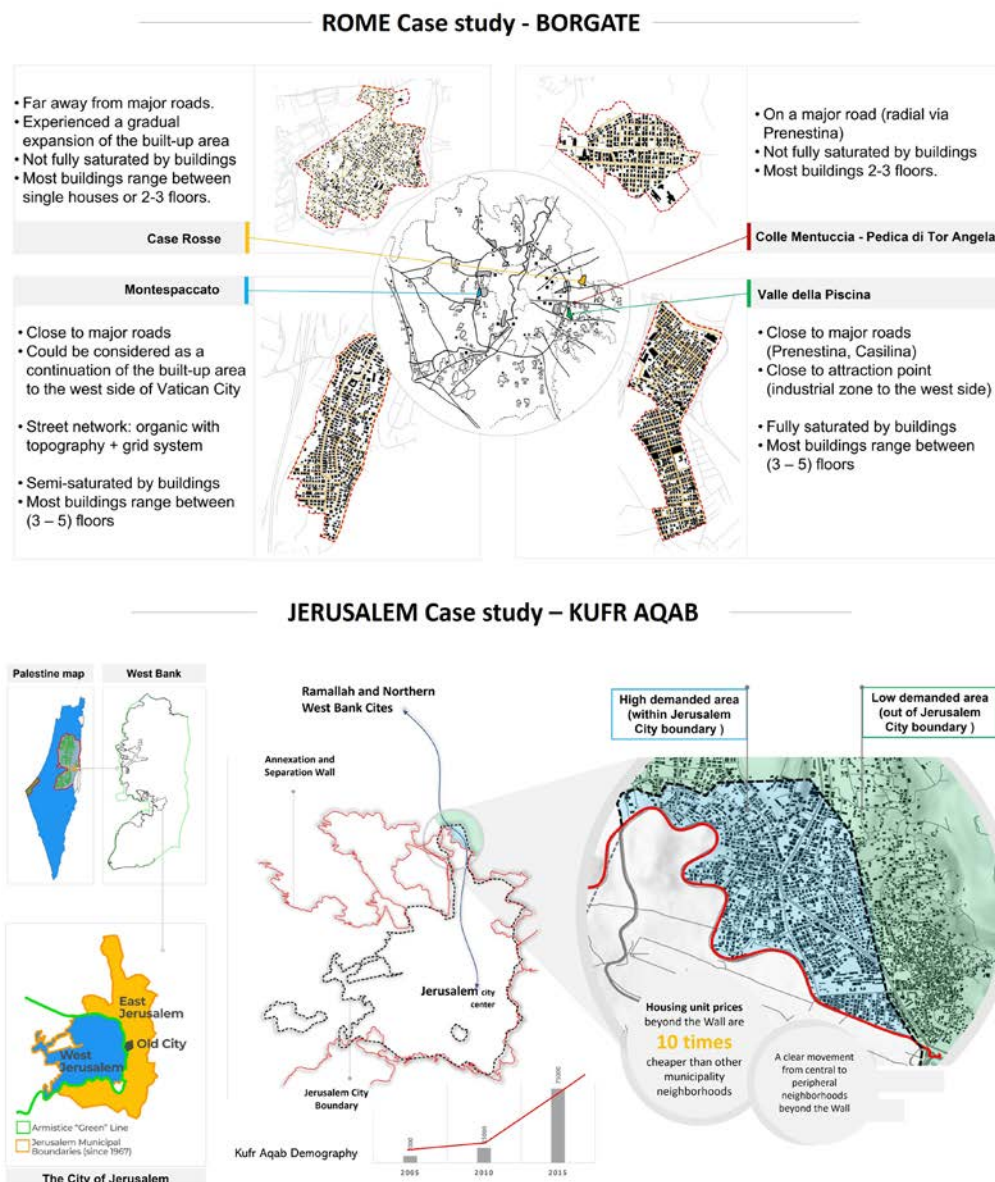
The coming work will be dedicated to verifying these preliminary findings. The actual usage of public space, public/private interfaces, neighborhood satisfaction, and other related issues will be the object of a more specific investigation. Therefore, exploratory mapping and fieldwork, are required, accompanied by iterative rounds of detailed observations, questionnaires, and interviews with inhabitants and experts in order to confirm or infirm hypotheses and preliminary conclusions.

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## Illustrations and tables



**Figure 1.** Location and characteristics of both case studies (Rome Case study – Borgate, and Jerusalem Case study – Kufr Aqab)



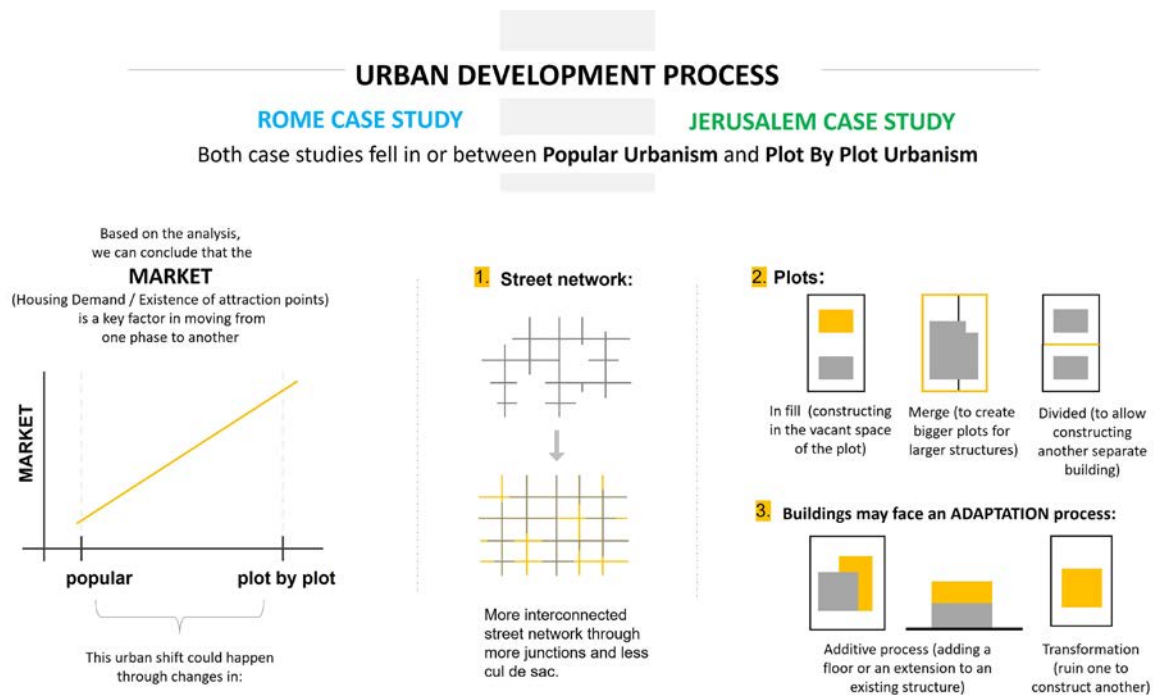


Figure 2. Urban development process in both case studies (Rome and Jerusalem).

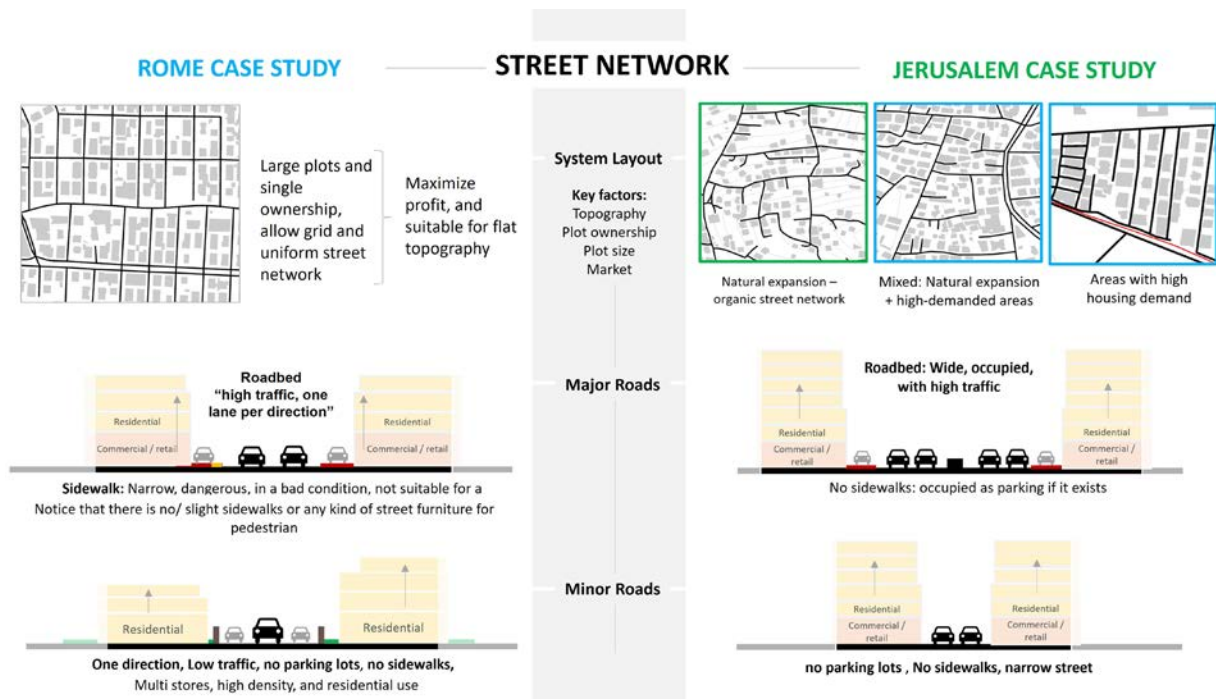
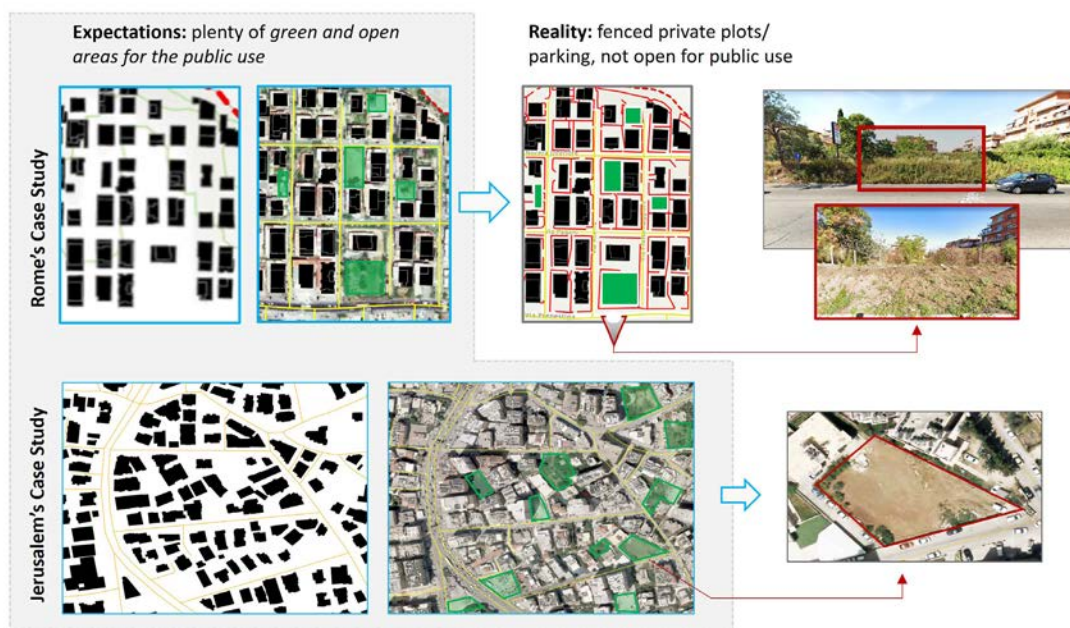


Figure 3. Street network characteristics in both case studies (Rome and Jerusalem).



**Figure 4.** Building types in Borgate in Rome - Colle Mentuccia, and in Jerusalem - Kufr Aqab in low and high-demanded areas.



**Figure 5.** Aerial photo analysis expectation vs reality in terms of green and public spaces in both case studies (Rome and Jerusalem)

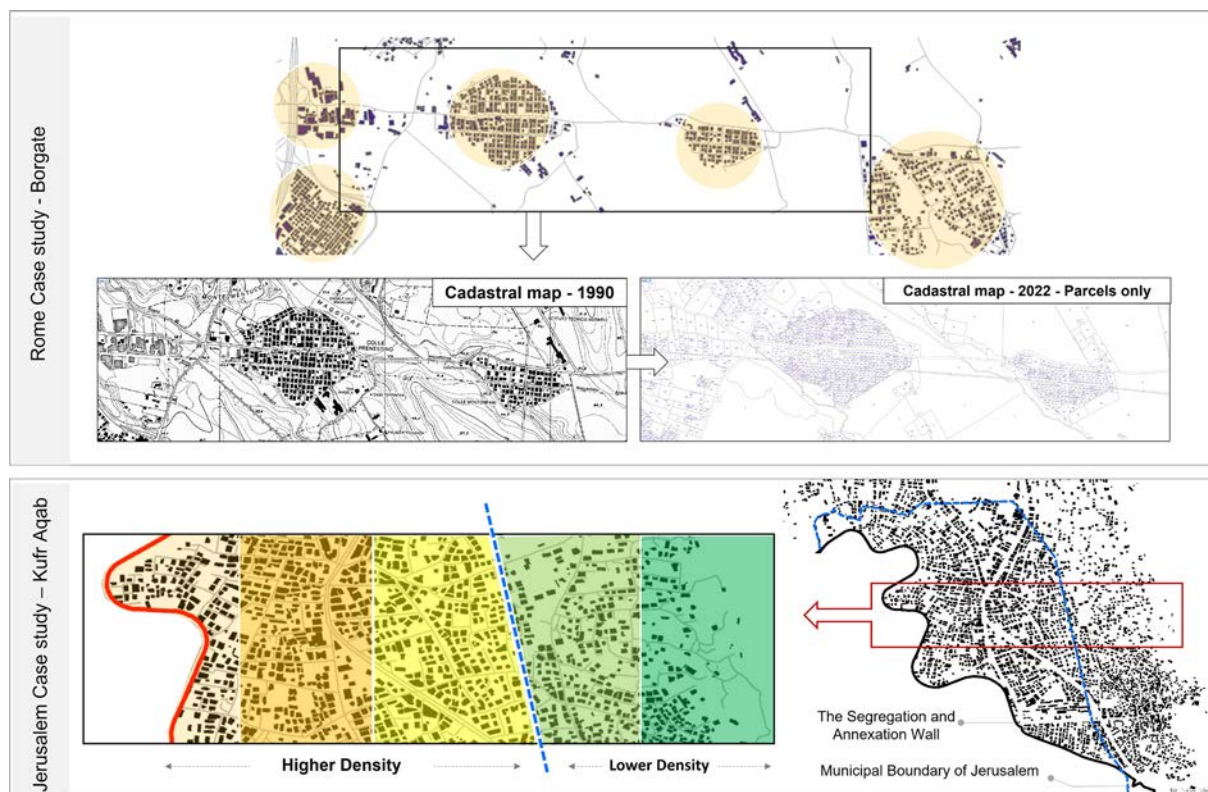


Figure 6. Urban transect in both case studies (Rome and Jerusalem)



## Notes for a morphological critique of the notion of territory: The 'archipelago' as a paradigm of the contemporary urban condition.

Nicola Marzot

Dipartimento di Architettura. Università degli Studi di Ferrara. Via Quartieri, 8. 44100 Ferrara

E-mail: nicola.marzot@unife.it

Keywords: Nomos, Territory, Archipelago, Infrastructure, Regeneration

Conference theme: Communities and Governance

**Abstract.** To paraphrase Carl Schmitt, our way of knowing is always in 'situation', insofar as it is conditioned by the particular 'point of view' through which we orient ourselves in the world. It follows that its very products are, in a way, predestined. The emergence of a 'common' perspective therefore requires a discussion in method and substance, destined to take on an impersonal character, to the conclusion of which it is agreed that all those involved are voluntarily subordinated. Political is therefore the interval (Greek: *μεταξύ*; Latin: *spatium*) in and during which one shares what is Public (Greek: *κοινόν*) and what is Private (Greek: *ἴδιον*), while Personal consequently becomes the unique and unrepeatable way in which one incorporates and puts into operation that achieved unity of a higher level between competing positions, which the Greeks called Nomos. The 'archipelago' is taken as a paradigmatic model for the construction of that 'common' perspective, which founds both identity and difference. Although its historical premises are to be sought in the first *koinè*, or alliances between Greek city-states, its re-proposition in recent times has re-enacted its archetypal meaning and its inescapable cognitive function for the definition of Territory. The essay aims to give reasons for its anticipations as well as its interpretations, which oscillate between an earthly perspective, aiming at a stable configuration, and an aquatic one, evoking a condition of programmatic instability. Through its comparison, it comes to recognise the role of infrastructures and networks as a 'medial' threshold that makes the transition from one to the other possible. This conclusion is confirmed in metropolitan areas as well as in the regenerative processes of disused building stock, which define the most relevant contemporary urban phenomena.



## Introduction

The complexity of territory is, first and foremost, semantic. This is confirmed, indirectly, by the broad spectrum of lexical recurrences of the term, which can be found by comparing the most diverse disciplines that appear to base their epistemic status on the relative concept. This requires that the depth of implications of the territory be patiently rediscovered by pursuing an archaeological method, questioning those sources that more than others proceed towards the origin of human phenomena, or at least remain close to it. In this sense, unmatched in its radicality seems to be the definition given by Carl Schmitt in the legal sphere (Schmitt, 1991). The criticism of a positive interpretation of the law leads him to find the premises of the law itself in the *nomos* (Greek: νόμος). In archaic Greece it identified grazing, understood as the archetypal outcome of that 'enclosure' which, by separating a portion of land from its natural datitude, explicitly claims possession and implicitly brings into existence an unprecedented fact, of which visible traces remain, thus making it emulatable. An 'anthropogenetic mechanism' is thus inaugurated, comparable to the manifestation of the *temenos* (in Greek: τέμενος), the first form of sacred space in Western antiquity, although in the latter case the appropriation of an existing cavern reduces the claim to mere use, minimising the degree of artificiality, with effects comparable to those generated by the practice of harvesting.

The simplicity of the gesture that separates and, in so doing, articulates an initial distinction between nature and culture, also defines a primordial geography (literally 'writing of the earth'). It acts as a rudimentary map inscribed in that soil surface from which it will gradually detach itself, to be transferred to different media and inaugurate that technical condition which, in its 'enabling' phase, has captured the attention of the philosophical turn in a phenomenological-existential sense (Natoli, 2015)<sup>1</sup>. That act establishes a 'competence', or rather a 'pertinence', the recognition and ascribability of which to an ante-litteram subject implies a law, which establishes all aspects relating to<sup>2</sup>. The repetition of the behaviour, even in the absence of a 'documentality' (Ferraris, 2009) other than the repetition of the relative 'trace', that is, in its instituting phase, becomes an operating title, which discriminates the behaviour of all those who accept its existence, making it through repeated use an acquired convention.

The *nomos* is therefore a limit to the transformative potential of nature, which not only discriminates it as 'other' than the outcome of that same partialising action, but also becomes an *exemplum* from which to extract a general principle to be (enforced). For this reason, several authors (Cacciari, 2004; Farinelli 2016) argue that the definition of territory is not to be traced back to the land (Latin: *terra*), from which it is distinguished, although it remains close to it, but to *terror*. Territory, in fact, is established by an act of authority, the legal institution, if not violence, which in itself instils fear and demands respect. The *nomos*, therefore, as a form-limit-

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<sup>1</sup>The reference to an 'enabling' technology, as mistakenly believed, does not necessarily imply that the same technology has already been accepted by a community as the bearer of shared values. For this to happen, that same technology must be 'enabled', i.e. recognised as the bearer of 'enablement'. Enablement', from the perspective of a socially constructed reality, is therefore the title by virtue of and in conformity with which what previously existed, but could not be recognized, is publicly accepted in order to be put into action and operation. However, in this way, the 'enabling' condition is translated from the phenomenological-existential level to the ontological-social one, becoming an attribute of its own title, i.e. 'enablement'.

<sup>2</sup>This implies that 'doing' originally anticipates 'knowing how to do' and that the latter is not sufficient in itself, but presupposes a shared recognition that certifies it, i.e. the title, so that it can claim a value within a socially constructed reality. The law therefore has the task of regulating all these aspects and guaranteeing their conditions of operation. It follows, however, that there is an establishing phase in which, in the absence of the law, those same aspects *de facto* already exist.

law that separates and, in this way, establishes a precedent to which the earth's surface can be conformed, regulating its use and meaning within a community of intent whose members are subject to a voluntary acceptance of and obligation to it.

In this way, the *nomos* not only establishes the territory as a portion of land subject to a particular order (the *ordnung* referred to by Schmitt), but also defines by difference all the terms involved. This occurs either because they are other than the territory itself, i.e. the land (Farinelli, 2016), or because they are generated by it, insofar as they emerge from the process of mutual implication, traceable to the action of "*enclosing*" as such, which the *nomos* will render explicit ex-post in a signifying structure, or system of relations. Recognition of the 'trace' inscribed on the surface of the ground as a principle of conformity to which historically given and shared behaviour corresponds, transforms it into a 'sign' (literally: 'that which stands for'), inaugurating a 'semiosphere' (Lotman, 1985) that founds the territory itself. Similarly it establishes every subject and object that it circumscribes within its own horizon of reference and pertinence, as entities that are part of it and over which the *nomos* itself can claim possession.

The territory, in this way, acquires, to paraphrase Aristotle, the characters of the 'synol' (instituted), unity of matter (institutor) and form (institute/institution). Nevertheless, if this recognition justifies its character in ontogenetic terms, that is, it describes its functioning within a socially constructed reality, it does not in itself fully account for it in a phylogenetic perspective, which in fact requires a continuous questioning of the process through which it was possible to arrive at that same result.

### The territorial 'point of view'

Carl Schmitt, interpreting *nomos* as the archetype of law<sup>3</sup>, which precedes and establishes it, also reveals its prejudicially earthly character. It is, in fact, a way of articulating relationships between individuals clearly based on a privileged point of view, which interprets nature from a perspective founded on the stability of the earth, and which subordinates everything to it. Illuminating are the pages in which the author describes the military behavior of Roman troops at sea as a projection of the strategies and tactics inaugurated and consolidated during the conquest campaigns conducted by land. The concept of territory is therefore strongly conditioned and implicated, to such an extent that it will be necessary to wait for the discovery of the Americas, which inaugurates the modern era, to witness a traumatic and inevitable change of perspective, which corresponds to a new order, interpreting, and therefore regulating, the world from sea to land. It is no coincidence that Farinelli (Farinelli, 2016) attributes to overseas expeditions, and to the overcoming of the proverbial 'Pillars of Hercules', which defined the conventional limits of the *Mare Nostrum*, hitherto likened to a lake, the institution of the globe, and of its manifest sphericity. In that, lands are figures that discreetly emerge from the continuity of an unprecedented liquid and ubiquitous connective.

This constitutes a clear discontinuity from the hitherto prevailing cultural dominance of a superficial, i.e. flat, view of the earth itself, punctuated by water. However, Saverio Muratori deserves the credit for having translated the pioneering insights of the illustrious jurist<sup>4</sup>, in an unprecedented territorial interpretation of the *ecumene*, giving it the status of a science. In

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<sup>3</sup>The archetype, for the reasons already mentioned, expresses the operative trace of the power instituting the law that represents its translation into another context, of a theoretical-conceptual nature.

<sup>4</sup>The first edition of Schmitt's *magnum opus* dates back to 1950. In the same year, Muratori published the essay *Vita e storia delle città*, in "Rassegna critica di architettura", January-April 1950, n. 11-12, pp. 3-52, in which he lucidly expounds his critique of positive thinking in the construction of the territory, which can be traced back to the rational idea of the General Regulatory Plan.

Muratori, the discovery of the world is, phenomenologically speaking, always 'in situation' (Muratori, 1950), i.e. conditioned by the specific modality through which one experiences it and thus becomes acquainted with it. The very articulation of the territory of this intentionality preserves memory in the system of signs that the scholar defines as type, alluding, not by chance, to that specific technique of engraving of a generic support to which he assimilates the persistence of *nomos* in the design of the soil. The study of the territory therefore translates - through graphic representations of the historically given modes of writing, i.e. the changing geography of locations and peoples, which are mutually separable - into a continuous work of deciphering the nomographic codes through which the territory itself consolidates and/or subverts its own facies<sup>5</sup>. Consistent with the phenomenological premises declared at the outset of his research, Muratori is in fact aware that territory is by its very nature stratified, that is, it is affected by cyclical changes in the point of view through which the world is interpreted. The pre-existing signs, once the historical conditions that justified their emergence and conventionally deliberated their consolidation have ceased to exist, are translated, and thus betrayed, within a new horizon of experiential reference and, eventually, partially recycled, within new cultural structures, or systems of relations.

The spatial scientist, therefore, must have the ability to recognise not only the alternation of transformation phases, but above all that of the relative points of view, which are always first literal and then figurative, i.e. pertaining to a specific body/environment behavioral relationship. The settlement cycles of planting, based on a perception of the given oro-hydrographic circumstances, from upstream to downstream, through the so-called ridge routes, in their multiple articulation and variety of support, alternate with consolidation cycles, which overturn the phenomenological perspective from valley to mountain, in the inexhaustible wealth of solutions that can be found. Although both can be traced back to a rigorous taxonomy, their oscillation normatively restore the extraordinary exploratory adventure of what is given (Caniggia and Maffei, 1979).

The betrayal of any established tradition in a 'tentative' manner, i.e. by trial and error, thus occurs through a process of continuous translation<sup>6</sup> of the given conditions, thus precipitating them into phenomenologically unprecedented situations, altering their perception and comprehension, i.e. constantly bringing their assumptions into play. Being captured within an unprecedented horizon of reference also implies that the subjects and objects circumscribed by a previous nomography suffer the same fate as the signs that have been abandoned and reduced to mere traces. They are therefore reprogrammed to a condition of second nature, becoming part of a process of unprecedented legitimisation, whose outcome is in any case uncertain, potentially destined to translate into a new *nomos-limit-law*, in which the life and death of anthropic arrangements constantly flow back into each other.

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<sup>5</sup>For Muratori, the construction of the territory occurs 'organically', i.e. deriving its structure, through successive stages of approximation, from the transformation of previous arrangements inherited in a 'critical' manner, as they are progressively inserted within a changing horizon. Change, therefore, always refers to the 'point of view' through which we orient ourselves in the world and know it, appropriating it. Just as the phenomenal horizon inscribes itself in the given situations through that same 'point of view', and its movement, circumscribing every fact that has actually occurred within its own limits, similarly the noumenal horizon inscribes itself in the brain, which constitutes its natural support, encompassing every event encountered in its own unfolding. The same mechanism recurs in language, which is a translate of the former.

<sup>6</sup>Translation (in Latin: *trānsducēre*, meaning "to lead through") implies a movement through unexplored territories, in analogy to linguistics, for which the source language and the speaker are destined to open up, losing their own, to a new reference system, passing through an inescapable situation of intermediate estrangement. The latter can be likened to a temporary metalanguage, which is overcome by full insertion into the target language.

## A paradigm shift

Saverio Muratori's teaching, by virtue of its radical approach, is destined to make proselytes far beyond the inner circle of followers, even if the recognition of its merits appears painfully posthumous. His research, aimed at the architectural construction of the territory, is taken as an effective antidote to the spread of a dangerous drift in a 'positive' sense of the relative conception and management. Of the latter, Urbanism aspires to be the zealous interpreter, starting from the 1960s, in its persistent claim to the role of *instrumentum regni* in the politically founded government of the earth, reduced once again to soil (Muratori, 1950). One thinks of the important contributions in this sense by Vittorio Gregotti (Gregotti, 1966) and Aldo Rossi (Rossi, 1985). Despite the diversity of approaches, there is recognition of the shared primacy ascribed to geography, understood as a persistent form/writing that, by subdividing the earth's surface, articulates the mutual relationships between its constituent parts, making them more meaningful and transmissible. In addition, all the aforementioned authors attribute to the route a founding function of the territory itself, *sub specie* of infrastructure, coming to define its character in strict adherence to the manner of its crossing. Not coincidentally, this is confirmed by the etymology of the word 'method' (from the ancient Greek *μέθοδος*, a compound deriving from the prefix *μετα-*, meaning 'pursuit' and *ὁδός*, meaning 'way').

The uniqueness of the Muratorian approach consists, however, in managing to hold together perception, design and production of the given conditions, recognising each aspect as having equal dignity. To the former corresponds the notion of "landscape", or the primacy of the personal point of view, always conditioned by its being phenomenologically "in situation". To the second corresponds the notion of 'type', equivalent to the nomos-limit-law-map already discussed, the expression of an impersonal point of view, derived by conceptual abstraction from the comparison between potentially competing perspectives<sup>7</sup>, in which, after extensive debate and subsequent deliberation, the members of a community recognise themselves. The third is the territory proper, as an existential landscape conforming to a conventionally assumed a priori reference system. Its eventual crisis, on which Muratori indulges, sometimes with a certain complacency, introduces a 'panoramic' dimension, not by chance privileged by bourgeois culture, or 'cyclopean'<sup>8</sup>, by its very definition multiple and dynamic, inevitably prodromal to a condition of disorientation, which only a renewed phenomenological approach can possibly help to overcome.

Muratori's ecumenical approach to the territory, however, leaves the function of the sea as infrastructure substantially unexplored, thus confirming the author's profound 'Roman-ness'. As later confirmed by the studies of one of his most fruitful pupils (Cataldi, 1977), the sea is tendentiously equated with the approach below the coast, through the technique of the so-called 'cabotage', that is, the projection of a valley floor condition towards the open horizon, confirming the primacy of the land point of view over the water one. This apparent removal reveals in reality an abysmal unthinking of the morphological approach to territorial studies, inherent in the impossibility of leaving a trace proper to navigation. This appears as the expression of a geographical aporia of the map, only partially compensated for by the cartographic surrogate, *sub specie* of pilot book. Its logistical function is, first and foremost and

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<sup>7</sup>It is appropriate here to recall that the instituting power is equivalent to the 'power of' (Greek: *δύναμις*, *dynamis*) and that the trait d'union with the instituted power (Greek: *ἐνέργεια*, *energheia*) is never direct, but guaranteed by the institution/nomos.

<sup>8</sup>The etymon of cyclops (Greek: *κύκλωψ*) is that of 'circular sight' and not monocular, which it is not by chance that the Odysseus myth associates with a condition of monstrosity and brutality, which precedes the emergence of humanity.

not by chance, the art of continually renegotiating the relationships between the different patches of land that can potentially be connected due to the vacuity (from the Latin *vacuus*, “free, unconstrained”) and vagueness (from the Latin *vagus*, “indeterminate, lacking orientation”) of marine experience. The sea, therefore, as a persistent condition of crisis, constantly imposing decisions on how to behave, and therefore a source of danger.

The territorial type, as an ‘operating script’ to which to subordinate the conformation and construction of a man-made world, in the image and likeness of the experience acquired, therefore finds a quasi-invaluable mortgage in its non-applicability to the watery medium, causing the primacy of seeing as a superior sense to be lost<sup>9</sup>. On reflection, Greco-Roman culture had already translated the characteristics of freedom and indeterminacy proper to the watery point of view, deliberately making instrumental use of it in the processes of transformation of the given conditions, whether natural and/or artificial. This is the super-imposition on the pre-existences of an ordering infrastructural grid, the so-called Hippodamian system, named after its first creator and popularizer, Hippodamus of Miletus, which intentionally acts as an effective device for the deactivation of an already existing *nomos*<sup>10</sup>. In this spirit, both the Magna-Greek colonies were re-founded and the lands temporarily confiscated from the indigenous populations were redistributed within the processes of agrarian *centuriatione*. This aspect, which especially in the Roman experience appears as a true reinvention of the territory, has been largely underestimated by studies in the field. The morphology thus reveals, through the infrastructural solutions adopted, a *destruens* function of equal importance to the *construes* one, which is often completely subordinate to the former<sup>11</sup>. This also explains important terrane translations of the marine perspective that have animated the international debate on urban form, in an attempt to bring the metropolitan dimension, a mature expression of modernity, back into an architectural discourse on the city.

### Actuality of the urban archipelago

In 1977, at the conclusion of a workshop on the city of Berlin, organised on the occasion of the *Sommer Akademie*, Oswald Mathias Ungers and his group of young colleagues, including Hans Kollhof, Rem Koolhaas, Artur Ovasca and Peter Riemann, formulated the seminal version of the ‘archipelago city’. Its provocatively apocalyptic vision was destined, a year later, to become an accomplished Manifesto of the post-modern city of great critical acclaim (Ungers, Koolhaas, Kollhof, Ovasca and Riemann, 1978). The impetus for reflection is provided by the phenomenon of progressive depopulation and impoverishment that affected the city of Berlin in the 1970s, following its internal separation by the wall. The authors develop a theoretical project in which they imagine abandoning to oblivion extensive areas of the city, which are expected to be progressively demolished once they have reached a state of ruin. The surviving citizenship are then concentrated within the parts most endowed with identity and morphological character, of which they envisage interventions of typological consolidation, also resorting to the grafting of modern prototypes with the function of social condensers.

Conventional urban geography is thus integrally altered: the selective erosion of residential

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<sup>9</sup>Greek culture, by its earthly nature, is founded on the primacy of seeing (Greek: *ὁράω*). Just as the horizon (in Greek: *ὁρίζων*) is what can be embraced by sight (in Greek: *ὄψις*), in the same way theory (in Greek: *θεωρία*) is all that can be comprehended by the eyes of the mind.

<sup>10</sup>The infrastructural network, when applied to the given oro-hydrographic conditions, analogously deactivates the *physis* (in Greek: *φύσις*), to be understood as an internal regulatory process.

<sup>11</sup>The imposition of the *centuriatio* therefore acts first as a ‘destituent power’ (the order in act) and then as an ‘instituting power’ (the order in potency)



fabric, instrumental in the emergence of areas with greater figuration, acts as a disorienting flooding/re-foundation, reminiscent of Superstudio's (1972) radical imagery, visually responsible for the sudden appearance of an archipelago-like configuration of surviving relicts. The void that separates them, in the double Latin meaning of *vacuus* and *vagus*, is left to a hypothetical recolonisation, in a playful-experimental key, by contemporary infrastructures, conceived as the expression of a counterculture strongly influenced by the development of the American city, dynamically connoted by freeways, mobile homes, shopping malls and urban farming. The 'archipelago city' is undoubtedly conditioned by both the 'city by parts' theorised by Rossi (Rossi, 1966) and the collage city of Colin Rowe and Fred Koetter (Rowe and Koetter, 1978). The former literally makes the permanence of the 'primary elements' emerge from the continuous metabolisation of the 'residence areas', assimilated to a field of programmatically unstable tensions, by virtue of the continuous urban transformations, which consume their conformative character without apparent pause. The latter establishes an equivalence nexus between modern city/figure, in one sense, and traditional city/background, in the other.

Similarly to the two illustrious precedents, Ungers' focus is on the development, both in phylogenetic terms, by removal of pre-existences, and ontogenetic terms, by reinforcement of the most resistant typological structures, of urban islands alone, leaving out the infrastructural sea completely (Hertweck and Marot, 2013). Thus the idea of a 'dialectical city' takes shape, within which each architecturally accomplished part constitutes an alternative, albeit complementary, point of view on the future fate of the contemporary metropolis, surrogated by the emerging rhetoric of cultural pluralism. However, the most interesting part of the proposal is the one that is ideologically left out, confirming the topicality of Carl Schmitt's reading. The ill-concealed objective is in fact to rehabilitate the terrestrial perspective, to which the island condition is reduced, as opposed to the maritime one. The Manifesto's exceptionally regenerative and revolutionary potential, seen in its complexity, is still inhibited by a strongly ideological, or 'trendy' reading of it, which is re-proposed a few decades later, with the aim of re-enacting its original meaning (Aureli, 2008).

In fact, unlike the promoters, it escapes the notice of the epigones that the emergent character of the condition of insularity derives precisely from that 'making void'. The latter, by literally dissolving the conventional conditions of pre-existing constraints - responsible for the 'structure', or system of relations, which holds the given morphology in its internal articulation according to meaningful relations - sets it free, allowing it to come into play and lend itself to new adventures of the designing spirit. The resulting islands therefore become meaningless fragments, which a policy understood as mere discursive practice certainly could not redeem<sup>12</sup>. In this sense, the prejudice manifests itself in the refusal to recognise the Roman city, the *urbs*, as an accomplished form in itself, in spite of the Greek *polis*. This is not only a blatant misunderstanding of the concept of *nomos*-boundary-law-map, which has nothing to do with the 'finite' character of the artefacts that incorporate it, regardless of their size, as demonstrated by the notion of type<sup>13</sup>, as much as the inability to understand that the function of infrastructure is by its very nature 'disorienting'.

As the centurial process well demonstrates, and in particular the emblematic affair of the *Ensanche* of Barcelona, as its conceptual re-proposition in the bourgeois era, the function of

<sup>12</sup>The reduction of the political dimension of the city to a *praxis* (Greek: *πρᾶξις*), i.e. to pure discursive praxis, is a prejudice already present in Hanna Arendt's thought, which Aureli cites in support of his theses.

<sup>13</sup>Type is a choice that entails a constraint, regardless of its size and extension. Its limit is not geometric but relational, implying simply a reduction in the field of the possible.

the isotropic and undifferentiated ordering framework of infrastructures and networks is not to fill a void, as Aureli claims, but rather to create it. The territory prior to the arrival of the Roman legions, even if reduced to a purely natural state, is completely reinvented on the basis of a warp that superimposes itself on the pre-existing, deactivating it and subverting its meaning, in order to completely reinvent it through a renewed architectural-building plot, to be developed *ab urbe condita*. Similarly, the fertile plain destined to host the future expansion in *manzanas* of the Spanish city, expresses a strongly structured territory that the Plan Cerdà integrally restructures, absorbing into its design the pre-existing villages, the area of the port of Barceloneta, the centre of the walled city and Montjuic and reinventing the relationships between them.

What Aureli with ill-concealed factiousness calls the widespread “urbanisation” promoted by bourgeois capitalism is, when the facts are proven, the heir to a great planning tradition. The latter, far from prejudicing the *forma urbis* on the basis of abstract speculation, as the western urban planning tradition, the true enemy of the built form and the nomos-limit-law-map, will do, contains in its own internal measure the future promise of the architectural principle. The limit, it is worth repeating, does not have to do with the finite in a geometric-dimensional-extensional sense, but in a relational sense. The infrastructure therefore has a twofold significance: as a warp it reopens the field of the possible, disarticulating the existing in its internal grammatical, syntactic and semantic limitations, being the expression of a “destituent power” (Agamben, 2020); as a weft it redefines it, progressively introducing new degrees of constraint, and it acts as the expression of an “instituting power” (Esposito, 2020). What results from the first phase is thus re-signified during the second, often becoming unrecognisable to the extent that it is literally ‘captured’ within an unprecedented system of relationships. The paradigm of the ‘urban archipelago’ thus expresses that condition of necessary fragility and programmatic instability of every configuration, regardless of its nature, in the phase of transition from a stable state, which is no longer, to one that is not yet<sup>14</sup>.

The conventional interpretation of the urban archipelago is thus placed in the terrestrial perspective of the individual islands, in an attempt to establish a dialectical relationship based on an assumed ‘isonomy’ that is rhetorically disregarded, preceding in fact the relationship itself and its objects, both of which participate in the same metahistorical ‘semiosphere’. It is no coincidence that the same distinction between an ‘inside’ and an ‘outside’, which in philosophy first becomes diriment in order to be able to decide, within the so-called anthropogenetic machine (Agamben, 2002), on the process of progressive separation between the living and the human (the so-called *misterium disiunctionis*), to the point of multiplying its direct implications in every field of knowledge, is taken for granted by Aureli himself.

Without justifying its emergence, this assumption prejudicially conditions the very possibility of understanding its outcomes, even with regard to the archipelagic paradigm being discussed. The political space is not the one established by the distinction between subject and object; between public and private. If anything, it is a representation of it, however refined it may be, to be understood as a ‘re-presentation’ of those same conditions of possibility generated by that continuous existential flux that precedes every possible form of confrontation, where everything is still held, that is, held together, without anything being able to be separated: a universe of preliminary indifference. The metaphysical presumption of the subject, therefore,

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<sup>14</sup>It is worth remembering that systems of relationships, in structure, analogically correspond to relationships of force in real phenomena: where the former loosen up, to the point of collapse, the latter weaken according to an irreversible process. It is no coincidence that, even in physics and chemistry, isolated systems, to which urban fragments are assimilated, spontaneously evolve towards configurations with greater entropy, which are those with a lower degree of order.

prejudicially crystallises the possibility that the destiny of each strip of land can translate from a shared fate (even to that of the subject itself and its derivatives), to potentially becoming other than itself. This possibility, however, does not escape the interpretation that Rem Koolhaas gives to the urban archipelago. From the precursor visions of *Exodus, or the voluntary prisoners of architecture* (1972), to the so-called *Bigness* (Koolhaas & Mau, 1995), the trait d'union of the Dutch architect's research is precisely that of a continuous overcoming of the oppositional articulations of the existing city, regardless of its specific morphology. The latter is obtained through the preliminary precipitation of the given conditions in a state of pervasive generality, pursued through an infrastructure whose task is to establish, *pro tempore*, a desiring thrust, fueled by a quasi-messianic expectation, prodromal to future adventures of the designing spirit, with inevitably uncertain outcomes.

The first 'diabolic' and then 'symbolic' function of the infrastructure network is thus rehabilitated in a regenerative key<sup>15</sup>, whose claim stands as the true 'space of politics' (Laudani, 2016). In fact, it precedes (literally 'lies beneath') and promotes the structure, that is, the Common Good, whose deliberation introduces it to the exercise phase, or commissioning, which is always 'super-structural', constantly subjecting it to a process of verification (of its assumptions) and eventual refutation. It is the immersion of what is known and/or given in the disorienting atmosphere arising from an unlimited field of possibilities that generates possible state variations. In order for this to be possible, the urban body and, by extension, every institutional body, in its logical unity of intent, must be preliminarily dismembered, intervening in its signifying junctions and bindings, dissolving them and releasing their regenerative potential, held there by those same limitations (Franklin-Hall, 2009). The limitlessness, therefore, as a necessary, albeit insufficient, functional precondition for new forms of 'substantial constraint', to be sought by way of trial and error.

### Future perspectives

Politics is the place of sharing (from the Latin *cumdividere* and the Greek *κοινωνέω*) in which the parts are separated from the original whole through a dynamic relationship of reciprocity (the being of things), ultimately arriving at that unity of the distinct (the essence of things) that every entity, natural and/or artificial, embodies<sup>16</sup>. Then making a decision, or deliberating, precedes the conventional establishment of the subject, its possible predicates and objects,

<sup>15</sup>The apparent paradox of infrastructure, which first disjuncts (in Greek: *δια-βάλλω*) and then joins (in Greek: *συμ-βάλλω*), explains how 'politicisation', understood as a process of inclusive exclusion (i.e. a being outside being inside), anticipates the appearance of the space of politics. On this aspect, see Agamben, G. (2020). The caveat is to consider the Agambenian exception as the inclusive exclusion to which the 'naked life', i.e. the dimension of the Impolitic, is condemned in Western culture. On this aspect, see also Eposito, R. (1999). In both cases, it is important to understand the 'threshold' that, from time to time, divides and unites.

<sup>16</sup>'Sharing' evokes a dimension that seems precluded to mere 'division', which in a way precedes and promotes it, facilitating it. In dividing, in fact, one always assumes the existence of three distinct factors: a subject entitled to the action, the action itself and, finally, its object. Consider the exemplary case of the division of an inheritance. This is only possible on condition that one or more legitimate heirs are given; that a will (or a law, in its absence) is found that makes explicit the manner of the division itself; and that an estate exists. All this, in linguistic terms, confirms the predicative function of language, which oversees 'dividing'. Sharing, on the contrary, appears programmatically devoid of the aforementioned predicative function, as if its aspects could not be given a priori, but could only emerge in and from the very making of sharing. This is the prerogative of all 'medial' verbal expressions. Therefore, what sharing possesses is, paradoxically, a lack of 'normativity', because the latter is generated during the very unfolding of the former. This justifies, in addition, the difficulty in saying something that cannot be said, since the very presuppositions of saying are lacking. This confirms the primacy of poetry and philosophy, which do not preach but evoke, as opposed to 'calculating thought', i.e. logical-rational thought, bound by a pre-established system of internal regulation.

defining the conditions of its constraint. The paradigm of the 'urban archipelago', in this perspective, is the form in which the relationship between *continuum* and *discretum* is revealed in its multiple manifestations. However, this relationship is not to be sought between entities already prejudicially endowed with meaning, but in the conjunction/disjunction between the states just mentioned<sup>17</sup>. It is therefore a question of understanding under what conditions the archipelago as a 'continuous whole' (indeterminate) translates into a 'discrete system' (determined)<sup>18</sup>.

The condition of liquidity, which is central to the entire debate on the globalised world (Bauman, 2010), does not only pertain to the aquatic dimension, but also to the entire archipelagic configuration, knowledge of which implies the need to understand the political, social, economic and cultural institutional links through which its programmatic instability tends to stabilise, albeit temporarily. Within this process, which cannot be foreseen a priori, the form of the relationship therefore constitutes its 'stabilisation coefficient', or value achieved.

The process of globalisation, in this perspective, originally acted as a factor destabilising an original continental configuration based on the primacy of nations and their relations, in fact undermining and delegitimising it. Suffice it to think, since the end of the 1990s, of the growing primacy of logistics and networks, both tangible and intangible, in the economic and financial development of markets, dilating their extension through a mobilisation of goods, resources and people unprecedented in quantity and speed. Its enlivening function is today promoted by other emerging phenomena. These include cultural tourism, which increasingly, following the pandemic and its effects on lifestyles and habits, appreciates and rewards principles of soft mobility, in a clearly intermodal logic, that allow an unprecedented perception of places and habitability of territories. This has led to favoring travel times and modes that are completely redesigning settlement contexts, inserting them *de facto* within systems of relations that also radically modify those established *ex-lege*. Moreover, one should not underestimate the constant migratory flows fuelled by ethno-political conflicts and/or environmental disasters, capable of inaugurating new routes, inevitably harbingers of unexpected settlement configurations whose internal dynamics and relative duration are unknown at present.

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<sup>17</sup>The major limitation of Aureli's position is that by equating the political with a formal that, in fact, is not dismissed, and thus rendered inoperative, insofar as it survives in the 'individual' dimension of the island, and in the corresponding system of relations, it is unable to neutralise the corresponding system of forces. What is instead at stake in the 'archipelago' paradigm is not the dismissal of one system of power and its replacement by another, albeit different, but the possibility of the dismissal of power tout court. This is tantamount to confusing a problem of species with a question of gender. But this is, more generally, an indirect confirmation of the metaphysical residue of Western ontology, which still conditions its entire culture.

<sup>18</sup>The archipelago therefore stands as a 'medial' condition, simultaneously active and passive, in which, for which and 'between' which all the possible terms of a discourse on the form of the city emerge according to a relationship of mutual implication. Discriminating, in this sense, is the role of infrastructures, which come to constitute the threshold through which the change of state takes place, first of all ontological, of the archipelago itself, assumed as an interpretative paradigm, first, and then constructive, of reality. The infrastructure, in other words, is the critical threshold of indifference through which both a stable formal configuration is rendered 'inoperative' and an unstable formal configuration is rendered 'operative'. Taking this reasoning to its extreme consequences, one can go so far as to argue that the constitutive indifference of the infrastructure recalls by analogy that of man. It is thus indirectly confirmed that the infrastructure, as such, does not only perform a strategic function in the settlement process, but also proves to be determinate in the anthropogenetic process that distinguishes the agent/body from the patient/ground through the intermediate term *nomos*. See again, on this aspect, Agamben, G. (2020).

The 'liquidity', evoked by the assumption of a maritime point of view, therefore relates to the programmatic fragility of the institutive relations contained in a whole, the archipelago, here taken as a cognitive, theoretical and productive paradigm. One thinks, by analogy, of the different quality of molecular bonds in the solid state of matter compared to the liquid and gaseous state.

Finally, a special discourse deserves the phenomenon of the regeneration of abandoned building stock, which has reached unimaginable levels because of the combined effect of the financial crisis and retreating cities, the reduction of living and working spaces brought about by the growing impact of digital infrastructures and the growing energy deficit (Marzot, 2020). As a result, extensive urban areas lose their purpose, making a decisive contribution to destabilising the character of neighbouring inhabited areas. The greater the pervasiveness of the phenomenon of abandonment, therefore, the greater the potential for regeneration of extensive portions of the city by those directly and/or indirectly inherent in it. The interpretative and transformative paradigm of the “urban archipelago”, for the reasons stated, thus shows an extraordinary vitality, provided that its premises are not prejudicially altered. In this way, it is destined to assume an unprecedented anthropogenetic value, far beyond the objectives that a morphological reading<sup>20</sup> of locations and populations intends to give itself.

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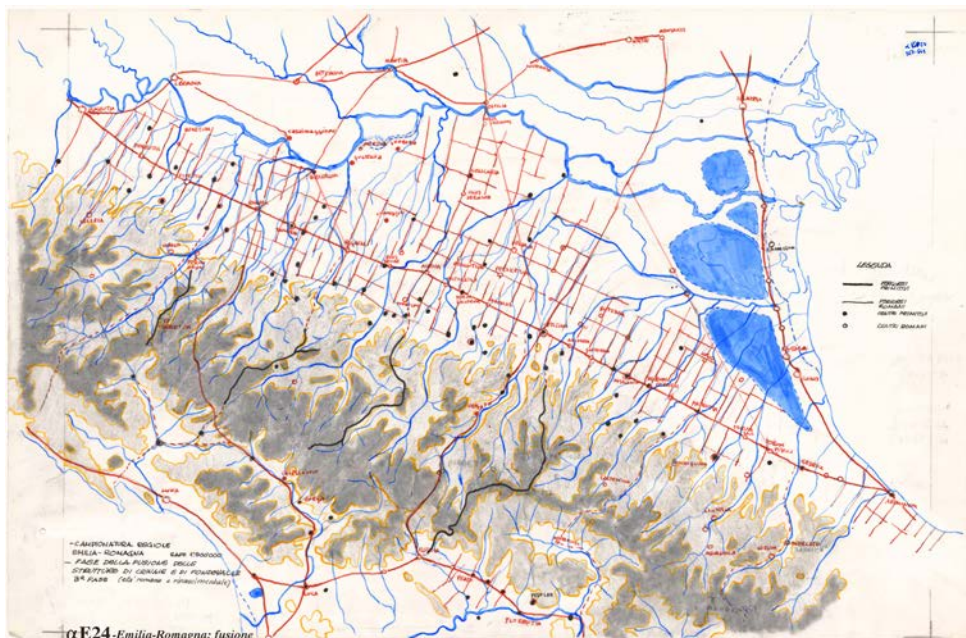
<sup>20</sup>The concept of morphology itself is called into crisis, insofar as, as 'discourse on form', it assumes the presence of a priori given classes and their 'nominability', the grammatical and syntactic rules of which, if anything, must be discovered, just as happens in linguistics, to which the use of the term itself constantly refers.



## Illustrations and tables



**Figure 1.** Cycladic grazing enclosure, island of Iraklia. Originally, *nomos* is that medial action that brings out the discrete (different) from the continuous (indifferent), giving both a relationally finite character of reciprocity. It is therefore a decision that establishes a constraint, opening up a limited field of possibilities, traces of which remain on the surface of the earth, absorbing it into a cultural view of the natural world.



**Figure 2.** S. Muratori, R. Bollati, S. Bollati, A. Giannini, G. Marinucci, Studi per una operante storia del territorio, Unpublished research, 1969-73. Drawing title: αΕ24: Emilia-Romagna: fusione (Archivio Saverio Muratori, Modena, Italy). The Roman centuriation, by disabling the existing territorial structure, founds a second nature, as the premise of a new order to come, whose promise is contained *in nuce* in the internal measure of its modular grid. If every decision is a constraint, which opens up a spectrum of possibilities that conforms to it, the infrastructural warp is capable of generating all the urban and building plots capable of interpreting its political premises.

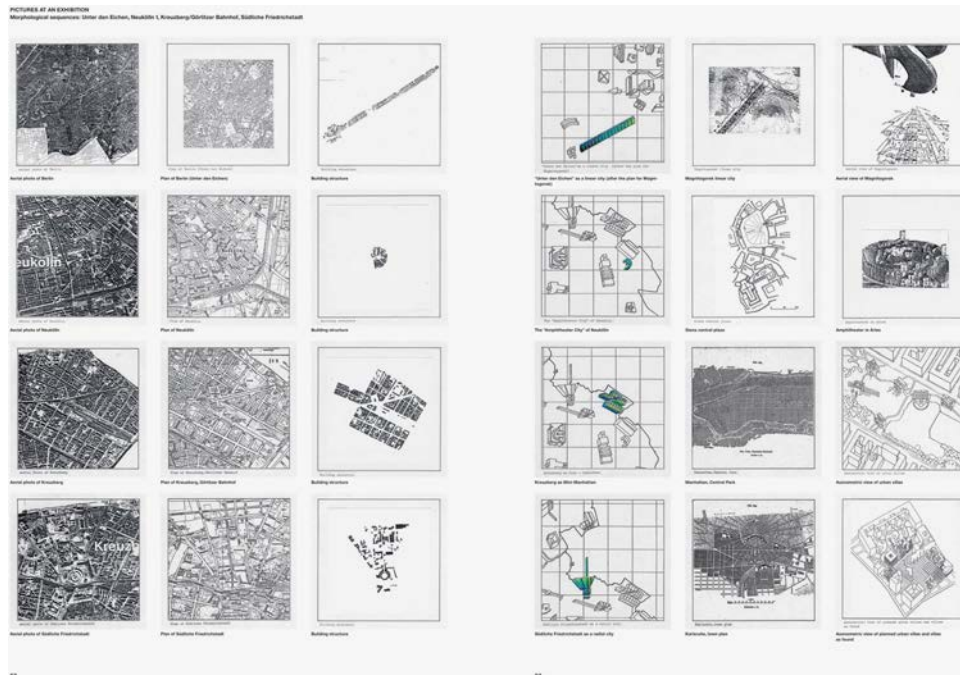




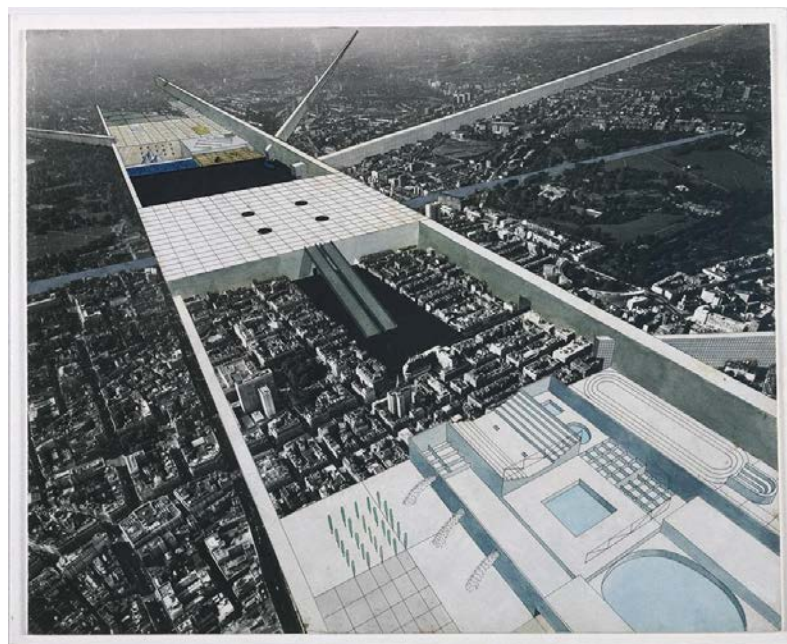
**Figure 3.** Ildefons Cerdà, mapping plane of Barcelona plain, 1854. The topographical relief of the Barcelona plain is not a relational void. On the contrary, it presents itself as a polycentric configuration characterised by a dense network of territorial connections between urban and extra-urban polarities and natural monuments, which have variously interpreted the original Roman farm infrastructure, until reaching a condition of relative stability.



**Figure 4.** Ildefons Cerdà, Reform and Expansion Plan for Barcelona, 1859. The Ensanche layout absorbs the pre-existing settlement system into its design by “superimposition”, acting as a device that deactivates the territorial structure, opening it up to new possibilities of use. Of these, the Plan Cerdà pattern comes to constitute only one of the interpretations, moreover almost immediately disregarded by the development of bourgeois society. The ‘autonomy’ of the consolidated centers is sacrificed to the pursuit of a more complex urban organism, of which they come to be the simple constituent parts, passing through the heteronomy of the new ordering system.



**Figure 5.** Oswald Mathias Ungers et al., *The City in the City, Berlin a Green Archipelago*, 1977. The abandonment to a state of ruin of extensive urban areas creates a relational vacuum, which plunges the surviving city fragments into a condition of mutual disorientation and disorientation. The dissolution of their ties is thus figuratively likened to a liquid state, which isolates what remains in a state of temporary suspension, that only the imaginary establishment of new infrastructural relations is able to evoke.



**Figure 6.** Rem Koolhaas and Elia Zenghelis, with Madelon Vriesendorp, and Zoe Zenghelis, *Exodus or the Voluntary Prisoners of Architecture*, London, 1972 An inhabited infrastructure, superimposed on the city of London, segments its morphology. In the Regent Street area, an urban fragment is ensnared in the meshes of a megastructural Strip, explicitly out of scale with respect to the context. Deprived of its system of conventional relationships; it is disoriented, as are those who voluntarily adhere to the unprecedented condition. Belonging to the new settlement model pre-determines its destiny within a prophetic perspective of the globalised world.

## São Paulo - the changing city.

Solange Moura Lima de Aragão

Universidade Nove de Julho, São Paulo, Brasil

E-mail: solangedearagao@gmail.com

*Keywords: São Paulo, urban morphology, public spaces*

*Conference theme: Communities and Governance*

**Abstract.** *Since its foundation, in 1554, up to the 19th century, São Paulo was a small city - in fact, a village until 1711. Many of the changes from the 1870's on were due to the cultivation of coffee plants, the railway, the immigration process, and the first factories built in the city which would not only result in landscape transformation but also give rise to social and spatial segregation on the urban tissue. The 20th century was plenty of changes with the opening of new avenues, alterations at the form and sometimes direction of the rivers, verticalization, urban sprawl, industrialization and afterwards deindustrialization, changes in street layout, replacement of many buildings by new ones and so forth. Some of these kept on taking place in the 21st century. The character of nowadays public spaces has assumed new meanings as well. Many pathways have become home for the homeless, some streets and squares were totally occupied by street vendors, and on the other hand some avenues and one viaduct in particular have been used as parks by those who live far away from such green spaces. As a metropolis, São Paulo never seems to stop changing. So this is precisely the scopus of this work: to analyze some of the changes of this everlasting changing city, especially those from the last decades.*



## Introduction

*"The streets of São Paulo do not age. They don't have time to grow old. (...) Here, the houses live less than the men. And they move away to widen the streets. Nor is there anything finished, definitive."*

Alcântara Machado, 1940, p.13-4.

Founded in 1554, on a plain situated between two rivers - the Anhangabaú stream and the Tamanduateí river - the Villa of Piratininga, as it was known then, remained a small village for approximately three centuries. Its houses were built with rammed earth in the alignment of long and narrow urban lots along narrow streets. In the landscape, only a few church towers stood out.

In the early 19th century, São Paulo was still concentrated between the two rivers - Anhangabaú and Tamanduateí. By that time, the streets of the city were almost always empty, except for the days when there were religious processions, as described by John Mawe on his trip to São Paulo in 1807:

*"The religious processions here are very splendid, grand, and solemn; they have a striking effect, by reason of the profound veneration and enthusiastic zeal manifested by the populace (people). On particular occasions of this kind all the inhabitants of the city attend, and the throng (crowd) is frequently increased by numbers of the neighbouring peasantry (farmers) for several leagues round. The balconies of those houses, which command the best views of the spectacle, are crowded with ladies in their gala dresses, who consider the day as a kind of festival (...)." (MAWE, 1812, p.90)*

The first change regarding the use of public space (although architecture remained the same) came in 1827, when the first Law School was built in São Paulo in São Francisco square. Students who came to the city in order to graduate in Law transformed its calm environment into a busy one and made serenades through the streets of the city (BRUNO, 1954, p.455-6).

*"Despite the majestic nature that surrounds it, the gentle elevation on which it is placed and the pleasant climate that surrounds it, the city of São Paulo is sad, monotonous and almost despondent. When the students of the Faculty of Law go on vacation, then it is better to recognize what we have just said and have had the opportunity to verify. Academic youth imprints on the village, during their residence there, a kind of fictitious life, which, when interrupted, makes it relapse, so to speak, into its usual state of drowsiness." (ZALUAR, 1860-1/1975, p.123)*

Changes in architecture were remarkable at the second half of the 19th century when richness derived from coffee led to the building of first factories, small palaces, and worker villages at the turn of the century. With coffee and the abolition of slavery also came the European immigrants who would transform architecture, houses and the ways of living of the São Paulo society. The city of rammed earth was torn down and gave way to the city of brick. At that moment, spatial segregation emerged with significant differences between the noble neighborhoods, the mansions, and the working-class neighborhoods - where the workers' houses and villages were built. In these last neighborhoods, where houses were too small, people sat on chairs arranged along the sidewalks while children would play on the streets. The streets became then places of sociability and leisure at least in the poorest neighborhoods. In wealthy neighborhoods, the paved, tree-lined and lighted streets remained empty most of the time. Also at that time, the city surpassed its rivers and began to expand horizontally - beyond Anhangabaú, with the richest neighborhoods, and beyond Tamanduateí, with the working-class neighborhoods. Beyond Tamanduateí, São Paulo became "the city on the other side",



where the poorest people would live.

In the 20th century, other notable changes regarding urban morphology would continue to take place in the city, either with the construction of reinforced concrete buildings, which would initially lead to the verticalization of downtown and afterwards of several neighborhoods, or with the implementation of bus lines that would allow people without resources to build their houses on the periphery, further expanding the area occupied by the urban fabric:

"Due to the fact that the price of land rises in areas with better infrastructure, close to the center, most people end up unable to settle in central locations, having to move further and further away. (...) In 1950, 83% of the population of the metropolitan area lived in the central areas and only 17% in the periphery; in 1980, the central areas housed 72% of the population and the periphery 28%." (SANTOS, 1990, p.48)

The city surpassed two other important rivers: Pinheiros and Tietê, which were straightened throughout the 20th century - the first one between 1928 and 1950, the second one between the 1920s and 1980s. According to Denise Pessoa, "rectification of rivers was considered the best alternative to solve the problems of floods and insalubrity of the floodplains" (PESSOA, 2019, p.8). These rivers, which were formerly used as regatta clubs and for other sports and leisure activities, also lost their use with the straightening process and the implementation of expressways along their length, which separated them from those who used to go there for sport or leisure:

"Thus, the Tietê River was squeezed between two avenues with seven lanes on each side, without any condition of being used by the population for a nobler use, as less than a hundred years ago it seemed to be its vocation: the practice of sports, fishing, leisure..." (PESSOA, 2006, p.118)

Differences between the richest and poorest neighborhoods were also accentuated throughout the 20th century, not only in terms of public space but also with regard to the quality of urban housing. In the richest neighborhoods of the city, high walls were built around the houses and condominiums, in an attempt to increase the individual security of these residents. In these neighborhoods, sidewalks have practically lost their use, remaining empty throughout the day.

"Another trend is a kind of fortification of middle-class neighborhoods and the richest segments of the population. Fearing urban violence, caused by the extreme poverty of hundreds of thousands of urban inhabitants, landlords and tenants have created veritable upside-down ghettos, isolating them inside their mansions and apartments guarded by private police, as well as other employees dedicated to the safety of the residents." (SANTOS, 1990, p.110)

This way of denying the city often led to the emptying of public space in certain neighborhoods, although the streets continued to be heavily used by cars. Interestingly, this increased the lack of pedestrian safety in these neighborhoods.

At the turn of the 20th century to the 21st century, the city presented (as it still does) a series of contradictions between very rich and extremely poor neighborhoods, luxurious houses, mansions and apartment buildings and, on the other hand, self-built houses, tenements and favelas housing a significant portion of the population, streets and squares that remain empty and streets and squares that are heavily used throughout the day, entire neighborhoods without a tree on the streets and heavily wooded neighborhoods, neighborhoods with all infrastructure and neighborhoods with practically none. Contradictions established by man on the same urban site.

"It is necessary to seek a balance between the polarities of the metropolis. There must be a balance between the built environment and the natural environment, impermeable soil and

permeable soil, vehicles and pedestrians, and so on, tend to present serious urban problems.” (PESSOA, 2006, p. 173)

### **The use of public spaces**

As we have seen, traditionally the public open spaces in the city of São Paulo had a use closely associated with religion, processions, and family gatherings in spaces in front of churches, especially on Sundays. One of the most significant changes noticed even in the first decades of the 19th century was the use of public space for the serenades of the Largo São Francisco Law students. With the transformation of the city at the end of the 19th century and the spread of tenements and workers' houses, another change marked the use of public space, since children began to play in the streets while the elders sat in their chairs arranged in front of their homes in working-class neighborhoods.

At the turn of the 19th to the 20th century, new public squares and gardens were created, inviting people to walk along its tree-lined pathways. But not everyone was allowed to enter - in some of these gardens only the richest had access. Over time, the use of these public open spaces has changed. The squares became spaces for leisure and sports and not just a meeting place or a place to see or be seen. However, with the growth of the city, although they still offered appropriate equipment for these functions, they ceased to be used in this sense, mainly from the 1970s, with the construction of subway stations (which transformed several squares into pedestrian circulation areas), with the increase in the lack of security and urban violence, with the occupation of these spaces by homeless people, people without jobs and drug users. Gradually, many important squares and public gardens ceased to be spaces of coexistence, of sociability and spaces of leisure and sports practices.

“The square of the cathedral [Sé square] was marked by a strong transformation imposed by authoritarian planning in the 1970s, when the subway station was built (...), which substantially altered it, fragmenting it into several separate spaces and completely breaking its architectural configuration, with an urban and landscape treatment considered predatory and de-characterizing.

Among the numerous possible dimensions of approach in a synthesis space such as Sé square and surroundings, attention is drawn to the strong concentration of street children, who circulate and inhabit the place and surroundings (...) and occasionally transform parts of the subway in a dormitory, the fountain in the square in a shower and its water mirror in a swimming pool.” (FRÚGOLI JR., 1995, p.53-5)

Curiously, with regard to the use of public spaces today, it is interesting to note that some areas destined for cars, such as important avenues and viaducts, are closed on weekends, turning into extensive leisure areas, such as Paulista avenue and the João Goulart viaduct. An entire avenue is occupied by people walking, cycling, skateboarding, families walking with small children, as if it were a large linear park - in the absence of a linear park in the central area of the city. The same can be said about the João Goulart viaduct, where you can see people walking, running, cycling, walking with their pets, talking with their friends on weekends - a completely different use from that observed during the week, when the viaduct is occupied only by cars. Thus, while many squares and public gardens lose their original use, other spaces (originally intended for automobiles) are now appropriated by people as large leisure areas on weekends - by observing this change in use and in ways of appropriating space, the architect and urban planner Eugenio Queiroga established the concept of “parkality”, when open spaces are appropriated as parks, enabling the enjoyment of the landscape by walking around (QUEIROGA, 2012, p.60).

On the other hand, it is observed the appropriation of sidewalks by street vendors in busy streets of the city of São Paulo, recovering the ancient meaning of public spaces as commercial areas.

"The autonomous aspect of this street commerce and its invasive character end up generating a conflicting relationship with the government and social sectors. However, the pragmatic arguments against the permanence of street commerce on public roads, such as littering the streets, obstructing pedestrian crossings and vehicle traffic, selling products not subject to quality or hygiene standards, approaching pedestrians, etc., are apparently controllable. The street vendors themselves, in their testimonies, suggest forms of organization and control, which would allow them to optimize the conditions of their activity." (COSTA, 1989, p.114)

Regardless of all social aspects related to this, it is interesting to observe the change of the use, the meaning, and the function of such public spaces nowadays.

## Conclusion

In its 468 years of existence, the city has remained practically unchanged for three centuries, but in the last 168 years it has not stopped changing. Its public spaces have also changed over time, as has their use.

Thus, we observed the city of rammed earth constructions giving way to the city of bricks, palaces and workers' houses and, later, to the city of reinforced concrete, of tall buildings and skyscrapers that definitively transformed the landscape and the skyline. And not just that. The old center was transformed with the verticalization, but it also ceased to be the noblest area of the city. Rich neighborhoods were created, while poorer people inhabited tenements and afterwards slums. The city also expanded horizontally with the creation of neighborhoods on the periphery where land was cheaper and houses were self-built, but also where there was no adequate infrastructure for residents, let alone trees on the streets. The course of the rivers changed to make it possible to occupy the floodplain areas, generating a flooding problem that persists to this day.

The original vegetation no longer exists, with the exception of some insignificant remaining stretches. The soil is compacted due to constructions and apartment and office buildings. The city also has an extensive area waterproofed by concrete, asphalt and cement. With all this, not even the climate is the same anymore. São Paulo is no longer the "land of drizzle", becoming a place where sometimes a variation of more than ten degrees can be seen in the same day. In this sense, we could speak of the irreversibility of the landscape, as some geographers suggest. It is no longer possible to recover the landscape of the past and the landscape continues to change day after day due to human action, the interests of the real estate market, political interests and other agents involved in the process.

Regarding the use of public spaces, it is important to mention that with the growth and development of the city, some public spaces disappeared or had their design or shape changed, starting to house other uses, while new squares and parks were created, but in insufficient quantity to meet the demand, causing people to start appropriating other spaces to carry out sports and leisure activities.

At the same time, the sidewalks of the busiest streets, as well as the more central squares and sometimes even the squares of neighborhoods further away from the center, began to be appropriated by people who had nowhere to live or by informal vendors - a problem that is beyond the scope of architecture and urbanism for its sociological and anthropological bias, but which also requires a search for a solution on the part of these professionals.

The landscape is in a constant process of transformation, said geographer Milton Santos (2004,

p.54). This assertion is extremely coherent with the city of São Paulo and accentuated by the continuous process of transformation resulting from human action. Since the end of the 19th century, São Paulo has been the everlasting changing city.

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## Urban morphology in urbanism: towards a more holistic paradigm.

Lucia Nucci

Dipartimento di Architettura. Università degli Studi di Roma Tre. Roma Via Madonna de Monti, 40. 00184

E-mail: [lucia.nucci@uniroma3.it](mailto:lucia.nucci@uniroma3.it)

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*Conference theme: Communities and Governance*

**Abstract.** *With an unprecedented speed more people worldwide choose to live in cities. These rapid changes are radically transforming the structures of our cities. The new settlements are unsustainable with isolated pockets of open space patterns, fragmented and mono-functional patterns, reinforcing social segregation and car-dependency. This ever-expanding city contributes to creating disaster-vulnerable environments which exacerbate the negative effects of extreme weather events and natural disaster which threaten the livelihood, health and safety of billions of urbanites worldwide. The answer to reconstruct and protect the city is often inadequate. The key lessons of Hurricane Katrina is related to what humans did to nature and how it came back to haunt all. It has demonstrated the appalling consequences of maintaining vulnerable populations in dangerous locations, the low-lying areas of the city. It is time to re-adopt more traditional urban morphology solutions that may seem now radical. The complexity of urban phenomena requires a scientific awareness capable of catalyzing different disciplines and expertise within the urban fabrics. We need to work with nature's own processes to better protect the city and the world. A design-led planning practices, as traditional urban morphology in urbanism, have been re-gaining importance worldwide: a practices based upon physical form, watershed catchment patterns, ecological network, to foster tailored place-based spatial solutions by resettling scales and views in a more holistic way. The paper aims to raise questions in order to define the scientific coordinates concerning the changing urban form assumed effects, and how these disrupted prevailing regional and urban planning paradigms.*



**More people worldwide choose to live in cities.**

With an unprecedented speed more people worldwide choose to live in cities. In mid- 2009 the United Nations formally announced that cities had reached a global milestone. For the first time in history, urban dwellers outnumbered the rural population.

With an unprecedented speed more people worldwide choose to live in cities which consequently grow at an unprecedented speed. In mid- 2009 the United Nations formally announced that cities had reached a global milestone. For the first time in history, urban dwellers outnumbered the rural population. Recent projections by the United Nations set the current proportion of urban dwellers at 55% of the world population – about 4.2 billion people. It is projected that by 2050 this proportion will rise to about 68% of the 9.7 billion total. Most urbanites will live in newly developed urban areas that will exist in 2030 are already in place (Romice, Porta, Fellicciotti, 2020). This new wave of development is occurring often in a climate of unstable state institutions, flawed legislative systems, political struggle and young planning systems.

**These rapid changes are radically transforming the structures of our cities, the new settlements are unsustainable.**

A significant part of the new settlements will be only partially formal, in relation to land security, access to infrastructure and planning/building regulations. Already in 2014, nearly one-third of the urban population in developing countries lived in informal settlements that failed to meet basic requirements for tolerable living. The fear is that lacking effective strategies to fulfil and manage the rising demand for housing, food, water, transportation and basic infrastructure, this figure will keep soaring. At the same time the formal part of the new settlements for the rising middle class are facing the same unsustainable patterns of development: with isolated pockets of open space patterns, fragmented, mono-functional patterns, as well as exclusive gated communities, reinforcing social segregation and car-dependency. The form of this new wave of urban construction and the shape of our cities will have profound impacts on the ecological balance of the planet and the human conditions of people growing up and growing old cities. It is not the first time that city form and social development attract global attention. Social reformers in Europe and North America in the late-nineteenth centuries were preoccupied by similar concerns. The answer was entire communities ripped from the city cores to create clean and healthy new urban environments with road widening schemes and large scale blocks. Suburbanization led to the separation of city functions. In our time the order of magnitude is radically different. Cities are becoming more spatially fragmented, more socially divisive and more environmentally destructive.

**The answer to reconstruct and protect the city is often inadequate.**

It is time to ask ourselves whether we have got the planning formula right. The impact of the emerging urban landscape on people and the environment is negative. The expansion has occurred with the growth of peripheral development triggered by suburban lifestyles, and a combination of land speculation, weak planning control and greater population mobility. There is growing evidence that urban environment with higher-density residential and commercial buildings, a well distributed mix of uses and public transport reduce the energy footprint. Research has shown that the so-called “compact city” model has lower per-capita carbon emissions as long as public transport is provided at the metropolitan and regional level. The more we observed the complex processes of social and economic change, the more we became aware – as Saskia Sassen puts it – that the materiality of the city itself allows it to

survive, while nation-states, companies, kingdoms and enterprises come and go. Paradoxically, though, it became clear that very materiality (its architecture) is subject to continuous, at time violent, modification that accounts for the resilience of some cities and the failure of others to adapt to economic change and deal with the consequences of transition.

Communities are exposed to extreme floods, violence, disease and wars, many live without right to land, shelter or votes, entrapped in a vicious cycle of social and spatial exclusion. It is these fragmented topographies that brings the informal and the formal close together, rendering them interdependent within the contemporary urban landscape. It has become difficult for many of the Urban Age experts to talk about their own discipline without reference to the spatial dynamics of urban change (Burdett, Rode, 2012).

There is: a cyclic oscillations between limited versus systemic visions; a separation between emergency interventions and overall design of the space; a lack of understanding the interactions between soil, water and vegetation; a loss of consciousness about interscalarity (macro, meso, micro dimensions); a loss of the technical ability to read and design the spaces by combining these components; a limited evidence and image-based view of project that are iconic, securitized, without a full understanding of the design; a proliferation of overly specialized terms that foster the segmentation of knowledge.

This ever-expanding city contributes to creating disaster-vulnerable environments which exacerbate the negative effects of extreme weather events (flooding, landslides, ...) and natural disaster which threaten the livelihood, health and safety of billions of urbanites worldwide.

The key lessons of Hurricane Katrina and Sandy is related to what humans did to nature and how it came back to haunt all. It has demonstrated the appalling consequences of maintaining vulnerable populations in dangerous locations, the low-lying areas of the city.

There are interesting experiments that are being made for reconstruction after natural disaster, climate change adaptation plan and energy conservation at the scale of the neighborhood and city. I am referring to some project and plans for adaptation which effectively re-use residual spaces within the city as a renewable resource (Copenhagen, Portland, Philadelphia, New York, New Orleans,...). These offer a renewed relationship between technology, history and the internal rules of the discipline and society.

In New York the Hurricane Sandy 2012 forced the city to face the reality of climate change. The need to develop options for long-range solutions become paramount, and it was undertaken with a serious focus on keeping New York's varied coastline more resilient. Recommendations based on expertise from architects, engineers, and scientists include a variety of diverse solutions for the 520 miles of coastline. In some locations, architects are studying new ways to build more resilient neighborhoods along the waterfront; in others, advancing a return to a "soft" un-built edge, with natural means of mitigation and resilience (new coastal defences, changes to the city's zoning and building codes) (Lerner J.N., 2013, MoMA 2011). The rebuild by design project program is a protective system around Manhattan from flood and storm water, provides social and environmental benefit to the community, an improved public realm. This is a long term program to grow resilience in NY working with existing project: green infrastructure (flood protection and social amenities with rain garden, street planting,...), working with and for the communities, a continuous active planning process.

In New Orleans the history and geography is entwined with the challenges presented by the city's natural setting. Colten describes how the city, originally situated on a natural levee built by periodic inundations from the Mississippi River, has gradually expanded aided by drainage canals, pumps, and levees. As swampy ground was reclaimed and developed, the peaty

wetland soil compacted, resulting in a gradual subsidence of much of the city. Construction of manmade levees denied the periodic deliveries of sediment previously carried by the river, causing the ground to sink further. As Colten highlights, the early French strategy of reliance on levees created a dependence on structural solutions to flood control that persists to this day. He shows how, once such a strategy is embarked upon, it becomes increasingly difficult to seek alternative solutions that will not disrupt established patterns of life for many people. The entire dependence on the leveeing system is not only unsafe for us, but I think will be destructive for those who shall come after us. Topography...during floods, created inequity in times of suffering. The highest ground...in the wealthier districts remained above the inundation, but the utmost distress prevailed among the poor who lived in the lower sections that went under water first... (Colten, 2005). In the book Colten outlines alternatives to total dependence on levees and pumps, which include the creation of river outlets above the city, restrictions on development in marginal areas, reduction of impervious surfaces, and raising the foundations of homes. It is a serious injustice to simply rebuild and repopulate the low-lying areas of the city, leaving future generations to suffer the consequences. Any plans to restore wetlands in the city, or limit redevelopment of low-lying areas must, however, provide a guarantee to the previous residents of compensation, relocation assistance, and the right to return to, or remain in, New Orleans. The city is tied to its history as it is to its environment, and that history includes the long-standing dependence on levees and the building of large portions of the city on slowly sinking ground. This history could help not to repeat the mistakes of the past (Rickert, 2005). New Orleans cannot exclude nature, it is time to work with nature's own processes to better protect the city and its inhabitants.

In *Disasters by Design*, Mileti (1999) argues that disasters are largely the result of how we build and design human communities. Disasters are events that can be mitigated through thoughtful land use policies. However, this concept has gone largely untested from an empirical perspective among researchers over the past decade. The book *Rising Water* builds on Mileti's theory by offering systematic, empirical evidence that the location, intensity, and pattern of the built environment are critical factors in determining the impacts of floods. Authors underlying premise is that the rising cost of floods is not solely a consequence of increasing mean annual precipitation, population growth, or inflationary monetary systems. It is also driven by the manner in which we plan for and subsequently develop the physical landscape. Individual and community-based decisions pertaining to the distribution of buildings and impervious surfaces, and the degree to which hydrological systems are altered, are exacerbating losses from repetitive floods. Increasing development associated with residential, commercial, and tourism activities, particularly in coastal and low-lying areas, has diminished the capacity of hydrological systems (e.g., watersheds) to naturally absorb, hold, and slowly release surface water runoff. As a result, private property, households, businesses, and the overall economic well-being of coastal communities have become increasingly vulnerable to the risks of repetitive flooding events (Brody, Highfield, Kang, 2011). The life below sea level is possible only with the operation of powerful pumps, grouped into arrays that have the capacity to lift water out the region's. Pumps destabilize local soils and cause areas that were once swamp or marsh to sink. Uneven streets and potholes, failing infrastructure, and broken foundations are some of the more immediately appreciable consequences of this subsidence. Deep organic soil layers indicate the potential for continued subsidence if new approaches to managing stormwater and groundwater are not adopted (Waggoner & Ball Architects, 2013).

### **Towards more traditional urban morphology solutions**

It is time to re-adopt more traditional urban morphology solutions that may seem now radical. The complexity of urban phenomena requires a scientific awareness capable of catalyzing different disciplines and expertise within the urban fabrics. We need to work with nature's own processes to better protect the city and the world (McHarg, 1962). A design-led planning practices, as traditional urban morphology in urbanism, have been re-gaining importance worldwide: a practices based upon physical form, watershed catchment patterns, ecological network, to foster tailored place-based spatial solutions by resettling scales and views in a more holistic way.

Neglecting to monitor the harm done to nature and the environmental impact of our decisions is only the most striking sign of a disregard for the message contained in the structures of nature itself. Everything is connected. Ecology studies the relationship between living organisms and the environment in which they develop. This necessarily entails reflection and debate about the conditions required for the life and survival of society, and the honesty needed to question certain models of development, production and consumption. It cannot be emphasized enough how everything is interconnected. Time and space are not independent of one another. Just as the different aspects of the planet – physical, chemical and biological – are interrelated. The fragmentation of knowledge and the isolation of bits of information can actually become a form of ignorance, unless they are integrated into a broader vision of reality. When we speak of the “environment”, what we really mean is a relationship existing between nature and the society which lives in it. Nature cannot be regarded as something separate from ourselves or as a mere setting in which we live. We are part of nature, included in it and thus in constant interaction with it. Recognizing the reasons why a given area is polluted requires a study of the workings of society, its economy, its behaviour patterns, and the ways it grasps reality. Given the scale of change, it is no longer possible to find a specific, discrete answer for each part of the problem. It is essential to seek comprehensive solutions which consider the interactions within natural systems themselves and with social systems. We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental. Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature. Due to the number and variety of factors to be taken into account when determining the environmental impact of a concrete undertaking, it is essential to give researchers their due role, to facilitate their interaction, and to ensure broad academic freedom. Ongoing research should also give us a better understanding of how different creatures relate to one another in making up the larger units which today we term “ecosystems”. We take these systems into account not only to determine how best to use them, but also because they have an intrinsic value independent of their usefulness. Each organism is good and admirable in itself; the same is true of the harmonious ensemble of organisms existing in a defined space and functioning as a system. Although we are often not aware of it, we depend on these larger systems for our own existence. We need only recall how ecosystems interact in dispersing carbon dioxide, purifying water, controlling illnesses and epidemics, forming soil, breaking down waste, and in many other ways which we overlook or simply ignore. Once they become conscious of this, many people realize that we live and act on the basis of a reality which has previously been given to us, which precedes our existence and our abilities. So, when we speak of “sustainable use”, consideration must always be given to each ecosystem's regenerative ability in its different areas and aspects (Laudato Si, 2015).

It is time to turn complex problem into an opportunity. These projects have to: follow a holistic approach that integrates all interacting parts and processes as far as possible; adopt geomorphological structure governing water and sediment flow; sustain a site's predevelopment hydrologic regime; propose a "rewilding" of riparian corridors to restore lost ecological functioning while forming well-amenitized urban networks of linear parks, neighborhood open spaces, and pedestrian facilities; learn more about the external and internal conditions of the site, promote a broader view of the premises. These are a provisional attempt to re-practice and re-theorise urban design discourse and suggest a new narrative that need to be describe and written.

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## Bologna and the Porticoes, the form of a shared space

Valentina Orioli

Dipartimento di Architettura. Alma Mater Studiorum Università di Bologna, sede di Cesena.

Via dell'Università, 50. 47521

E-mail: valentina.orioli@unibo.it

*Keywords: Bologna, Historic Urban Landscape, Unesco, Urban Morphology*

*Conference theme: Communities and Governance*

**Abstract.** *The Porticoes of Bologna were inscribed on the Unesco World Heritage List on July 2021 as the 58th Italian site. The inscription of the property, a serial site consisting of 12 components extended for 52 ha, has highlighted the role of the porticoes with respect to the growth of the city of Bologna from 12th century onwards, with some peculiarities that distinguish it from other cities which are rich of arcades. In particular, the aspects that have determined the recognition of the outstanding universal value of the Porticoes of Bologna are the important linear development, the ancient local legislation on the subject, the declination of an architectural element of ancient origin and its continuous reinvention, to the point that the arcades characterize both the historic and the contemporary city. Starting from the materials and reflections developed during the creation of the candidacy dossier, this intervention proposes some reflections on the form of the city of Bologna and on the relational and social significance of spaces that for centuries have been the main place of interaction between public and private and actually really represent the identity of the city itself.*

## Introduction

On 28 July 2021 the Porticoes of Bologna were inscribed in the Unesco World Heritage List (WHL) as the 58th Italian site.

Bologna is one of the pioneering cities in Italy and on the international scene in the conservation of the historic center, and just in the period in which the Municipality worked to finish the candidacy for the WHL, the 50th anniversary of the formation of the Historic Center Plan, adopted in 1969, was also celebrated. If the conservation of the historic urban heritage can be said to be a consolidated work field in this city, the process of inscription in the WHL has highlighted further motivations and meanings (Orioli, 2020; Orioli and Massari, 2020).

This contribution highlights the main aspects relating to the inscription in the WHL of the city of Bologna, emphasizing the centrality of urban morphology survey and interpretation in relation to this process.

## The World Heritage Convention and its challenges

The World Heritage List (WHL) established by UNESCO in 1972 aims to help build intercultural understanding by protecting those sites that are considered to be of exceptional value and beauty, and for this reason have a value that transcends the national dimension and affects all populations of the world. Such sites can relate to cultural heritage but also to natural heritage. As far as cultural heritage is concerned, they can consist in single monuments, agglomerations, or in real complex sites, in which the work of man can also be combined with the beauty of nature.

The 1972 World Heritage Convention stipulates that each signatory State may send to the World Heritage Committee an inventory of its properties which are likely to be inscribed in the WHL. The inscription is based on the recognition of an “outstanding universal value” (OUV) and commits the country in which the site is located to act as a real “guardian”, which preserves the asset over time in order to make it available to generations futures. In this sense, the inscription in the WHL takes up the same principles that we recognize as the roots of the notion of “sustainable development”, i.e. the idea that the resources that are available to us are limited and cannot be reproduced and that it is therefore the task of each generation to preserve them in the best possible way so that future generations can benefit from it. In a broad sense and more in tune with the contemporary debate, we can recognize that transmissibility to the future is one of the reasons for mobilizing around commons, intended as “those resources that apart from the property that is mainly public, pursue a natural and economic vocation that is of social interest, immediately serving not the administration but the collectivity and the people composing it”. According to current sensitivity the commons “are resources that belong to all the associates and that law must protect and safeguard also in virtue of future generations” (Lucarelli, 2011). This is the purpose of the Unesco World heritage List, but also of the Italian Constitution, as stated in article 9.

Referred to urban historical and architectural heritage these concepts give a special meaning and a broad perspective to the work of urban planners and restorers. “Conservation” and “valorization” emerge as a work to preserve and bring to the attention of the public the values that have contributed to shape cities, and that are shared well beyond the local dimension and the present time. In general terms, working from the perspective of Unesco means rooting the conservation of urban and environmental commons in the ethical principles of strengthening permanent multicultural dialogue and pursuing peace (Baroncini, 2021).

This premise is necessary to frame the political and technical responsibility of proposing a site for inscription on the World Heritage List; a list that today counts 1157 sites, of which 58 are in

Italy.

The candidacy of “I Portici di Bologna” had been registered in the Italian Tentative List since 2006. When, in 2018, in agreement with the Ministry of Culture, the Municipality decided to bring the process to its conclusion, they choose to change the original approach also in relation to these considerations (Orioli and Legnani, 2021).

In fact, the Municipality has submitted a serial property made up of 12 components, choosing significant parts among the 62 km of arcades of the city, so as to mark a gap with respect to the comprehensive image of the historic center - an image crystallized by urban planning and translated into a “Bologna model” whose contours, in many respects stereotyped, risk overshadowing the richness of the present and of the ongoing processes. On the other hand, the operation of selecting the components has stimulated an in-depth reflection on the arcades in Bologna, a work of “internal comparative analysis”, which has allowed to refine the approach by specifying the meaning of the choice and identifying, among the many parts of porticoes worthy of being included in the series, those that represent the theme in the most complete and coherent way.

More precisely the Municipality tried to interpret the Unesco values through the candidacy, with the ambition of offering, through the experience of Bologna, a contribution to the general reflection on the transmission of heritage to the future, and on the challenge of conserving a living heritage and therefore in continuous change, enhancing synergies between conservation and urban planning (Orioli and Mariotti, 2022). In fact, in the same period in which the candidacy was completed, the Municipality of Bologna also completed its new General Urban Plan, approved in 2021.

### **“I Portici di Bologna” in the World Heritage List**

The main criterion that motivates the recognition of the universal value of the arcades is criterion IV, namely: “to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history”.

Although arcades are widespread in many Italian and European cities, the comparative analysis shows in fact how their evolution in Bologna embraces the entire urban history, from the Middle Ages to the present day, also producing a considerable extension in spatial terms (42 km within the 14th Century walls “La Circla” and 62 throughout the city). In fact, no other city has such a quantity and variety of porticoes as or more than Bologna, which translates into a veritable open-air “atlas” of styles, materials and building techniques.

The reason for this substantial continuity of the arcades as elements of the urban structure is due to the decision to make their construction compulsory, implemented with the municipal statutes of 1288 and never called into question.

This decision, which is in fact the first urban planning regulation of the city, has remained essentially unchanged, even if the dimensional and building indications have been adapted over time, creating a “shared space” that characterizes all types of buildings - from social housing to aristocratic ones, from university to religious buildings, from cemetery to sanctuaries, ... - and all types of urban space, from streets to squares (Ceccarelli and Pascale, 2021). The presence of arcades in Bologna is therefore effectively a distinctive feature of the historic urban landscape, as intended by Unesco (2011).

Bologna was founded by the Romans as a colony along the Via Aemilia and between the rivers Savena (east) and Reno (west). The location near the hillside in a safe and prosperous part of the plain, the availability of water and the position along the Via Aemilia, which was the most stable track of the regional road network, allowed the city to survive after the collapse of

Roman Empire. Albeit in the early Middle Ages the benefits of a good geographical location were the essential factor for the permanence of the urban settlement, the city of Bononia, like many others, experienced a period of decline and retraction.

The city of the early Middle Ages insisted on a part of the Roman city, of which it has preserved until today the imprint like a sinopia (Ricci 1980). It was surrounded by a wall of selenite, and it was characterized by a dense urban fabric, with a lot of tower-houses belonging to patrician families. As in other cities in the same era, the urban blocks, each organized around the house of the ruling family, were introverted, characterized by aerial connections and private and protected open spaces.

The birth of the arcades probably coincides with the subsequent period of "opening" and new development of the city, when Bologna established itself as a flourishing urban center thanks to agricultural production and to the creation of the Studium (in 1088), the oldest university of the Western world, but also due to the development of the manufacturing industry.

The reason for the birth of the arcades has been the subject of many interpretations, some of which are quite imaginative, such as the one that links the porticoes to the need for rooms for university students. It is certain that in the period of recovery of demographic and economic growth, the city regained and surpassed its Roman extension, with the construction of two new city wall systems, the Torresotti wall (12th Century) and the huge enceinte called La Circla (ended in 1374). Already at the time of construction of the Torresotti wall, arcades spread, first as a spontaneous system of expansion of the space of the houses above the road.

This way of developing residential buildings, providing a space adapted to host activities and interaction with the public, was frequent in many cities of the period. It was spontaneous and many municipalities ended up banning it, because it occupied the street space in an uncontrolled way. As is known instead in Bologna it became mandatory from 1288. The reason for this choice probably corresponds to the many practical advantages of the portico, which is a space that protects people both from the street (at the time not paved and very dirty) and from the inclement local climate (very hot in summer and cold and wet in winter), offering a suitable and comfortable place for interaction between domestic and public life.

This type of space, on the other hand, was typical of rural houses in the Bologna area. Bologna grew up due to subdivisions carried out by the monastic orders, granting land in emphyteusis to peasants and laborers who settled inside the city walls. These people brought their habits and their lifestyle to their new place of life, and, together with them, they brought the porticoes as essential spaces in their houses. This "transfer" of forms of living space from the countryside to the city is well explained in the fundamental work of Francesca Bocchi (2019) and exemplifies the interpretation of Bologna as an eminently agricultural city given by some geographers, including Franco Farinelli.

This fundamental characteristic of the arcades, of being an expression of the ways of life and relationships of one's time, has been maintained in every period of their construction, and declined in relation to the specific functions of the buildings with arcades. The result is an "urban porticoed continuum" that defines the historic urban landscape of Bologna, prevailing over the singularity of the buildings, even monumental. Walking in the shade of the arcades it is impossible to perceive the difference between the facades of the individual buildings. Rather, one perceives a sense of continuity and unity, determined by this very important infrastructure of the collective space, which is also the threshold between public and private, and a place suitable for the most varied activities. This characteristic that is typical of the historical development of the city is also recognized in its modern and contemporary parts, which have been included in the candidacy with the components "Cavour, Farini e Minghetti", "MamBo",

and "Treno della Barca".

The "Treno della Barca" component is particularly significant: a long porticoed building (over 600 m) designed by Giuseppe Vaccaro and built in the heart of the Barca district represents the largest urban intervention carried out in the nearest Bolognese suburbs after the Second World War. It was linked to the historical experience and the social characteristics of the more traditional *infra muros* Bolognese portico, and was proposed as an identity experience for newly immigrated citizens.

The inclusion of a piece of post-World War II suburb on the property recognizes this continuity in both morphology and values, but also represents an attempt to rebuild roots and open up a path of care for the shared space in one of the most problematic neighborhoods of the city. With these objectives, a process of restoration and reuse of the spaces on the ground floor of the "Treno" was launched, with the inclusion of new private and public functions and the support of facilitators ("Capitreno") to accompany the positive reappropriation of spaces. In the wake of this experience, in which cultural activities and initiatives play an important role, a city program was launched which culminates in a biennial "Festival dei Portici", whose first edition will be in May 2023.

In essence, what effectively distinguishes the historic urban landscape of Bologna is that the arcades not only materialize the transformation of architecture over the long term of the city's history, but constitute a specific form of collective space, and in this sense, they are representative of the physical city, the *ville*, but also of the values that it expresses, and which constitute its identity, therefore of the *cit * (Sennet, 2018).

The Municipality tried to emphasize these aspects by proposing, as the second criterion for the candidacy, criterion II, which states: "to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design". During the discussion of the candidacy at the World Heritage Committee, this criterion was removed, and the registration of the property was essentially based on criterion IV and on these characteristics:

- important linear development of the porticoes, so much so that in the city the presence of the portico is pervasive and all-encompassing (62 km);
- centuries-old legislation on the subject, equally exemplary are the state of conservation of the porticoes and their daily use, favored by a special civic awareness and by an urban planning that has been kept constant over the centuries;
- ancient architectural element: the Porticoes of Bologna are a particularly representative declination of an architectural and urban element which, since ancient Western civilizations (Greek and Roman), has been the place of shelter and decoration par excellence, available to the whole community;
- relationship between ancient and contemporary: the system of the porticoes of Bologna permeates both the old historic city and the contemporary one to such an extent that it has no equal in the world;
- private/public interaction and social issues: from the Middle Ages to today, the porticoes of Bologna have uninterruptedly represented the "place of integration" par excellence, where civil and religious spaces, and private homes belonging to all social classes, are perfectly integrated. They represent a social meeting point.

## Conclusion

This description of the main elements that characterize the meaning and path of the candidacy highlights how relevant the history and urban morphology have been in defining its contents.



A more detailed analysis of the selection of the 12 components of the property demonstrates this even more precisely. The property is in fact made up of 12 components whose perimeter is defined in relation to the urban expansion and the three circles of walls that have characterized its different historical phases. The selection of the 12 components incorporates concepts and elements of analysis that have characterized the survey of the historic center of Bologna proposed for the formation of the 1969 Plan, but it explicates and underlines the peculiar characteristics of the open spaces, both in physical and social terms.

This emphasis on the structure of open, public, or shared spaces such as arcades shifts the challenges of conservation towards the management of a heritage that is subject to intense and constantly changing use. From this point of view, the inscription in the Unesco WHL is a way of recognizing and welcoming new challenges, combining the usual tools for conservation and urban planning with a management plan open to welcoming and reconciling many uses and interpretations of urban space.

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## Tourism as impulse of urban and social transformation. Local frames of a global phenomenon.

Christina Papadopoulou

TU Berlin, Faculty VI - Planning Building Environment, Institute of Architecture, Department of Architectural Theory. Straße des 17. Juni, 152. 10623 Berlin.

E-mail: cpapadopoulou@outlook.de

*Keywords: urban form, transformation, colonialism*

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**Abstract.** *Globalization, climate change, digitalization - factors that are currently changing our society. This transformation is integrally connected with a humanitarian crisis which is gradually emerging from distorted urban constellations and generated components, such as neighbourhoods, economic resources and state-owned strategies for dealing with urbanism. Syros Island is serving here the context of examination. The history of the capital of Cyclades, goes back at least 5.000 years, to the Early Bronze Age of the Cycladic civilization, introducing its acme during the 6th century B.C. The high level of individuality of the dwellers, as well as very specific historical and morphological conditions have led to a typological homogeneity, which arises the question of the genesis of a 'Greek identity'. The search for a collective identity is investigating tourism as an evolutionary urban and communal forming impulse. Which are the spatial interaction patterns? What kinds of agencies, networks and social bonds are emerging? From ancient times philosophers had understood the direct connection between inhabitants and the city. In his work *Politeia*, Plato likens the soul of the human to the city. A human topography of transformation is being indicated. Spatial phenomena are being today constantly re-defined via demographic changes, technological advancements and socio-political interventions. By deconstructing the concept of identity used as a category of analysis, we may reveal the spatial interaction patterns of these communities. A rather territorial thinking applied on this locus is aiming to challenge the notion of urban landscape and redefine contemporary topographic and morphological extensions of the island's resilience.*

## **Introduction**

Globalization, climate change, digitalization - factors that are currently changing our society. The urban transformation that follows these conditions plays a decisive role in our co-existence with the contemporary world. This transformation is not merely natural or intangible, emanating outside the bounds of society. It is integrally connected with a humanitarian crisis which is gradually emerging as a result from a distorted urban topography caused by any crisis or spatial alteration force. Social networks are being affected by a constellation of components, such as neighbourhoods, economic resources and state-owned strategies for dealing with urbanism. A thorough understanding of how social networks react and adapt to spatial distortions may lead to the definition of a resilient urban planning for the future.

## **Methodology**

This points to the need for a context-specific framework for understanding how external factors applied for a period of time affect and redraw the social topography. Tourism is being at this point defined as an external filter, as a temporary membrane which is altering the cityscape and most of the times in favour of economic exploitation. The transforming urban realities of Syros Island are serving here the context of examination. As the capital of Cyclades, Syros Island shares topographic, climatic and social characteristics with many other isles in the archipelago and has the potential to form an urban module case study of Aegean Sea topography. Figure 1.

## **Measurement and analysis**

Tourism is not a constant actuality in Syros. It is reflected on the city's urban life for three to four months per year. But how much do we know about the city's life throughout the rest of the year? Is the pre-existing cultural and social cartography taken into consideration by the municipality's programmatic actions during the touristic period? Overpopulation of a specified period of time, re-planning the urban network as an emergent measurement and extensive commercial activity are dynamic forces that define a hybrid identity for the island. Are locals though benefiting or are they internally displaced and neglected? Who are the key stakeholders? Emerging hypothesis is that tourism may sometimes appear as a social equalizer attracting travellers, enhancing local businesses. But inside this function local communities may be very much affected by pre-existing social conditions. A potential of social vulnerability during the post-touristic time and amplification of social inequities arises. But has it been so far deeply examined, which planning methodologies could establish new spatial patterns, which would accommodate both local and international lifestyles?

Syros is a special site of antiquity. The history of settlement on Syros goes back at least 5.000 years, to the Early Bronze Age of the Cycladic civilization. The high level of individuality of the dwellers at the beginning of its urban chronicle, as well as very specific environmental and historical conditions and settlement processes into stages, have led to a typological homogeneity of the first ancient city of the island, Ano Syros. Syros constituted a very important centre of the Cycladic culture introducing its acme during the 6th century B.C., indicating that the history of Syros spans over many centuries. Ermoupolis is the main city of Syros and became rapidly the commercial centre of the Eastern Mediterranean and soon acquired splendid public and private buildings. Some of the most important buildings of the country were built in Ermoupolis, among them in 1823 the first General Hospital of Greece and in 1833 the first Greek High school of Greece. The town also experienced a huge commercial and cultural development until the early years of the 20th century and constituted the largest port before that of Piraeus. Decisive time markers in history and also very specific topographic characteristics

generated gradually a continuation of spatial evolvement and demonstrated the social changes that motivated the transformation of the conception of space. Figure 2.

The question of the genesis of a 'Greek identity' is pursued at this centre, or rather the search for collective identity and its extensions throughout touristic development. The main concern of this development as a realm of investigation is to address the conceptual basis by which the uncovering of the social network that works as an impulse for transformation can be classified. The testimony of individual and collective existence, morphological, demographic and cultural elements of Syros can act as a system for proposing a typical urban study for its settlement in the framework of contemporary issues.

Sites have temporality and locality. The temporality of a place determines the season, while the actions of humans in combination with spatiality and temporality determine the landscape, the Topio (τοπίο). In other words, the collective perception that we form of a place. The human topography of transformation. From ancient times philosophers had understood the direct connection between inhabitants and the city, as well as the conciliatory relationship that develops between them. In his work *Politeia*, Plato likens the soul of the human to the city. He attempts to analyze the soul by investigating the city and by drawing his conclusions from his observation. Dwelling inside the Topio as a perpetual state of human existence and as a spatial phenomenon is being constantly re-defined via transformations, which are formed through demographic and socio-economic changes in addition to technological advancements and socio-political interventions. By introducing a complex system of analysis through the perspective of tourism, we may approach the definition of the city by the deconstruction of the concept of identity used as a category of analysis and reveal the spatial interaction patterns of these communities.

A rather territorial thinking applied on this Cycladic Island could challenge the notion of urbanscape and redefine contemporary topographic and morphological extensions of the island's resilience. Is tourism shaping a spatial evolution for these communities? Which are the spatial interaction patterns? What kinds of agencies, networks and social bonds are emerging? Figure 3.

## Conclusion

An analysis of the urban morphology would only be accomplished through a critical rethinking of history and of the origin of things. By redrawing the contemporary ethics of society. The city becomes the object of investigation not only the context of investigation. Through the lenses of human action. Things can hardly be experienced in isolation but only exist in arrangements. It has been amply demonstrated that in the modern era the social organisation of space has fundamentally changed. In recent years, research on the early modern era has worked intensively on territory as the central form of organisation of space (Low, 2016). Architectural space is understood as a container for social actions. Shared and circulating patterns of space penetrate the social networks. The cultural sociology and spatial phenomena could potentially be understood through codes, myths, icons, narratives, movements and representations.

In order to obtain a feedback to life practice, an additional level of analysis is proposed to be opened up by integrating the processes of spacing and synthesis (borrowed from Martina Löw's sociology of space). The concept of narrativity as an identity-forming moment and a basis for interpretation will attempt to define the parametric impulses of urban touring. How should the new civic shells or the treatment of traditional ensembles be organized in the future, considering the ever evolving touristic expansion and the replacing architectural local practices? Critical regionalism can be defined at this point as an architectural approach that

strives to counter the homogeneity and cultural inherent and lead to a social oriented Topiographia, towards a measurement framework for a more responsible and resilient urban planning.

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#### Illustrations and tables

Figure 1. Syros, Cyclades



Figure 2. Syros, Morphological evolution





Figure 3. Topio-graphia, Topography of transformation



## The School as the City: Rewriting and Collaging an Urban Morphology. Vimercate Campus' Design

Laura Anna Pezzetti<sup>1</sup>, Helen Khanamiryan<sup>2</sup>

<sup>1,2</sup>ABC Department of Architecture Built Environment Construction Engineering, Politecnico di Milano. Piazza Leonardo da Vinci 32. 20133 Milan.

E-mail: <sup>1</sup>[laura.pezzetti@polimi.it](mailto:laura.pezzetti@polimi.it), <sup>2</sup>[helen.khanamiryan@polimi.it](mailto:helen.khanamiryan@polimi.it)

*Keywords:* Learning Architecture, school buildings, rewriting and collaging, Regenerative Architecture, re-morphologisation.

*Conference theme:* Communities and Governance

**Abstract.** In recent years, the debate around the innovation and rethinking of school buildings has restarted at an international level, driven by contemporary pedagogy and ICT technologies offering new active learning modalities and by the advocated role of school buildings as civic centres. Yet, Italian school buildings present an endemic lack of renewal and active integration in urban regeneration concepts. While schools should be seen as the pivot of districts' fabric and community life, little theoretical efforts and no guidelines have been developed so far for school types as "Urban Architectures", that is, essential units in regenerative processes and "Learning Architectures" rather than specialised functional types and indistinct learning environments. The paper presents research by design on the High Schools Campus of Vimercate (Italy) funded by the Provincial Government, which constitutes a morphological area as wide as the town's medieval centre. Dilapidated large school campuses represent a higher challenge, as demolition is neither possible nor sustainable. In a "regenerative architecture" approach and under the conceptual instrumentation of "rewriting" on the pre-existing order, the design explored the School in Form of the City, probing remorphologisation strategies, collage procedures and design of new active space-places (Pezzetti 2019) to stimulate active learning together with an aesthetic experience of architectural space.

## **The Italian Status Quo**

In recent years, the debate around rethinking and innovation of school spaces has become a hot topic at a both national and international level.

Specifically Italian school buildings are in a serious state of backwardness and decay.

According to the recent data presented by the Italian Ministry of Education (MIUR), the Italian school building stock comprises 58,842 buildings. Out of those, 3,800 were built before the 1920s, about 23,800 between 1946 and 1975, and about 21,000 after 1976. Besides, 23% of the total are buildings adapted from other functions (MIUR, 2020).<sup>1</sup>With few exceptions, most modern buildings are prefabricated “containers” organised by a rigid classrooms-corridors system with insufficient communal spaces and no architectural quality. As classrooms are small and mostly overcrowded, they have proved vulnerable to the pandemic threat when exceeding the number of twenty-one students (Pezzetti & Khanamiryan, 2020).

Moreover, many Italian schools built between the 1950s and 1970s have weak relationships with the city, due to their location in areas of new expansion and development as autonomous objects enclosed in fenced green areas.

Moreover, the standards set by legislation in 1975 (MIUR, 1975) are still in force, since “The New Guidelines for School Buildings” issued by MIUR in 2013 only introduced some generic concepts for updating learning spaces that did not replace the outdated standards. Recently, MIUR issued new Guidelines in the framework of PNRR Next Generation EU (MIUR, 2022) resulting in ten general performance principles for building the country’s new “schools for tomorrow”.

As far as this paper is concerned, some aspects should be pointed out.

Both Guidelines fail to frame clear strategies and tools for planning and design to supersede the 1975 DM’s standards, and merely express generic declarations. There are no specific indications about innovation and the regeneration of existing buildings. This is a major challenge, as they cannot be all demolished and substituted (demolition is not sustainable and teaching cannot be interrupted), while, on the other hand, the correct location of schools in the boroughs is of primary importance. The major issue is not building a limited number of new schools, but how to innovate and regenerate substantially the huge number of existing schools.

One positive aspect is that both documents stress the concept of the school as a no longer autonomous object and functionally self-contained institution but as a part of the city open to the local community. This concept should provide a clear stimulus to widen pedagogical approaches, currently too focussed on innovative furniture and technological innovation and therefore only affecting the interior realm (Pezzetti & Khanamiryan, 2022).

A second aspect stressed by the latter Guidelines is the need to combine pedagogy with a high architectural quality and outdoor education. While various disciplines have already contributed to innovate educational strategies, the physical dimension of educational buildings as architectures still needs to be explored and defined.

Finally, both documents still concentrate on the school as an individual building and not as a part of the city fabric, and fail to discuss its insertion in wider urban regeneration strategies and relationships with different kinds of urban contexts up to the unsolved dialectic between the need of a managed boundary and the requirement of openness.

## **The School and the City: School Buildings as Key Units in Regenerative Processes**

If the school starts to be perceived as a Civic Centre, school buildings should address more than the mere functional dimension and rather embrace the new paradigm of Regenerative

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<sup>1</sup>Based on the data obtained from MIUR (Open data: “Use of origin and date of construction of buildings”).

Architecture involving the relation between the school and the city, that is, the school as a part of the city and specifically a catalyst for residential districts.

In this perspective, educational institutions should provide additional facilities (such as auditorium, library, gym, and recreational services) that are meaningful not only to community use but also to urban design. Therefore, we should start to consider the design of school buildings as closely related to community development, revitalisation, and regeneration (Haar, 2003).

The crucial role of school buildings in the design of the city and development of urban districts has been acknowledged by architects since the 1920s, although in relation to the urban challenges of the time. In his idea of the Rush City, Neutra (1927) early assumed the school building as a key component of urban design, although under the influence of the Modernist open city and hygiene approach that fenced it within a green belt<sup>2</sup>. Twenty years later, claiming that schools were isolated from the life of districts, Sert suggested planning schools as parts of neighbourhood units, interconnected with public spaces and community centres (Sert, 1944). Significantly, this approach was reaffirmed by Roth (1966)<sup>3</sup> in response to the vision of the school building largely reduced to the mere fulfilment of functional requirements and neglecting its role as a living part of the neighbourhood (Roth, 1966). When Quaroni designed the school in Canton Vesco (1955), then assumed as a reference at the XII Triennale Exhibition (1960), the pavilion type was turned into a pavilion system shaping the fulcrum of the neighbourhood and creating a dialectical relationship with the rows of the Rationalist linear fabric. The design also featured a fresh degree of integration into the urban fabric by including some district-level commercial functions (Tafuri, 1964).

### The School as a Community Centre

Between the 1960s and the 1980s, the relation between the school and the city clearly evolved towards the role of the school as Civic Centre that addressed the need of representative urban centralities in new suburban areas. In Italy, this coincided with the research on typology, morphology and Urban Architecture, both in universities<sup>4</sup> and in the practice of the Italian Masters (Pezzetti, 2012). The school was explored at the same time as *Architettura Urbana* and *"Architettura Educatrice"* (Rogers, 1947), also inducing the typological inventio from behaviours (Canella, 1965). One protagonist was undoubtedly Canella, whose projects "condensed" urban and school activities together and brought urban life within the "school walls", converting the building into a catalyst of collective functions, as in the Incis Village (1968-82) and the Pieve Emanuele (1971) designs. Aymonino, in turn, suggested practising simultaneously different scales of architecture and urban design by creating an Urban Architecture as a recognisable "part of the city" and integral part of the urban system and territorial equipment for citizens. The School Campus in Pesaro holds the complexity of the city in itself, concentrating various educational and civic services addressed to both students and citizens (Aymonino, 1977).

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<sup>2</sup>In the words of R. Neutra, "if we give the right value to Schools, they will appear as one of the most effective means of renovation [...]. The increasing importance of these schools as centres that also serve the community, fully confirms the validity of the proposal; large part of adult education [...] takes place in elementary schools integrating functions. The determination of areas for elementary school in the city is of the highest importance" (Eng. transl. by the authors). R. Neutra (1936) 'Il problema delle nuove scuole elementari', 17-19.

<sup>3</sup>In 1966, in the book entitled *"The New Schoolhouse"*, A. Roth referred to J.L. Sert's famous statement, "There is no space for schools!" and reaffirmed the importance of the integration of the school buildings within the districts.

<sup>4</sup>Those themes found wide resonance in the Faculty of Architecture of the Politecnico di Milano, starting with the course on the typology of the Primary School directed by E.N. Rogers. "It is a question of activating the concept of utopia: of thinking concretely about a better society [...]. Nor is there a better place than school to tackle such topics [...]" E. N. Rogers (1962) *'Utopia della realtà'*, 1.



The school building itself became the definer of an urban part, reproducing morphological complexity, typological experimentations, integration of functions and pedagogical sequences, with an approach that refused to address the school as a specialized type to be designed following the mainstream handbook approach. The school, a key element in the culture of a society, as a public building is also an instrument for constructing the city, that is, building the city through “pieces of architectures” (Pezzetti, 2012).

These antecedents testify concisely that some modern architects kept on exploring the special urban role of the school for over a century.

Today, dilapidated and outdated existing structures represent a major challenge, as demolition is neither always possible nor even sustainable. Thousands of buildings must be renewed, modified, and retrofitted without interrupting their use and modifying their location.

Innovation challenges become more complex when generic concepts of innovation face the constraints of a pre-existing structure and a real context. The relationship between the school and the peculiarities of the context becomes crucial. This calls for a learning architecture intended as research by design that reopens questions of meaning in architectural forms.

The paper presents the research by design project funded by the Provincial Government of Monza and Brianza, Italy, critically facing the challenges of innovation and renewal by exploring jointly the concepts of regenerative architecture and learning architecture.

Within the framework of a comprehensive concept of regenerative architecture the isolated campus-like School Complex of Vimercate has been investigated and redesigned “in form of the city” and reincorporated into the civic life through the implementation of “architectural rewriting” in relation to the pre-existing order.

Within this urban-like strategy as an inventive adaptation to existing conditions, the grafting of a variety of learning space-places (Pezzetti, 2019) interprets innovation issues under the concept of learning architecture.

### **The Case Study: the Vimercate High School Campus**

The case study is the Vimercate Omnicomprensivo, a mega school-campus representing a typical reality of the 1970s-1980s, when large or various schools were grouped in large sites necessarily located in suburban areas, on the edge of the peripheral neighbourhoods.

The mega-school campus concept defined an “anti-city” isolated from the urban reality, while defining a morphological region as large as the historic town’s medieval centre, although deprived of its architectural quality and variety.

Located among farmlands, the Campus formed a self-contained island cut out of infrastructures and separated from the town due to the presence of the North-East PANE Local Park (PLIS), on one side, and of the farmlands opening the view towards the Prealps on the other.

Its self-referential layout contradicted the ancient rural structure inherited from the Roman centuriation. Moreover, the layout interrupted an ancient route that linked Vimercate’s historic nucleus to the village of Bellusco. This route still exists today outside the School Complex enclosure and holds a special interest for our design.

Besides, the Campus was originally designed in 1974-1975 for two schools and 1,500 students. Later, it gathered four establishments ranging from high schools to technical institutes for about 4,500 students. As a result, classrooms are now fragmented among various buildings, while shared spaces and facilities are critically undersized.

The Campus is today a paradigm of the large stock of Italian school buildings built in the 1970s-1980s and suffering from major problems of overcrowding, inadequacy and dilapidation of spatial quality, lack of facilities, security issues, energy consumption, and seismic vulnerability.

The original project (arch. D. Malvezzi, 1974) featured a clearer layout compared to the final one (1975), built in 1978, with the most interesting elements either altered or erased altogether. The addition of further buildings at a later stage only made the poor layout even worse: two provisional containers for classrooms (1982), still in use today; a new classroom block occupying what was left of the central lawn and the hemicycle canopy at the entrance (2001-2005), resulting in a problematic bottleneck and uninviting barrier.

The fragmentation of classrooms weakened the identity of each school, while the uncontrolled circulation and unmanaged entrance undermines the sense of security.

The poor architectural and maintenance quality of prefabricated structures, the loss of original shared facilities (library, canteen, meeting rooms, ateliers) caused by the increased number of schools and classrooms, the usage of hallways and patios for mere circulation, the neglect of outdoor spaces inaccessible to students, discourage any sense of belonging and social interaction. Besides, the gym and auditorium are nested inside the Campus and cannot be opened to the town with the necessary functional autonomy.

Students and teachers have no spaces other than those of the classroom: there are no spaces for study, informal or association activities, no organised and accessible spaces for outdoor activities, no adequate libraries, reference and reading rooms, no meeting spaces other than the rigid structure of the auditorium.

### **Design Methodology: a Rewriting Technique**

As the role of school buildings should be no more confined to the educational function and as a secluded self-contained institution, the Campus should be regenerated and innovated as an urban and landscape catalyst.

In order to give the current mono-functional building and dull morphology the richness and diversity of a public place open to the community, the architecture of the school Campus itself is seen as a collage of urban activity in miniature, that is, a small town rewritten by the assemblage of spatial fragments borrowed from the city and inserted into the present layout.

Dealing with an existent structure, the methodology entailed two levels:

1. the strategy to include the morphological fragment of the anti-city within the system of urban-landscape relations;
2. the redesign of the layout order as an Urban Architecture through the techniques of rewriting on the existent text and related assemblage procedures.

### *Establishing urban and landscape relations*

For a school complex to be part of the city, it must be included in a system of urban-landscape relations. The reading of the settlement's structure revealed some underlying topographical signs and urban facts that could be assumed to turn the condition of isolation into a potential. The Campus has been reconsidered in its potential as a cultural pole, strategically located at the intersection between a "historical urban circuit", formed by the ancient Roman axes and Medieval tracing, and a potential "landscape circuit", reinforced by the presence of the PANE Territorial Agricultural Park and the agricultural structure still shaped by the patterns of the Centuriation. The diachronic and synchronic mapping revealed the historical evolution of both town and countryside, up to the settlement of the campus that may constitute a possible hinge between these two realities.

The Campus design recovered some old "lines of forces" and re-established their continuity with the old routes through the PANE Park, suggesting cycle-pedestrian routes that would connect the educational-cultural pole to the town of Vimercate and its territory.

### *Rewriting and assemblage procedures*

The regenerative architecture approach stresses the resilience potential of the already built morphology by making use of circumscribed demolitions in favour of a “rewriting” technique practised in relation to the pre-existing built text and order.

Rewriting, rather than making a tabula rasa and reconstructing, is the way we continue to write onto an already-written text, which in this case takes the form of a “re-morphologisation” strategy.

Rewriting, therefore, is defined as a new inscription and stratification of signs connected by formal and semantic relationships based on the reading and interpretation of the structures inherited from the previous text (Pezzetti, 2020). The aim is to reshape the School Campus as a place of relationships, richly articulated, culturally vibrant and endowed of thematic and equipped space-places to be discovered. The new morphology is obtained through operations of collaging, grafting, inserting and partially erasing, which altogether form the rewriting technique.

Thinking of rewriting on the already-existent, the theory of the city as an assemblage, deeply rooted into the design culture, became relevant. Various articulated as city of composite (Kolhoff), collage city (Rowe and Koetter, 1978), and montage (“Roma interrotta”, Analogue City), the concept of assemblage has been largely implemented to make sense of existing morphological chaos and to incorporate contingent facts. In the early 1980s, the modern city already appeared as “a vivid set of pieces and fragments, of types and counter-types, a juxtaposition of contradictions, and a more dialectical than linear process” (Ungers, 1979).

The structuring intentionality of the assemblage of parts and layers introduced by our design led, therefore, to the evolution of traditional Urban Architecture design tools, suggesting the procedures for providing a new formal order and meaning to the in situ elements within a concept of co-evolutionary development and resilience of built facts (Pezzetti, 2020b). Thus, the layering produced by rewriting and collaging becomes a reading tool and design technique at the same time, which became part of the assemblage in its own right.

### **The School in Form of the City: Rewriting and Innovating the Vimercate High Schools Campus**

Continuing Aymonino’s “thinking of the building in form of the city”, the design applied to the existent layout various techniques of rewriting and assemblage thinking, rearticulating the complex through the insertion of some constitutive elements of the city composing the richness of the urban system. The School Campus was re-shaped in analogy with the places of the city: its neighbourhoods (or the clusters of individual schools); its squares, courtyards, and gardens (or the patios at different scales and hierarchies); its “urban interiors” (or the collective and informal spaces); and the private spaces (or the classrooms-households) stimulating the sense of relationship and belonging. The reshaping of the rigid morphology revealed unprecedented spatial potential, capable of co-evolving with the learning community.

The design, therefore, postulated a Learning Architecture envisioning spatial innovation by exploring school as the city, that is, stimulating active learning by the character of a plurality of space-places, each one responsible for proposing centres of attention and an aesthetic experience of the architectural space.

### *Re-centring, re-connecting, re-morphologising*

Rewriting worked first on the texture of the existing space, making it articulated and selectively porous to the outside. The campus thus absorbs energy from the outside – the town, and from the inside – the school community.

Its regenerative architecture interprets the potential of the existing layout with respect to the place and its founding rules, while identifying new “epicentres”, lines of force, grafting or thinning points.

To respond to the cruxes and main thematic areas of intervention, the design concept started from the existing text and three founding principles:

1. Re-centring the layout – the Green Ring

The Green Ring is a neo-type. Paying a tribute to the original project, it identified a new centrality common to all the four clusters reorganising the schools into well-identified systems, while maintaining this centre as a green void. All the Campus’ relationships and energies unfold from this elliptical epicentre, the actual representative place and beating heart of schools’ life.

2. Reconnecting and identifying the parts – the “Lines of Force”

The Green Ring radiates a field of relationships involving all the parts of the complex. Through the design rewriting, they acquire a strong identity, while participating in the new cohesion of the whole complex.

The “lines of force” are formed by the main outdoor spaces extending the routes coming from the town and Park into the Campus and leading to the major hybrid spaces shared with the community (gyms, auditorium, classrooms for associations, cafeteria). A system of partitions integrated in the Ring’s architecture allows adjusting the degrees of the Campus’ porosity according to schedules and activities. The main line of force is the diagonal line introduced by the design, which continues the historical route interrupted by the construction of the Campus, while dynamising the Campus’ rigid layout.

3. The patio system as spinal column – the Axis of Ateliers

The compositional principle of excavation, represented by the existing patios, is the theme echoed by the Axis of Ateliers, or the new spinal column of the entire complex. Tangent to the centre, the Axis structures a system of patios suited for outdoor education, overlooked by old and new classrooms. Through its interior route and exterior system of patios, the Axis connects all the four schools, while redesigning the gym’s façade and expanding its entrance.

*Spaces shared with the community and Rewriting strategies*

Integrating the need to oversee the entrance to the Campus with the need to give an identity to each school, the design resolved the current fragmentation by proposing the reorganisation of the four schools’ spaces into clusters, all equally connected to the Green Ring, to the Axis of Ateliers and to the system of the hybrid sharing spaces.

The rewriting defined and reshaped an area inside the Campus around which both old and new hybrid spaces shared with the community would gravitate. The “lines of force”, in fact, identified two preferential access paths from via Adda: one, corresponding to the present main axis, leads to the existing auditorium and gyms; the other, shaped by a new “line of force”, leads to the new Green Ring, Cafeteria, Classroom-Library and, again, to the Gyms. This shared area is designed to either communicate easily with the rest of the complex, or be secluded, depending on the case.

The first axis of the hybrid sharing spaces corresponds to the Green Ring. Here, all connecting paths converge, the connection with the Axis of Ateliers begins, and two of the new buildings overlook the Ring, while giving access to its walkable roof and the special “Classroom-Library”. The Green Ring, moreover, offers a cafeteria connected to the auditorium and various rooms with movable partition walls that can be shaped according to the required activities and capacity. Both the Schools and civic associations, whose presence would guard the site while extending the life of the campus beyond school hours, are going to share these spaces.

As regards to the second axis, the requirement for each school to have an atrium and welcoming space, guarding the entrances and acting as an interface between the schools and the town, intersected with the need to expand the Banfi and Vanoni Schools. In order to define this interface, a linear building was designed as the head of these schools, projecting the two existing axes in its elevation by the transparent entrance halls, each topped by an overhanging volume. As in the new multilevel classroom building overlooking the Green Ring, the theme of the pitched roof reinterpreted as a shell encasing a perforated screen signifies the schools' collective spaces and refers to the farmstead's figure, while raising beyond the one-floor complex to project onto the landscape.

Set back from via Adda, this building overlooks a new raised public space, which exploits the sloping ground to cover a semi-underground parking. This terracing provides an intermediate meeting space facing the Park, endowed with a green area and a shading curved canopy, open to the whole community and distributing the flow of students safely towards the entrance halls.

Both the raised terrace and the Green Ring axis are designed to be always open to public use. Beyond class time, gyms, auditorium, Green Ring and Axis of Ateliers will be open to the community and provide spaces for sports, meeting, associations and classrooms-laboratories for lifelong learning, so that the Campus becomes a vibrant cultural centre, integrated by civic association and leisure activities.

The aforementioned three principles of regenerative design (re-centring the layout; reconnecting the parts; the patio system as a spinal column) have been developed according to ten design strategies that include some techniques of urban rewriting applied to the whole layout composition (centralisation, interconnection, addition, fitting) and architectural rewriting (grafting, overlapping, infill); the enhancement of indoor and outdoor formal and informal learning spaces; and finally the redesign and retrofitting of facades.

After developing the design proposal for the Vimercate Campus, the research translated the ten design strategies into conceptual diagrams in order to set a first benchmark in school redevelopment, helping the public administration to visualise these strategies in forms of operational principles, although the details of architectural solutions should remain site-specific. The rewriting and collaging operations were identified as follows: 1. Centralisation of the layout; 2. Interconnection of buildings; 3. School-city connection; 4. Addition of buildings; 5. Grafting of solids; 6. Overlapping and infilling; 7. Internal insertions; 8. Activation of outdoor spaces; 9. Façade Rewriting and envelope retrofitting; 10. Façade rewriting by diaphragms and shadings.

## Conclusions

This research by design no longer considered school buildings as a specialised functional type only addressing pedagogical and functional issues, but rather as an Urban Architecture and an essential unit in regenerative processes.

In a Regenerative Architecture approach, the redesign of the Vimercate High School Campus investigated the problems and potentials of the existing structure and rewrote its syntactic and constitutive principles in relation to the urban-landscape structure while re-morphologising it by detecting lines of force, new epicentres, grafting and thinning points. Aiming to set a benchmark for existing school redevelopment, the design explored and defined a set of rewriting techniques, space-places and assemblage procedures to reconstitute an innovative morphological text and Learning Architecture. Postulating the concept of the School in Form of the City, the research shifted from learning environment to Learning Architecture, envisioning spatial innovation and stimulating active learning by a plurality of space-places, each one



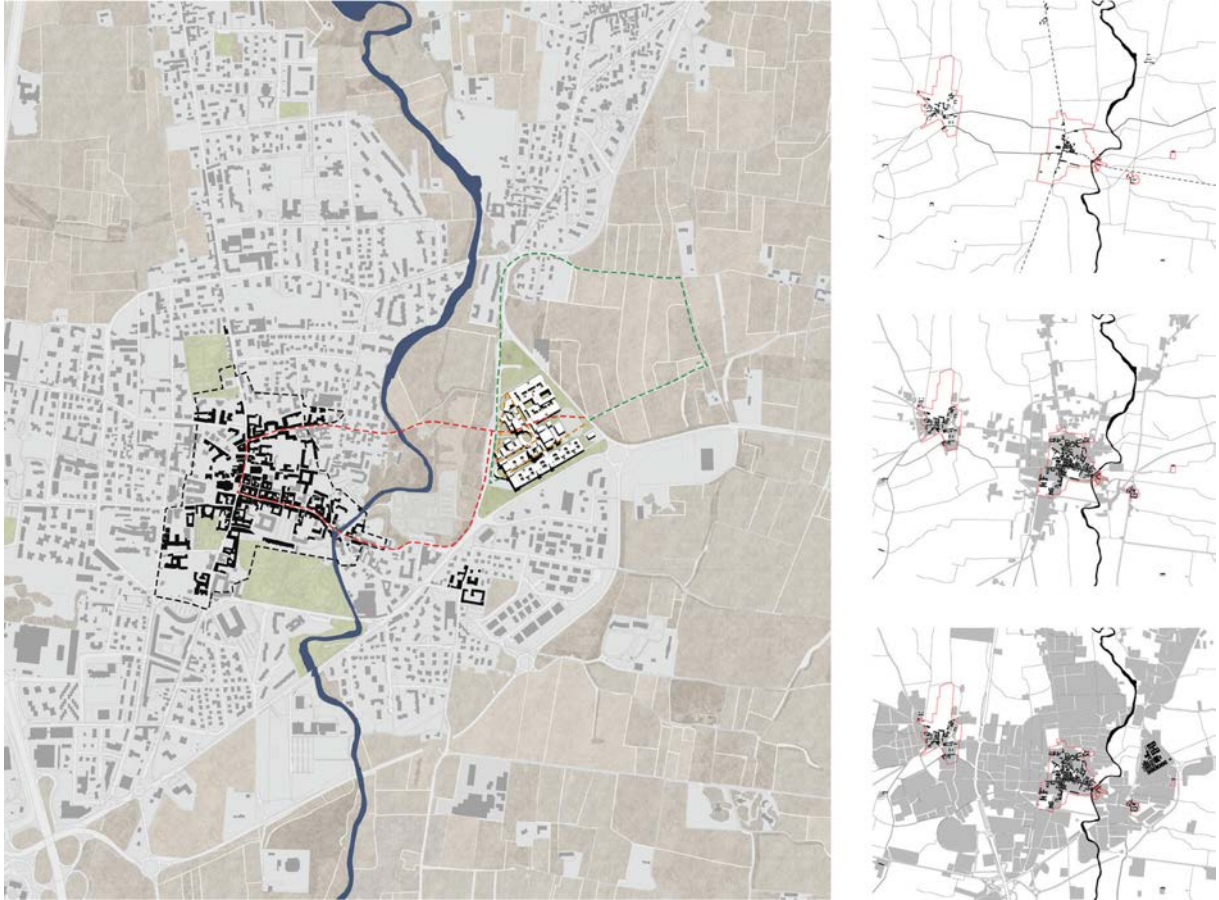
responsible for proposing centres of attention and an aesthetic experience of the architectural space.

Finally, opening school spaces to the community by matching different degrees of porosity and partition to the layout, the new Omnicomprensivo becomes an urban catalyst providing the scenarios of a constant dialogue and interaction within the framework of city-community-school relationships.

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## Illustrations

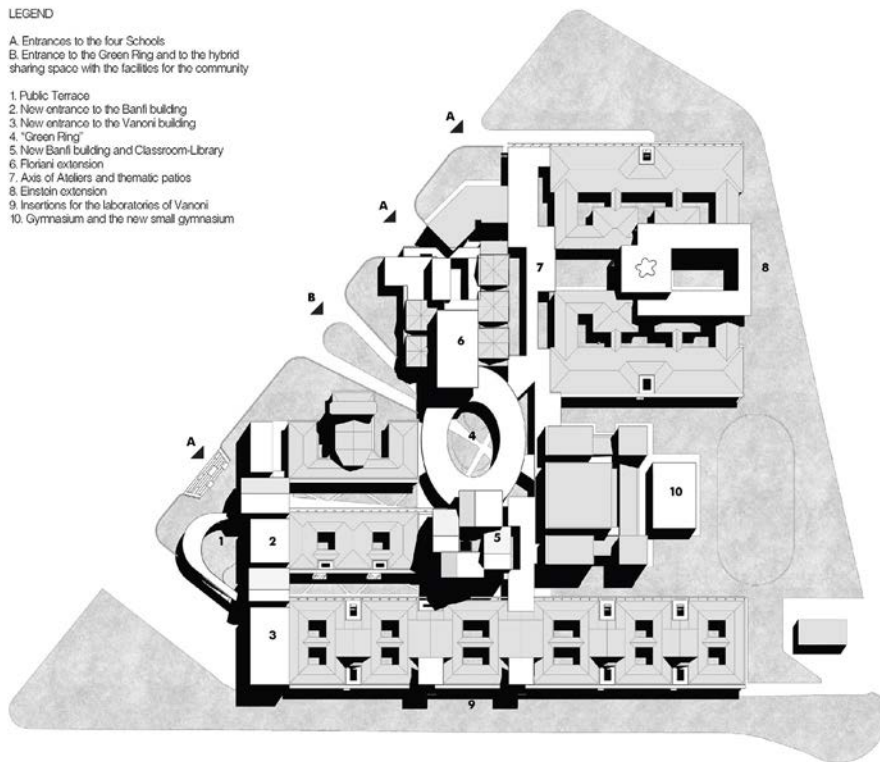


**Figure 1.** The Vimercate Campus as a cultural pole at the intersection between the “historical urban circuit” and the “landscape circuit”; historic sections in: 1722, Teresian Cadastre; 1954, Orthophoto; 2020, Orthophoto (mapping by the authors)

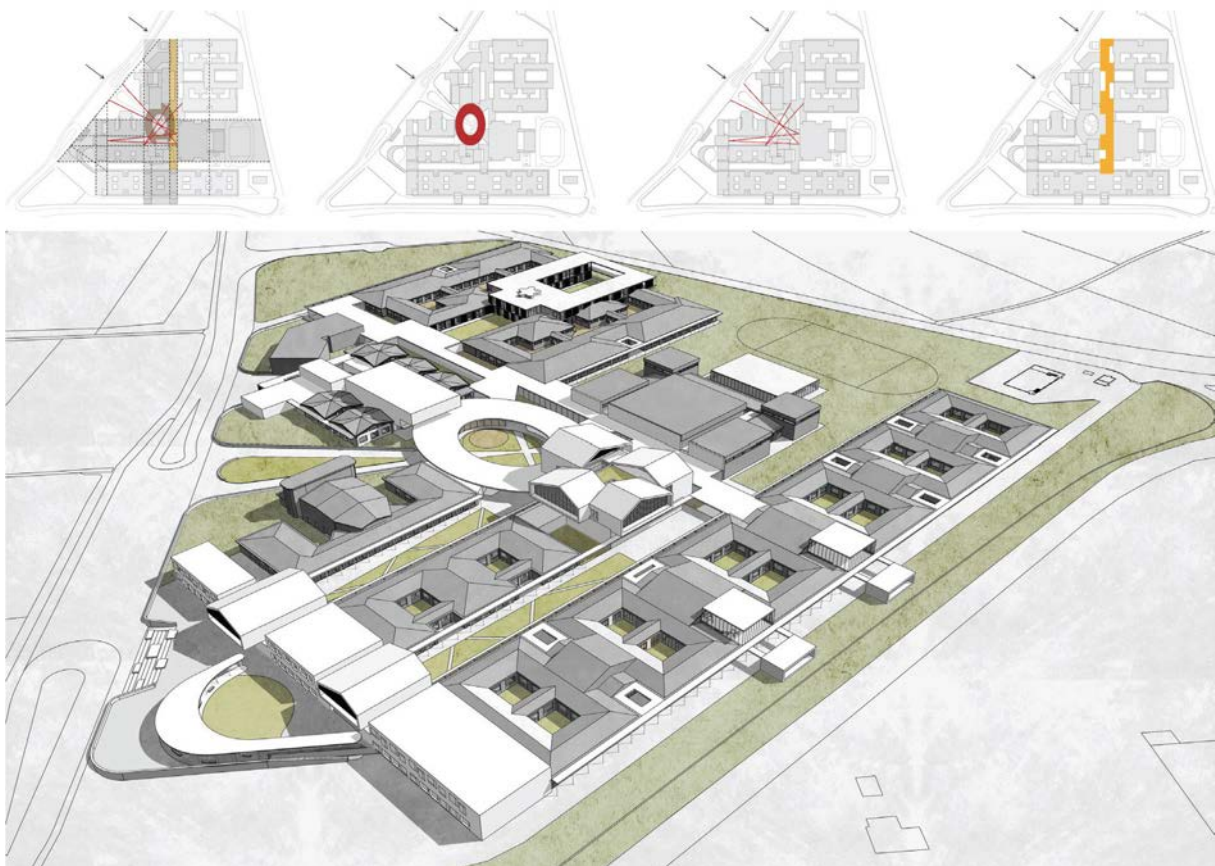
# LEGEND

A. Entrances to the four Schools  
B. Entrance to the Green Ring and to the hybrid sharing space with the facilities for the community

1. Public Terrace
2. New entrance to the Banfi building
3. New entrance to the Vanoni building
4. "Green Ring"
5. New Banfi building and Classroom-Library
6. Fiorani extension
7. Axis of Ateliers and thematic patios
8. Einstein extension
9. Insertions for the laboratories of Vanoni
10. Gymnasium and the new small gymnasium



**Figure 2.** Rewriting design for the Vimercate Campus, site plan (by the authors)

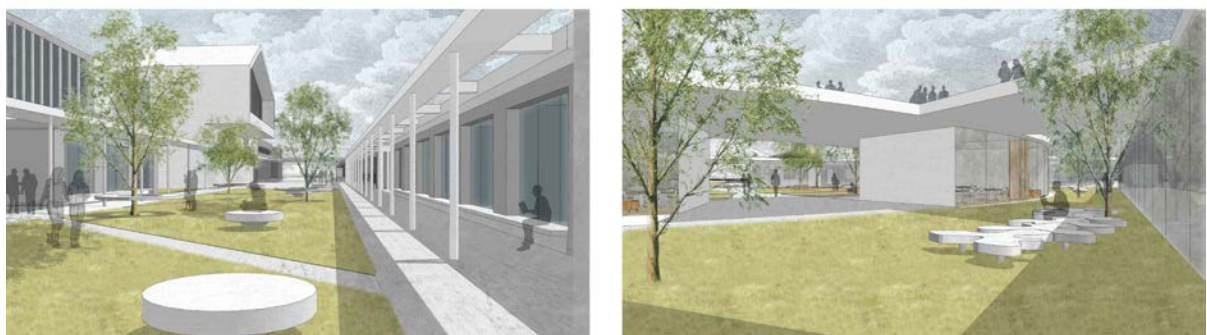


**Figure 3.** Aerial view of the Campus' redevelopment and design's diagram: re-centring; reconnecting; re-structuring (by the authors)

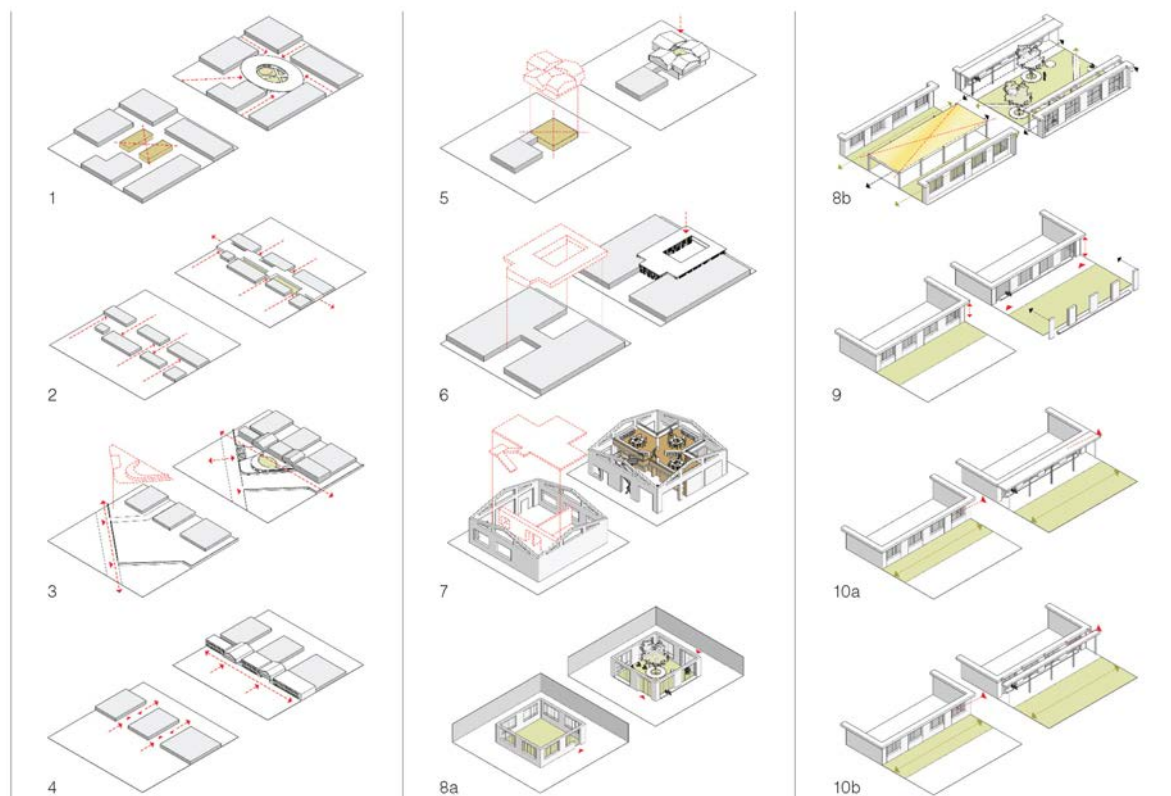




**Figure 4.** Design of the main entrance raised on a public terrace; the main “historic” axis leading to the auditorium, the Green Ring and the gym (by the authors)



**Figure 5.** The Green Ring and jutting Classroom-Library; the secondary “historic” axis; the patio between the Green Ring, the Gymnasium and the Axis of the Ateliers (by the authors)



**Figure 6.** Diagrams of the ten Rewriting Strategies 1. Centralisation of the layout; 2. Interconnection of buildings; 3. School and city connection; 4. Addition of buildings; 5. Grafting of solids; 6. Overlaps; 7. Insertion; 8a. Reactivation of patios; 8b. Reactivation of outdoor spaces; 9. Redevelopment and retrofitting of the façade; 10a, 10b. Diaphragms and shading devices (by the authors)





## A strategic-multidisciplinary approach to reduce the seismic risk. Ongoing activities within the ADRISEISMIC project.

Giorgia Predari<sup>1</sup>, Lorenzo Stefanini<sup>2</sup>, Angela Santangelo<sup>3</sup>, Giulia Marzani<sup>4</sup>

<sup>1,2,3,4</sup>Alma Mater Studiorum -University of Bologna, DA (Department of Architecture), Viale del Risorgimento 2, 40136, Bologna, Italy

E-mail: <sup>1</sup>giorgia.predari@unibo.it, <sup>2</sup>lorenzo.stefanini2@unibo.it,

<sup>3</sup>angela.santangelo@unibo.it, <sup>4</sup>giulia.marzani3@unibo.it

*Keywords:* Seismic risk, expeditious assessment, urban planning, historic centre

*Conference theme:* Communities and Governance

**Abstract.** Many active faults make the Adriatic-Ionian area one of the most prone to seismic events in the entire European continent. Earthquakes, which are often disastrous, have strongly affected the building practice and the culture of the countries involved, inspiring specific regulations and prescriptions that have followed over the years. However, despite the progress, the historic centres are still characterised by a high vulnerability, while the acquired knowledge and experience often remain confined within national borders.

Within this framework, a specific study has been conducted as part of the ADRISEISMIC project, funded by the Interreg Adrion programme, to address seismic vulnerability through a multidisciplinary approach. Starting from the surveys carried out in the Countries involved in the project (i.e., Italy, Serbia, Albania, Greece, Slovenia and Croatia), the most common construction techniques, numerical assessment methods, and good practices for the reduction of seismic risk at different scales were collected and catalogued. An expeditious method to assess the seismic behaviour of reinforced concrete and masonry buildings has also been developed. The elaborated protocol is in its validation phase and will be shown referring to the case study of Piazza Puntoni in Bologna. These investigations are the basis for developing guidelines and harmonised procedures to integrate the assessment of seismic risk in the urban planning tools. Investigating seismic vulnerability at territorial scale can support the identification of urban regeneration strategies and, consequently, the prioritization of seismic risk reduction intervention in areas subjected to a higher risk.

## Introduction

Seismic risk has always been a paramount issue for Italy and the south-eastern European area. Indeed, the specific morphological configuration of the area makes it prone to earthquakes of considerable magnitude, often with catastrophic consequences for man-made areas. Disaster-hit countries have traditionally faced the consequences of seismic risk without a shared approach, developing their own solutions to the problem. There have been many studies on building vulnerability assessment over the years, Calderoni (2016) and Moufid Kassem (2020) being some of the most recent examples. Interesting approaches on the subject are also illustrated by Clavi (2006) and Giuffrè (1996), the latter offering a specific view on historic centres. Only in recent years, with the increase in international collaborations, and thanks to the European funded programmes, the need to create common criteria for intervention has started to be satisfied.

Moreover, historic centres, squares and their surrounding buildings are conceived as symbol of local identity and socio-economic cores for the Adriatic-Ionian area settlements. At present, the seismic vulnerability of historic areas is mainly addressed at building level (Bernardini e Ferreira 2021), but sectorial studies are often not able to address the interrelated consequences of earthquakes on complex socio-economic systems like cities are. The diagnosis of seismic risk at urban level is considered of great importance to bridge this gap even though its potential is underestimated (Marzani et al., forthcoming). A large-scale assessment of seismic risk takes into consideration the relationships between buildings and public spaces, and it is capable of orienting planning strategies for the regeneration of the entire city (Lorenzo, 2017).

The ADRISEISMIC project fits into this context and, through a multidisciplinary approach, it aims to develop a common protocol for seismic risk reduction in the project partner countries. The work presented here, briefly goes over the main points of the ADRISEISMIC project developed so far, describing its general context and structure. A special section is then dedicated to the work carried out on the Italian Pilot Action of Piazza Puntoni, the survey phases, the data acquisition phases, and the results obtained through the application of the method. In this way, a general knowledge of the entire project is given, both from a procedural and operational point of view. The last chapter describes the first considerations on the evaluation protocol, obtained from its application to the Italian Pilot Action.

## The ADRISEISMIC Project

ADRISEISMIC is an EU project funded under the Interreg Adrion Programme, which is specifically devoted to address common challenges through territorial cooperation. The main objective of the project is to exchange and systematise knowledge and practices to counter seismic vulnerability in historic urban areas and squares. To this aim, eight partners from six different countries (i.e., Italy, Croatia, Slovenia, Greece, Albania and Serbia) are involved. The participants have different backgrounds in terms of expertise and the territorial level they represent.

Two different Italian partners are involved in the project, bringing specific and complementary competences: the Alma Mater Studiorum - University of Bologna (UNIBO) – Department of Architecture and the Institute for Vocational Training of Construction Workers in the province of Bologna (I.I.P.L.E.). On the one hand, UNIBO is responsible for the overall project coordination and brings theoretical support to the activities concerning the analyses of seismic vulnerability, the policy framework and urban planning regulations and strategies; on the other hand, I.I.P.L.E. is responsible to support the creation of new training packages increasing the impact of the project and fostering the creation and dissemination of new knowledge for specific target

groups.

The City of Kaštela in Croatia and the Municipality of Gjirokaster in Albania are the two local public authority involved as project partners. Both settlements have a strong seismic exposure and a rich architectural and cultural heritage to preserve. This condition makes the areas very sensitive to the issues addressed in the project and, consequently, suitable for both the implementation of harmonised regulations and the testing of the techniques introduced by the project. Being local government institutions, they have the authority to implement their policy framework endorsing ADRISEISMIC project results and to develop innovative strategies for the conservation of the built heritage.

Regional development agency Bačka (Serbia) is a body founded by local municipalities to develop coordinated actions for the socio-economic improvement of the region. Similar to the Region of Crete (Greece), their participation is aimed, on the one hand, to test new planning tools and programmes acquiring detailed knowledge to be transferred to the local actors involved, and on the other hand, to develop specific activities with the regional and local administrative bodies for the implementation of innovative regulations.

The remaining two partners are the Slovenian National Building and Civil Engineering Institute and the University of Crete. The two research institutes directly support the development of the project activities, providing expertise respectively in the structural field and in training the volunteers to respond to the emergency phase.

The project identifies three specific objectives:

- 1) Harmonisation of technical norms and financing tools for seismic vulnerability reduction;
- 2) Enhancement of the competencies/skills on seismic vulnerability of all the professional figures involved in the construction process and in the management of the emergency phase;
- 3) Codification of effective diagnostic methods and intervention techniques for seismic retrofitting.

ADRISEISMIC project foresees two main outcomes: on the one hand the establishment of an international cooperation to jointly tackle seismic vulnerability; and on the other hand, regional/local action plans, aimed at embedding the shared methods for assessing seismic vulnerability of aggregates of buildings and other actions to increase resilience towards seismic vulnerability into the local and/or regional planning instruments.

The first series of activities dealt with the harmonisation of the tools and approaches adopted by the project partners in terms of standards, operations and economic-financial instruments. The collection and systematisation of the standards and incentives currently adopted in the various areas covered by the ADRISEISMIC project have been performed. This step led to a knowledge base of the current situation, highlighting the most advanced approaches and those most replicable to the various contexts. The results consist of a repository of good practices, intended as virtuous initiatives, documents and laws already in place in one of the countries involved in the project to be potentially replicated and transferred to other contexts. At the end of the project, six roadmaps (i.e., one for each country) will be drafted to explore the pathways that each country intends to develop to tackle seismic risk and increasing resilience working on the improvement of their policy and planning framework.

In addition, a lack of specific skills and high-qualified actors to properly deal with the seismic hazard and its effects was detected. Therefore, the need to enhance competences of all the actors involved in the seismic retrofitting process at local level has been envisaged. Based on the analysis of the available training methods regarding seismic improvement interventions in the ADRISEISMIC countries, three specific training packages (i.e., addressing practitioners, civil servants, and workers) have been developed. An additional toolkit designed for volunteers is

planned and structured with both theoretical modules and hands-on activities. All the courses are available on the project Moodle platform.

Besides the analysis and improvements of the regulatory framework and the training offer, the project focuses on the development of an expeditious method for the assessment of seismic risk of the existing heritage. Focusing on buildings facing historic squares, therefore characterised by a load-bearing structure in reinforced concrete and masonry, all available information was initially collected on the construction techniques, intervention techniques and assessment methods for each of the countries involved in the project. The survey carried out ensured a widespread knowledge of the state of the art, establishing the starting point for the subsequent activities.

Two different assessment protocols were implemented: the first concerns reinforced concrete buildings, the second masonry buildings. The two systems, although distinct, maintain almost identical characteristics in terms of the input and output provided by the system at the end of the data processing phase. This preserved the consistency and comparability necessary for the two systems to be used in parallel on the same urban areas.

The ADRISEISMIC method was therefore used in three areas set in three different countries (Pilot Actions). The aim was to test the method also from an operational point of view, having both the possibility of investigating possible strengths and weaknesses of the system, and the possibility of verifying its versatility by operating on areas with very different characteristics.

#### **Italian Pilot Action: Piazza Puntoni**

The Italian Pilot Action of Piazza Puntoni, located in the city of Bologna, was the first to be fully developed. The investigations and activities carried out served as a reference for the other pilot actions in the project (located in Kaštela in Croatia, and Rethymno in Greece). The three areas were chosen following the objectives and themes investigated by the project. Priority was therefore given to buildings facing urban squares, preferably with a historical connotation, and characterised by constructions with a reinforced concrete or load-bearing masonry structure.

The investigated Bolognese area is located in the University area, within the medieval walls that traditionally characterise the oldest part of the urban centre. Although the square is located in the most historical part of the city, it is of recent construction. The public space is the product of demolition works that took place in the 1930s with the aim of redesigning the entire district and making it the hub of university life in the city. Due to these transformations, it has a very peculiar shape (a sort of right-angled triangle) and is bordered on all sides by driveways. Its conformation makes it more a transit point than a meeting place, as squares are often understood. However, it is precisely its particular genesis that has made it the ideal place to study: it is in fact surrounded both by historic masonry buildings, conceived with traditional techniques and used for both public (University) and private (homes and shops) functions; and by relatively recent buildings, characterised by reinforced concrete structures and Twentieth-century masonry ones.

Specifically, it is possible to group the buildings into six groups with similar characteristics: the University library, the Department of Economics, the National Gallery of Bologna and Fine Arts Academy, the University student house and canteen, a sundial building and ancient residential buildings.

The University Library is also the seat of the University of Bologna. It extends planimetrically over several blocks and is characterised by a very articulated layout. The original layout, to whom numerous extensions and modifications have been made over the centuries, dates back to



1549; it was erected at the wishes of Cardinal Giovanni Poggi, who wanted it as his personal residence. It became the property of the University in 1803, after also serving as the Academy of Sciences. Structurally, it presents very diversified configurations. The portion facing Piazza Puntoni, that is the subject of the project, is characterised by load-bearing masonry walls in the elevation and floors made of wood or by arches and vaults.

The Department of Economics is one of the buildings conceived together with the new layout of the square, thus dating back to the second half of the 1920s. Although aesthetically congruent with the adjacent Palazzo Poggi, the construction techniques are different. The vertical load-bearing elements are made of masonry with higher characteristics, and the floors in the classrooms are made of reinforced concrete.

The building hosting the University student house and the canteen is the most recent among the ones facing the square. Its inauguration took place on the 25th November 1954, after one and a half years of construction work. Its distinctive form was imposed by the configuration of the plot, located in a historic district and surrounded by many existing buildings. The external façades seek a dialogue with the surrounding context, proposing the typical elements of the city's tradition, such as the portico on the ground floor, the exposed masonry façades and the regular rhythm of the openings.

However, the external configuration conceals an internal structure composed of reinforced concrete beams and columns, designed to support large spans (over eight metres). The flat roof, later elevated by a metal frame, is another element of discontinuity with the neighbouring buildings.

The National Gallery of Bologna and Fine Arts Academy is the building with the most articulated history. Over the years it changed function several times and, as a consequence, the original layout has been modified each time. In a planimetrically barycentric position, the former Santo Ignazio church is (1728-1735), while the portion parallel to Via de Rolandis (Collamarini area) dates back to the 1960s and has a reinforced concrete structure. The complex currently houses the paintings gallery, offices of the Superintendency, the Academy of Fine Arts and an art school.

The sundial building is located in the immediate neighbourhood of the intersection of Via de Rolandis and Via Zamboni, and therefore has a triangular planimetric configuration. Built in the second half of the 1930s, it presents peculiar and heterogeneous characteristics: the ground floor is partially made of columns, while the rest of the structure is made of load-bearing masonry. The floors are realised either by steel beams or, on the upper floors, by precast concrete elements. Currently, the ground floor is dedicated to commercial activities, while the upper floors are dedicated to private residences.

The last buildings investigated, collected here in a group for convenience, are the ancient residential buildings. The units, hypothetically constructed with similar techniques and materials (it was not possible to carry out in-depth investigations), can be defined as a structural aggregate. Their conformation, created by successive extensions, makes it very difficult to identify defined structural units. Installations of this type are very common in all ancient historic centres and are often the most vulnerable parts of the city. Not only because of their intrinsic criticality, but also because of the difficulty in implementing coherent and shared structural measures. Currently, the ground floor is dedicated to commercial activities, while the upper floors are private residences. Structurally, they are characterised by load-bearing masonry, while the floors are either made of vaults or wooden elements.

The application of the protocol and the consequent obtaining of results required a preparatory and preliminary investigation phase. Initially, all possible material on the buildings was searched,

and archives and cadastral databases were consulted. For the buildings of the University of Bologna, access was gained to the executive drawings (when they existed) and also to the plans deposited with the municipal authorities. This made it possible to arrive at a historical and morphological reconstruction of the entire area.

The material served both as a cognitive basis and to hypothesise the characteristic construction techniques of those buildings for which no certain data was available. In this regard, the recognition work carried out in the first months of the project, when an attempt was made to catalogue all the techniques typical of the areas covered by the ADRISEISMIC project (Predari, 2022), was of fundamental importance.

At the end of the archival research, it was possible to define for each building: the historical analysis, the planimetric configuration and typical plans, the hypothesis of the structural system and the construction solutions.

Parallel to the documentary research work, site surveys were carried out, aimed at the dimensional acquisition of all the elevations facing the square. It was decided to operate both using a photogrammetric analysis and a laser scanner (or lidar) analysis. This made it possible to determine which of the two methods was the best one for the intended application of the project.

The first survey was carried out by means of terrestrial photogrammetry: the operator, using reflex cameras, at the beginning covered the entire surface of each elevation, then processed the photographs using software and generated the point cloud. The second campaign was carried out using a similar process: initially, 23 laser scanner points (stations) were set up to acquire the entire square; then the data was processed through software. The two analyses allowed, in both cases, a faithful reconstruction of the study area, capturing details more accurate than a structural assessment requires. The difference between the methods were evaluated considering accuracy, data processing time, personnel and instrument costs.

The accuracy of laser scanner is higher, about one centimetre compared to 3-5 cm for photogrammetric analysis (in any case more than sufficient for the purpose). The processing time is shorter for the laser scanner: the survey took one morning for field analysis and about three hours for processing, while the photogrammetric analysis took two days for filming and about five hours for processing for each building. The cost of personnel, understood as specific training, can be evaluated as equivalent for the two methods. Photogrammetry, on the other hand, is better from a cost point of view: laser scanner is a specific instrument, therefore often not available for expeditious analysis, and implies very high purchase costs. Terrestrial photogrammetry, as mentioned, allows results to be obtained with any imaging instrument.

From the aims of the project, considering the need to contain costs and to allow its application to the widest possible audience, the adoption of photogrammetric analyses was deemed ideal since, although less accurate, they better meet the requirements sought.

Once the cognitive phase was completed (documentary research, field surveys and material processing), the ADRISEISMIC method was applied to all the buildings under study.

The method, whether applied to reinforced concrete or masonry buildings, provides some useful outputs to judge the seismic performance of a building. Specifically, seismic vulnerability, understood as the building's potentiality for damage, seismic risk and the most probable damage mechanism, is provided. In the case of the masonry method, it is also possible to obtain information on masonry quality (for this, the MQI method has been borrowed, Borri 2019).

The results are obtained by incorporating inputs derived from the surveys and research conducted into the two assessment protocols. Schematically, for reinforced concrete buildings,

the following are requested: designed use, floors above ground, irregularities in plan, irregularities in height, expected ductility, concrete strength, steel strength, column dimensions, transverse reinforcement (in columns), longitudinal reinforcement (in columns) and presence of large spans. For masonry structures, on the other hand, in addition to the data required by the MQI method (which for reasons of brevity will not be reported), it is necessary to define: designed use, floors above ground, irregularities in plan, irregularities in height, transversal wall distance, wall thickness, floor height, connections between structural elements, expected ductility, permanent floor loads, thrusts due to arches or vaults (floor level) and thrusts due to arches or vaults (roof level).

The data are necessary for the definition of seismic vulnerability, called "structural response index" in the method. Seismic risk is instead defined as follows:

$$S_h = I_v \cdot E \cdot H$$

Where:

$S_h$  is the seismic risk;

$I_v$  is the vulnerability index, i.e., the inverse of the index of structural response;

$E$  is the exposure;

$H$  is the seismic hazard;

Each of these parameters, has been defined using the European seismic standards (European Committee for Standardization, 1998) as the main reference and the Italian technical standards (Ministero delle infrastrutture e dei trasporti, 2018) where there are no specific international references. It is therefore clear that the hazard is identical for all the buildings investigated, since both the acceleration (0.167g) and the type of soil (type C, as in Eurocode 8) are the same.

All the results obtained for the buildings under study are shown below in tabular form:

Building	Index of structural response	Index of structural response category	Most probable collapse mechanism	Seismic risk	Seismic risk category
University library	0.28	II	Horizontal deflection	1.09	High
Department of economics	0.71	V	Vertical deflection	0.43	Low
University Student House and canteen	0.32	II	Soft storey mechanism, torsional effects, ductile column failure	0.91	High
National Gallery of Bologna and Fine Arts Academy	0.40	III	Simple masonry overturning	0.75	Medium
Sundial building	0.49	III	Vertical deflection	0.49	Medium
Ancient residential buildings	0.35	II	Cantonal Overturning	0.86	Medium

**Table 1.** (Results obtained in the bologna pilot case)

From the results, the buildings with the highest vulnerability are the University library and the University student house and canteen, having values of 0.28 and 0.32 (where zero is the highest

vulnerability and 1 the best result). Similarly, having the same hazard and high exposure, they also show the highest seismic risk (high), while the Department of Economics, having been the subject of improvement works in the past decades, shows values of low seismic risk (0.71) and low risk (low). The categories (very high, high, medium, low and none) of seismic risk are associated with the respective numerical value, higher numerical values imply higher categories.

In general, the buildings facing the square, with the exception of one case, have a low seismic capacity and therefore a medium-high seismic risk.

## Conclusions

The activities conducted within the ADRISEISMIC project are aimed at seismic risk reduction using a multidisciplinary and coordinated approach on a transnational scale. Therefore, in the course of the Project, two parallel systems for expeditious assessment of the seismic response of reinforced concrete and masonry buildings were defined (the ADRISEISMIC method). Once developed, the method was applied to three Pilot Actions, selected to offer the greatest possible variety in terms of construction techniques and construction periods. The specific case discussed above, namely the Piazza Puntoni area located in Bologna, was the first implementation of the method on real buildings.

The work carried out on the Pilot Actions allowed the first feedbacks from the assessment algorithm to be obtained, showing some criticalities (especially in terms of information acquisition) and some strengths. The method, both for reinforced concrete and masonry, was easy to use and very fast in returning the results (seismic vulnerability and seismic risk). In addition, the adoption of Eurocode 8 as the reference for input parameters and the decision to avoid specific national regulatory references can guarantee its widespread use, going beyond the national scale.

The most time-consuming part resulted to be the information acquisition. It is not always possible to obtain executive drawings, floor plans and elevations of all buildings, especially in the case of urban-scale applications. For this reason, possible survey methods were investigated, conducting campaigns on the area with both laser scanner and photogrammetry. It was found that, considering the framework, both surveys conducted offer excellent results in terms of accuracy. However, photogrammetry was found to be preferable due to the lower costs of the necessary equipment and consequently was found to be more accessible.

The duality between accuracy and required analysis time is typical of expeditious assessments, which is the reason to use the system consciously, having the possibility of introducing assumed data when necessary, reducing assessment time and, to some extent, the reliability of the results.

The analyses conducted so far through Pilot Actions have, thus, represented an initial application of the method on different national contexts, showing encouraging perspectives for a more widespread use on a larger scale. The method can be adopted to conduct seismic expeditious assessment at urban level, fostering the integration of seismic vulnerability reduction strategies into urban planning discipline and tools. This will support policymakers in identifying priorities of intervention for different areas of the city in favour of urban regeneration practices towards safer cities and conscious investments of public financial resources.

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## Illustrations and Tables



**Figure 1.** (The three pilot actions: Piazza Puntoni, Bologna; Platia Koroneou ke Periferiakos, Rethymno; Kaštel Sućurac, Kaštela © Google Maps)





**Figure 2.** (From left to right, first line: university library, department of economics, national gallery of Bologna and fine arts academy; second line: university student house and canteen, sundial building and ancient residential buildings © Predari)



**Figure 3.** (On the left the mesh generated by the photogrammetric survey, on the right the point cloud from the laser scanner survey © Stefanini)

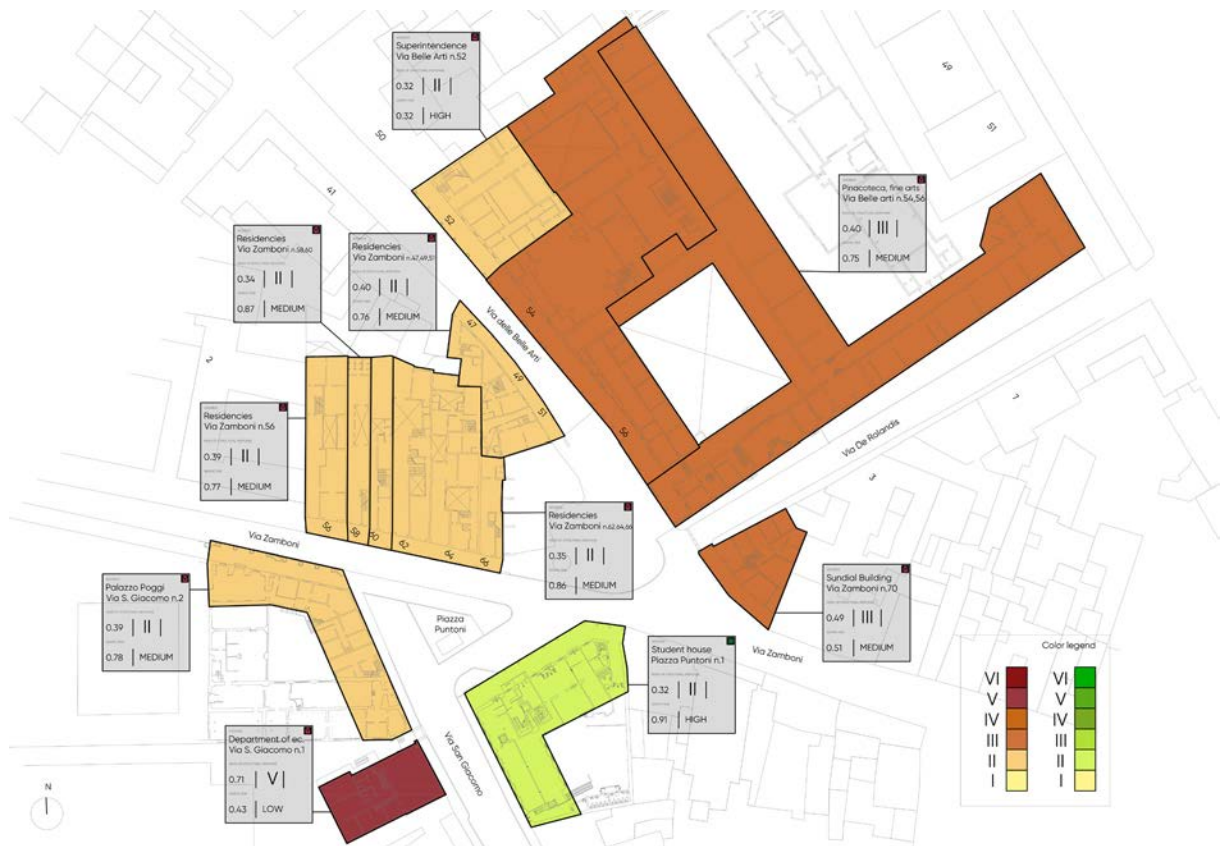


Figure 4. (Plan view Piazza Puntoni with the assignment of vulnerability and seismic risk classes © Stefanini)



## CONF.I.A.N.Ç.A.: a moment of stillness, self-reflection and connection in the ever-moving reality of modern societies.

Vicky Simitopoulou

Institute for Advanced Architecture of Catalonia, Poblenou Barcelona 08005 Spain

E-mail: vickysimitopoulou@gmail.com

*Keywords: mental health, urban living, awareness, mindfulness, safe space*

*Conference theme: Communities and Governance*

**Abstract.** CONF.I.A.N.Ç.A. is an experience, a guided ritual into an action of contemplation, self-healing and confession. The intention is to spatially address mental & emotional health issues that are already present in the cities, because of our everyday and lifestyle choices; to raise awareness over the causes and present the fact that we are part of the problem as much as of the solution.

Currently around 4.4 billion people live in cities. On average, city dwellers have access to better infrastructures. What about mental health though? Urban living is associated with increased risk for chronic disorders, anxiety & mood disorders, social fragmentation & disparities. It can be loud but also lonesome. To stop the "noise" and seeking for amity, we often turn online. Is this a solution or we are just making it all worse?

Is the answer going rural? Well, not necessarily; we do, however, need to rethink and refocus urban design. CONF.I.A.N.Ç.A. is visualized as a spot for stress release, anxiety moderation and creation of meaningful connections; a point for introspection & healing. Thereby, the public space can be experienced in a different way, as a safe space created to unwind and express oneself. It is a silent garden, a little sanctuary, within the urban context.

In the long term, CONF.I.A.N.Ç.A. is multiplied and a network is created, so that what is designed as a point of placidity, is transformed into a tool for mapping a city's stress or loneliness density, giving valuable information to designers for future interventions.

## Introduction

CONF.I.A.N.Ç.A. is an acronym formed from CONFess – Interact – Analyse – Narrate – Confront – Activate, and stands for the Catalan word for trust. Beyond any definition of trust what makes sense to me is that, trust is a decision that occurs the moment you decide to engage and choose to connect, to empathize; and CONF.I.A.N.Ç.A. intends to create the circumstances needed for that to occur.

It is an urban intervention, providing space and time for people to connect with their inner selves, but also with others. And at the same time the data produced during this moment of connection could help read, analyse and map the city on a different level. It is envisioned as both a space to unwind and relax, and a tool to make mental and emotional health issues visible and extract valuable information.

The goal is to address spatially mental & emotional health issues that are already present in the cities, because of our everyday and lifestyle choices; issues currently becoming more and more evident. The aim is to raise awareness over the causes & effects and present the fact that we are part of the problem as much as of the solution. I strongly believe that we can help each other through this.

It is designed as a system to offer a “transitory solution”, in the ever-moving reality of modern cities, and at the same time, a powerful tool for mapping a city’s density in terms of stress or loneliness, giving valuable information for future interventions.

## Urban living

It is a fact that we live in crowded cities. And it is getting more and more crowded. It seems that, in the next 30 years, the world’s population continues to grow, yet the pace of growth is slowing down. The latest projections by the United Nations suggest that the global population could grow to around 9.7 billion in 2050 and 10.4 billion in 2100. Yet the urban population is estimated to grow at an even greater pace.

The urban population of the world has grown rapidly from 751 million in 1950 to currently around 4.4 billion people; that is 56.2% of the world population. It is estimated that by 2050, more than 6.6 billion people will be living in cities, that is almost 70% of the estimated world population. And whereas developing economies drive population growth, a growing proportion of the population lives in cities all over the world. Over the last ten years, urbanization has been most pronounced in developing economies, especially in Asia and Oceania. Urbanization levels are not the same in developing and developed economies, and even within the same region we can detect different patterns. The projection for the coming years though is pretty clear; big cities are becoming even bigger.

Some of the fastest-growing urban agglomerations are cities with fewer than 1 million inhabitants, many of them located in Asia and Africa. While one in eight people live in 33 megacities worldwide, close to half of the world’s urban dwellers reside in much smaller settlements with fewer than 500,000 inhabitants. However, by 2030, the world is projected to have 43 megacities with more than 10 million inhabitants, most of them in developing regions.

It is apparent that cities will still be a pole of attraction in the future and there is a simple explanation as to why: on average, city dwellers receive improved nutrition, sanitation, healthcare, education, etc. However, for quite a while now, we have been disputing issues such as density, noise and air pollution, but also social fragmentation (singles, living alone or with strangers, absence of connection between society and individuals, migration, etc), and social disparities (uneven distribution of economic assets and income as well as between the overall quality and luxury of each person’s existence).



We have been dealing with these problems from different angles, yet ¿have we considered how urban living affects our mental and emotional health? Some of the best-established effects of urbanization concern mental health, as the urban environment is considered rather demanding. Meta-analyses show that current city dwellers have a substantially increased risk for anxiety by 21%, and mood disorders by 39%. Furthermore, for those born and raised in cities, there is a twice as high possibility of incidence of schizophrenia. Although these findings have been widely attributed to the urban social environment, the neural processes that could mediate such associations are unknown. Urban upbringing and city living have dissociable impacts on social evaluative stress processing in humans.

But ¿do cities drive us mad? No! Cities do not cause mental illnesses. Yet urban living interacts with our brains and -if we carry further genetic factors- it results in higher risk for mental health problems. Genetically vulnerable individuals are more at risk, in agreement with the assumption that schizophrenia represents a neurodevelopmental disorder. Importantly, urbanicity effects on schizophrenia later in life are minor, providing an epidemiological dissociation between current and early life urbanicity effects, which are associated with mood and anxiety disorders and schizophrenia, respectively.

Because longitudinal studies indicate that urbanicity effects on mental illness are causal and not mediated by other epidemiological variables, attempts to explain these associations must consider the specifics of the urban situation affecting the brain. Factors such as increased social evaluative threat or chronic social stress or stress processing might underlie greater risk for mental illness or contribute to the manifestation of disorders.

Urbanization and common mental disorders (CMD) are increasing worldwide. Using data on urbanicity and CMD burden in 191 countries, a team of researchers from the Department of Psychiatry, of the Amsterdam UMC, found a positive, non-linear relationship with a higher CMD prevalence in more urbanised countries, particularly for anxiety disorders. On the review of meta-analytic studies on the association between urban factors and CMD risk factors relating to the ambient, physical, and social urban environment and showed differences per diagnosis of CMDs were identified.

According to the UMC researchers, factors in the urban environment are likely to operate as a complex system and interact with each other and with individual city inhabitants (including their psychological and neurobiological characteristics) to shape mental health in an urban context. These interactions operate on various timescales and show feedback loop mechanisms, rendering system behaviour characterised by non-linearity that is hard to predict over time.

Yet the evidence of their existence is conclusive. And we cannot turn a blind eye any more. In the next decades, we will have to face an even greater challenge, as the scale and pace of urbanization is increasing -according to the Chilean architect Alejandro Aravena, we will have to build a one-million-person city per week. So if this is the case, ¿which aspects should we consider as parameters in urban design and planning, so that we moderate the levels of mental and emotional health?

### Online living

To stop the “noise” and seeking for amity, we often turn online; more and more often. Human beings are social creatures. We need the companionship of others, and the strength of our connections has a huge impact on our mental health and happiness. Being socially connected to others can ease stress, anxiety, and depression, boost self-worth, provide comfort and joy, prevent loneliness, etc. On the flip side, lacking strong social connections can pose a serious risk to mental and emotional health.

In today's world, many rely on social media platforms for connection. Ironically for a technology that's designed to bring people closer together, spending too much time engaging with social media can actually make one feel more lonely and isolated -and exacerbate mental health problems. The more connected and updated we try to be, the more we risk our mental state. There are several facts related to media use that are quite shocking. For example, it is calculated that in the next 40 years, we will spend 520 days watching series, 02 years sending messages, 03 on social media, 06 watching tv, 08 online, 10 years staring at screens. To put these numbers in perspective, it is worth mentioning that, we spend 06 years dreaming -in a lifetime!

As the world's digital population grows, so does the reach and usage of social media. As of April 2022, there were more than 5 billion internet users worldwide, which is 63.1% of the global population. Of this total, 4.7 billion were social media users. That means that social media platforms are used roughly by one-in-three people in the world. Connecting billions of people worldwide, the internet is a core pillar of the modern information society, and it is hardly possible to imagine the world without it.

To fully comprehend the impact of tech and media on our daily life, let me just say this: An average user checks his phone over 150 times per day, which means once every 6 to 7 mins. We receive 105.000 words per day (23 words per second), coming in the form of emails, direct messages, posts, push notifications in general. We scroll through 300 feet of content, every day. That is the size of an American football field. If you are unfamiliar with American football, let me make another comparison; the Statue of Liberty is 305 feet tall -ground to the tip of the torch! Our brain is loaded daily with 34 GB of information; that is a sufficient quantity to overload a laptop within a week. It may not get "full" soon but is jammed. Our attention is what we should be worried about. Our ability to focus is hampered. The more connected we want to be, the more we allow notifications to reach us, whenever and unfiltered, and the more our routines are affected by distractors. It is calculated that our attention span is around 8 seconds(!)

Since it's a relatively new technology, there's little research to establish the long-term consequences, good or bad, of social media use. However, multiple studies have found a strong link between heavy social media and an increased risk for depression, anxiety, loneliness, self-harm, and even suicidal thoughts. There are several conditions related to media usage, as most of us access social media via our smartphones or tablets, and while this makes it very convenient to keep in touch, it also means that social media is always accessible. This round-the-clock, hyper connectivity can trigger impulse control problems, the constant alerts and notifications affecting your concentration and focus, disturbing your sleep, etc.

Technology may have made it easier to keep in contact, yet the more we prioritize social media interaction over in-person relationships, the more we are at risk for developing or exacerbating mood disorders, such as anxiety and depression. In addition, this mediated interaction, according to a study at the University of Pennsylvania, increases rather than decreases feelings of loneliness. Conversely, the study found that reducing social media usage can actually make you feel less lonely and isolated and improve your overall wellbeing.

Furthermore, even if it is widely known that images on social media can be manipulated, they can still make someone feel insecure about their look or what's going on in their own life. Similarly, although we are aware that people tend to share just the highlights of their lives, rarely the low points that everyone experiences, that doesn't lessen those feelings of envy and dissatisfaction when scrolling through eg. airbrushed photos of their tropical beach holiday. That could also lead to self-absorption, by sharing endless selfies and/or all innermost thoughts on social media, that creates an unhealthy self-centeredness and distance you from real-life connections.

Last but not least there are new terms arising regarding media usage and mental health, such as FOMO. FOMO or Fear Of Missing Out, has been around far longer than social media, yet these platforms seem to exacerbate feelings that others are having more fun or living better lives than you are. The idea of missing out on certain things can impact self-esteem, trigger anxiety, and fuel even greater social media use.

Social media, and modern tech in general, has changed the world. While each platform has its benefits, it's important to remember that social media can never be a replacement for real-world human connection. It requires in-person contact with others to trigger the hormones that alleviate stress and make you feel happier, healthier, and more positive. The rapid and vast adoption is changing how we interact and connect, how we search for a new house or how we find partners, how we access information and read the news; how we perceive the world around us. But most importantly, the rise of such technologies affect our everyday routines and the way our brain functions.

### Brain physiology

Cities have both health risks and benefits, yet mental health is negatively affected in people born and raised in cities. Although findings regarding urban mental health have been widely attributed to the social environment, the neural processes that could mediate such associations are still quite unknown. Several studies, now indicate that there are specific brain areas affected by city living, as the neural processing is altered in those who have lived a significant period of their lives in cities.

In the paper "City living and urban upbringing affect neural social stress processing in humans", an experiment is described to test the hypothesis that urban living and upbringing modulate neural processing of acute social evaluative stress, by studying the neural responses of healthy volunteers undergoing stress during functional magnetic resonance imaging (fMRI) and confirming the findings using a different social stress paradigm. Then cognitive specificity was tested by ascertaining the effect of urbanicity on brain activation during cognitive processing without stress.

Current city living was associated with increased amygdala activity, whereas urban upbringing affected the perigenual anterior cingulate cortex, a key region for regulation of amygdala activity, negative affect and stress. These findings were regionally and behaviourally specific, as no other brain structures were affected and no urbanicity effect was seen during control experiments invoking cognitive processing without stress. Importantly, the subjects of the study did not have a mental disorder nor were they at high risk for one; the link to these illnesses from the environmental risk factor that the team studied was established by the epidemiological evidence discussed earlier.

Thus a closer examination on the physiology of the brain, and especially the amygdala and the prefrontal cortex should be contacted. Neuroscientist Dr Karolien Notebaert explains about these specific brain areas, and their roles in our mental state, giving us intel. Simply put: the prefrontal cortex acts like a battery, which is recharging when we are sleeping, and diminishing with every executive action we take (such as planning, organising, processing information, thinking solutions etc). Basically, all the tasks we do throughout a normal day are processed through the prefrontal cortex.

Amygdala, on the other hand, is the brain region responsible for processing of memory, and emotional responses (such as fear, anxiety, and aggression). The amygdala is commonly thought to form the core of a neural system for processing fearful and threatening stimuli, including detection of threat and activation of appropriate fear-related behaviors in response

to threatening or dangerous stimuli. Thus, it is a natural candidate for a neural structure that could modulate the emotional responsiveness of face processing areas in the brain.

We need these two areas working collaboratively and in moderation. It is suggested that there is a correlation of both brain areas with the time spent in a city by an individual, as well as, with the size and density of that city. The functional coupling between the prefrontal cortex and amygdala is significantly reduced in those who spent most of their lives in larger cities, resulting in reduction to the emotional control and processing for those individuals.

One can easily understand that our mental battery is working overtime, due our lifestyle and everyday choices, together with the environmental factors. In addition to urban living being loud, it can also be lonesome; there is what psychiatrist Dr Mazda Adli calls “loneliness in crowds”; “Our brains are not well-designed for living in metropolises; if density and social isolation come at the same time and hit high risk individuals, the city stress related mental illness can be the consequence”.

In the book *The Distracted Mind*, Adam Gazzaley and Larry Rosen—a neuroscientist and a psychologist—explain why our brains aren't built for multitasking. They describe that the way our brains work means we are too easily hijacked by “weapons of mass distraction”. Especially in youth, there is a marked increase in tech-related attitudes and disorders. Over the last decades, medication prescriptions to fight anxiety and disorders, went up to 6,1 million for young people under the age of 17 in the USA alone!

Living in cities also leads to an overstimulation or alteration in dopamine. Dopamine is a type of neurotransmitter and hormone, with a role in many important body functions, including movement, memory and pleasurable reward and motivation. High or low levels of dopamine are associated with several mental health and neurological diseases.

Scientists now think that dopamine's role is not to directly cause euphoria, but serves as a reinforcement for remembering and repeating pleasurable experiences. So, when drugs, for example, cause surges in dopamine, it's teaching your brain to remember the experience. Your brain links your drug use and all of your routines and other cues surrounding the drug event. It's a reason why you might crave drugs when returning to the location where you once used drugs long after you've quit.

Adequately, social media platforms are designed to snare your attention, keep you online, and have you repeatedly checking your screen for updates. Talking about dopamine and addictions, ¿does the platforms' design sound like it follows a certain pattern? Much like any other compulsion or addiction, social media use can create psychological cravings. When you receive a like, for instance, it can trigger the release of dopamine in the brain, the same “reward” chemical that follows winning on a slot machine, taking a bite of chocolate, or lighting up a cigarette. The more you're rewarded, the more time you want to spend on social media.

It is obvious that the built and digital environment we created is designed either without taking into consideration the influence on our mental and emotional health (best case scenario), or, even worse, targeting and triggering subconscious actions. Getting more knowledge on how our brain and neural system is affected, could give us valuable data for planning a solution -more- suitable for our everyday lives and routines, keeping the benefits but also eliminating the fallouts of both urban living and modern technology.

### **Mindfulness intervention**

Who has declared stress as one of the major health challenges of the 21st century. It is calculated that 1 in 13 people globally suffer from anxiety; more than 275 million people. By 2030, the cost

of all mental health challenges will be 16 trillion dollars globally. By the way, I should mention that all data is from the pre-covid era. We can already foresee the long term effects of the pandemic. During the past years we had to face different struggles, deal with uncertainty, fears, concerns. Feeling sad, stressed, confused, scared or angry is normal during crises.

It has now become even more evident that our built environment is not suitable, and that seeking “shelter” in social media is definitely not the right way to go. But, ¿should we go rural or off-the-grid then? Not necessarily! The answer is not that simple. In addition, I am not quite convinced we could, even if we wanted to. So, ¿what can architects, planners, designers do about it?

There are countermeasures to be taken, so that the situation is reverse-engineered. New strategies to regain and retain control could be planned, by reconsidering the way physical and digital environments are designed. Whereas there is a wide discussion regarding smart living over the past years, resources and efforts are focused mainly on infrastructures, construction, transportation, etc. Thus, while urban living is becoming smart and smart-er, with new technologies being implemented in our everyday routines, our lives are being transformed in ways that -I am not quite sure- we fully comprehend.

Maybe we need to pause for a second and think about what smart living actually affects, and reconsider our design parameters, putting mental and emotional health in the spotlight. The answer may lie in practices, derived and influenced by ancient spiritual traditions and rituals. Thus, a merge of such techniques is what the present intervention suggests; a place and moment to find inner serenity. CONF.I.A.N.Ç.A. is designed as a mindful way to connect, with ourselves and with others.

If you google “mindfulness”, you will get around 161 million results, most of them short videos of guided meditation processes. Mindfulness is a type of meditation in which you focus on being intensely aware of what you’re sensing and feeling in the moment, without interpretation or judgment. Practicing mindfulness involves breathing methods, guided imagery, and other practices to relax the body and mind and help reduce stress. Practicing mindfulness exercises can help you direct your attention away from draining kinds of thinking and engage with the world around you.

Simple mindfulness exercises can be practiced anywhere and anytime. Research indicates that engaging your senses outdoors is especially beneficial. For more structured mindfulness exercises, a special time when you can be in a quiet place without distractions or interruptions should be planned. CONF.I.A.N.Ç.A. aims to provide that moment and place to engage in a ritual that also involves mindfulness exercises.

The idea is for a hybrid space to be created; a peaceful spot in the urban context, for stress release, anxiety moderation and formation of meaningful connections. CONF.I.A.N.Ç.A. is an experience, when one can dive into an action of contemplation, self-healing and confession. It is a practice to alter our focus and strengthen our shield, so that we can be more aware of our environment and apt to deal with everyday struggles.

The experience aims at the catharsis (from Greek “κάθαρσις”, meaning purification, cleansing, clarification). It is the purgation of emotions -particularly pity and fear- that results in renewal and restoration. The end goal is an emotional release in the form of “confession”. Quotation marks are used, as the confession is usually associated either with religion or police enforcement. Yet in this case, it resembles self-help groups (SHGs) such as AA (Alcoholics Anonymous). These are informal associations of people, who come together to find ways to improve their living conditions, generally self-governed and peer-controlled.

Using the program, one can listen to stories, relate, and then record his own. Record whatever



one may wish -anonymously- and put it in the sequence of confessions. In that way, people can engage in the process, empathize and connect on a different level. In that way a new-era SHG is created, where the community may not be present as in flesh and blood, but committed to a practice, breaking the barriers of synchronicity.

CONF.I.A.N.Ç.A. is an urban structure, perceived as an individual cocoon, enclosing a silent garden, a little sanctuary, within the urban context. The cocoon is chosen as a symbol of the process from which persons finally emerge, a figure of transformation and metamorphosis; a visual representation of a life cycle unfolding in preparation for adulthood to survive in the world around it. Yet at the same time, the cocoon, encapsulating both visible outer transformations and private inner ones, is used as a morphological element as well, as it could be a structure, quite odd for the urban environment so that it stands out and piques someone's curiosity.

From a design perspective, the structure would be framed by natural material (wood for the structural elements, and fabric for the surfaces). To enhance the calming process, there is a layer of vegetation on the interior offering a little piece of nature. From the outside, the structure is viewed as a blank canvas, "disguising" it from afar but also providing space to project consciousness-raising messages. An app ensures the audio part of the experience, with soothing music, white noises and sounds of nature and a guided "meditative" process.

The eventual objective is that a feeling of safe space is created to unwind and express oneself. Then, relieved from our identities and bias, through our "confessions", we can relate only by hearing and not seeing each other; understand ourselves and connect without prejudices and preconceptions. It is proven that by saying out loud our problems engages many more areas of the brain than merely thinking about it, clarifies our thoughts, uncovers hidden assumptions, etc.

The intervention is visualized as a spot in the urban fabric; a point for introspection & healing. Yet, in a longterm plan, if it is multiplied and a network is created, using tech as an ally, with suitable sensors, monitors, and algorithms, valuable data could be collected regarding the mental and emotional state in cities.

With the information users provide to login to the app, "keywords" from the recordings and biomarkers, and ensuring those are collected for research purposes only and no commercial use, and they remain site specific and anonymous, we could turn a "transitory solution" into a powerful tool in the hands of future urban planners, architects, designers. A tool for mapping a city's density in terms of stress or loneliness, giving valuable information for future interventions.

## Conclusion

In the 21st century, one of the major challenges is projected to be mental and emotional health. There are different angles to work on, according to the aspect one decides to explore. For the present paper, urban and online living are cross-examined with the physiology of the brain, highlighting the role of certain areas (prefrontal cortex, amygdala) and hormones (dopamine, oxytocin). In such manner, the framework of the intervention is created.

CONF.I.A.N.Ç.A. is a hybrid urban device with a double identity. On one hand it is designed as an augmented cocoon within the urban context, offering a sanctuary as when entering one can isolate from stimuli and distractors, relax and unwind. Whereas on the other hand, it is intended as a system to map mental and emotional health levels in the city, by clustering data (verbal and sensory) provided by the users.

In the aftermath, you are invited to take a step back, be mindful of the moment. Allow yourself to breathe; feel, and reflect. What would you say if no one was listening?

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## Smart Façades for resilient cities

Ilaria Spasari

Dipartimento di Architettura. Università degli Studi. Ferrara. Via Via Quartieri 8, 44121, Italy.

E-mail: [ilaria.spasari@unife.it](mailto:ilaria.spasari@unife.it)

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**Abstract.** *The continuous change of urban aggregates has always revealed the correlation between the morphology of the city and the socio-economic needs of human beings. In recent decades, the threat of climate change has underlined the fundamental role of the environmental quality of the cities in local government policies. With a view to optimizing the exploitation of renewable resources and preserving non-renewable ones, some Italian regions have adopted urban plans aimed at limiting land consumption, favoring the urban regeneration of urbanized areas. While the redevelopment process of the existing leads to a volumetric crystallization of the urban morphology, the cities continue to evolve, experimenting with new forms of expansion in immaterial, virtual and smart fields. Contemporary cities reconfirm themselves as interpreters of the social evolution of the human beings, to which technology has allowed them to perform, even in the pandemic era, the functions of living, working and having fun. Although the application of IoT and smart components in the existing urban context is not a solution to all the problems of cities, it offers a useful tool in increasing urban resilience to contemporary challenges. The tax incentives of recent years represent a tempt to promote the redevelopment of existing facades, emphasizing the environmental impact of the building envelope within cities with strong expansionary limits. This paper, through the selection of case studies, aims to explore the impact of smart façades in consolidated urban contexts and to analyze the social repercussions of the way in which the habitants perceive the city.*

## Introduction

The constant changes in urban aggregates have always highlighted the perpetual relationship between urban morphology and the socioeconomic needs of people. Nowadays, in the face of the threat of climate change, several local policies are focused on emphasising the prominent role of environmental quality. In this panorama, urban renewal and urban transformation policies are being promoted, especially those aimed at conserving land use. So, while we overlook the volumetric crystallisation of urban morphology, the expansion of the city is moving towards other areas that are increasingly immaterial and virtual. The application of IoT and smart components in the existing urban context represents a useful tool to increase the resilience of cities to current challenges. In this sense, today's cities confirm themselves as interpreters of the social evolution of human beings, which, thanks to technology, allows him to fulfil the functions of living, working and enjoying even in the age of pandemic. Even if digitalization plays a key role in monitoring and analysing urban performance, the intelligent design of the building envelope becomes essential to regulate the environmental behaviour of cities with strong expansion limits.

## Urban form-changing drivers

To understand the key role of smart facades in today's cities, which require a high degree of resilience, it is important to identify the factors of social change that have influenced in different ways both the definition of the building envelope and the urban form over time. In a non-exhaustive digression, we will trace some basic stages in the evolution of urban form over the centuries and shed light on the relationship between building envelope and urban form. In ancient times, the most important factors for change were anthropological reasons. The organization of society and the observance of social hierarchies were reflected in the location and type of dwelling. An example is represented by the "Nuraghe" (Figure 1). The position of the ancient buildings mirrors the lifestyle of the Nuragic civilization: in particular, the king-shepherd lived in the "nuraghe" building, the sacred fortress dwelling and around the "nuraghe" stood the village, in circular huts with a wall at the base in dry stone and a cone-shaped covering of wood and branches. It is evident that the form of village's aggregation reflected the hierarchical organization of the society. The central spot in the stone nuraghe was reserved for the head and around it was developed the homes of the people, built with lighter materials and less tiring to transport. In this case both the urban form and the construction techniques bring a common explanatory message of the social organization. The differences between social classes have been amplified with the evolution of knowledge of new construction methods. In fact, in ancient Rome, there was a large gap between the housing quality of the "domus" in which the wealthiest people lived and the "insulae" intended for the poorer people. The domus had an enclosure that was totally closed to the outside and open to an internal courtyard. The external walls, that separated the internal environment of the domus from the urban context, were almost vacant of openings. In this way, the house enjoyed greater thermal inertia and good sound insulation from city noises. The envelope was open in correspondence with an internal courtyard, to favor summer cooling. The "compluvium", situated in proximity of the atrium, collected rainwater in the winter and favored the cooling of the air during the summer. The healthy microclimate of the domus was strongly in contrast with the crowded Roman insulae which experienced hygienic and acoustic discomfort and exposure to structural and fire safety risks. The difference between the more affluent and less expensive houses was evident in the presence or absence of the typical principles of environmental design. During the medieval era, the building typology was still the prerogative of the social class to which it



belonged. In fact, many rich people began to build towers inside the city walls to be able to show off their economic power, unlike the poorer people who lived outside the walls and often in the countryside. In this case, the economic and political factor is the main one of change of the urban form. With the advent of the industrial revolution and the strong migratory flow from the countryside to the city, urban planners have begun to question how to improve the quality of city life and to think about design solutions that can improve the health of the urban environment. An example is offered by Howard's garden city. In according to the theory of the 3 magnets, Howard explains the aim to reap the primary benefits of a countryside environment and an urban environment, while avoiding the disadvantages present in both. In Howard's scheme, the houses were built along concentric centers and placed side by side on the different avenues or at the edge of boulevards that converged towards the city. A ring railway surrounded the city and reduced pollution. Each city could develop with specific characters depending on the region, the climate and the technology available. While not many attempts were successful, Howard's Garden City inspired many future planners. If in the centuries preceding the industrial revolution, the urban form answered to human needs without particular volumetric constraints, with the advent of the first industrial revolution and the awful hygienic conditions of the cities, the role of urban planning has become indispensable for propose design solutions capable of responding to the social and environmental challenges of the contemporary world. Nowadays, the challenges of the development the societies have to face several threats, such as the climate change.

### **Contemporary Resilient Cities**

The term "resilience" is used in many subjects with different meanings. The ecological concept of resilience epitomises the capacity of a system to adapt itself in response to the action of a force, achieving a state of equilibrium different from the original (White, 2011). Resilience is the property of complex systems of reaction to stress phenomena, activating response and adaptation strategies in order to restore the functioning mechanisms. Resilient systems, in the face of stress, react by renewing themselves while maintaining the functionality and recognisability of the systems themselves. Resilience, therefore, does not imply the restoration to an initial state, but the restoration of functionality through change and adaptation (Colucci, 2012). The resilient city is an urban system that does not limit itself to adapting to the climate changes (especially global warming) that have made cities increasingly vulnerable in recent decades, with increasingly dramatic consequences and enormous costs. The resilient city is changing, developing new social, economic, and environmental responses that will enable it to withstand environmental and historical stresses over the long term. Resilience is therefore now a necessary component of sustainable development, and it primarily affects the organizational and management models of urban systems. Ensuring the survival of cities in the face of climate change represents the part of resilience in its broadest sense in which the performance of buildings can intervene to improve the urban microclimate. Urban morphology, land use, and the presence and quality of green spaces can have a significant impact on regulating urban microclimate by mitigating and reducing the heat island, including by setting appropriate urban parameters aimed at reducing the impact of UHI, improving urban comfort, and increasing the resilience of cities to the impacts of climate change (Talia, 2020). According to the report published by the Global Alliance for Building Council and Construction, whose analyses were presented at the COP25 in Madrid, it emerged that the constructions, materials, and buildings of the construction sector are responsible for 39% of the emissions of carbon dioxide dispersed in the environment. The report also predicted that continuing at the current

way, by 2060 the building stock is destined to double. Just as during the first industrial revolution urban planning played a key role in the reorganization of cities in order to create healthier living conditions, in the same way, nowadays, we try to react to climate change through urban planning, which aims to create resilient cities. An example is represented by the city of Bologna. The document "Risk analysis. Climate change in six Italian cities " created by the CMCC (Euro-Mediterranean Center on Climate Change) foundation, the city of Bologna was identified as one of the first cities which act for resilience. The reasons for this title are: the regulatory and procedural plan is focused on the issues of the climate emergency and uses a participatory approach; a local climate profile was drawn up with future projections in the event of a temperature increase, a virtuous risk assessment was carried out on which it was possible to define strategies and resilience plans, the communication of risks is effective, immediate through use of cutting-edge digital tools and provides for the involvement of citizens, excellent information and participation skills. The first resilience-oriented territorial planning tool of the city of Bologna is represented by the PUG (General Urban Plan), which envisages four urban strategies for the resilience objective: 1) favoring the regeneration of man-made soils, 2) counteracting the consumption of soil, 3) developing the urban eco-network, 4) preventing and mitigating environmental risks. In order to achieve this purpose, the perimeter of the currently urbanized area has been defined and the categories of permitted building interventions have been indicated. Within the urbanized area, only urban reuse and regeneration interventions are allowed, while outside the urbanized area the forecasted interventions from now to 2050 are equal to 3% of the urbanized area. In this panorama, the possibilities spawl the construction outside the urbanized area is drastically reduced (it is called anti-sprawl), while regeneration and reuse interventions are allowed and encouraged (economically and through regulatory derogations). This urban strategy leads to a horizontal volumetric crystallization, but at the same time, on the one hand, it represents an opportunity to reduce city degradation and give a new life to abandoned or disused buildings and on the other, it highlights the importance of the quality of the building facades regenerated.

### **Smart Façades**

In light of the reduced spatial extent of cities, the qualitative performance of buildings is a fundamental objective for planners to address climate change. Nowadays, buildings are no longer considered only as volumetric containers for activities that must guarantee microclimatic well-being to the occupants who live indoors, but they actively contribute to the health of outdoor spaces in the broadest sense. The building envelope, as the boundary between outdoor and indoor spaces, is the technological element most involved in this process. Since the facades represent the largest surface area of the building envelope, they are also the element that, if intelligently designed, can provide significant benefits from an environmental perspective. As a non-exhaustive example, the benefits of some facades that have an intelligent behavior or a high degree of adaptability to the context in which they are built are realized. A well-known Italian example is represented by the building called "Bosco Verticale", designed by the Architect Stefano Boeri (Figure 2). The "Bosco Verticale" consists of two towers of 80 and 112 meters, capable of hosting trees of large and medium height, of small dimensions, shrubs, for a total of 10 thousand square meters of wood. The Vertical Forest favors the formation of an urban ecosystem in which different types of greenery create a vertical networked environment that could also be colonized by birds and insects, becoming an urban sensor of the spontaneous plant and animal recolonization of the city. The urban environment as a whole also benefits from it as the Vertical Forest filters the fine dust and the diversity of the plants

helps to create a microclimate that produces humidity, absorbs CO<sub>2</sub> and dust, produces oxygen, protects from radiation and pollution. acoustics. Among the positive effects of the Vertical Forest there is also anti-sprawl, or the ability to help control and reduce urban sprawl. At the level of urban densification, each tower of Bosco Verticale constitutes the equivalent of a peripheral area of single-family villas and buildings of about 50 thousand square meters. Edifici come il Bosco Verticale dimostrano che le soluzioni tecnologiche disponibili sono oramai mature (Giacomello e Valagussa, 2015).

Another interesting example of smart façade is represented by the BIQ (Bio Intelligent Quotient) building which is the first building in the world to have a bioreactor facade. Microalgae are grown in the glass façade's module that make up the "bio skin" of the building. They allow to provide the house with the necessary energy. The only task performed by algae is simply to grow. These are continuously fed with nutrient liquids and carbon dioxide through a separate water circuit that crosses the facade. With the help of sunlight, algae can photosynthesize and grow. The algae bloom and multiply in a regular cycle to the point where they can be harvested. These are then separated from the rest of the still growing algae and transferred in the form of a thick pulp to the technical compartment of the BIQ. The seedlings are then fermented in an external biogas plant so that they can be reused to generate biogas. Algae are particularly suitable for these purposes as they produce up to five times more biomass per hectare than terrestrial plants. In order to design for the wellness of citizens and given the countless properties of microalgae, solutions of this kind and innovative integrated services could be a way to mitigate the environmental, but also social and economic problems, of present and future cities (Peruccio, Vrenna, 2019).

If, on the one hand, the generation of energy and the improvement of the environment is an important element of smart facades, on the other hand, it is necessary not to reduce this concept to a purely energetic meaning. The element that most readily characterises a façade as smart is precisely its ability to adapt to the multiple demands to which it must respond. This depends not only on the particular climatic context, but also on the material from which a façade is made. For example, transparent curtain walls generally have a much lower thermal transmittance than opaque walls, and precisely because of their transparency, they must control high solar gains, glare, and overheating in the presence of strong sunlight (Romano, 2011). All these factors must be taken into account in both the design of the transparent facades and their shape to avoid inappropriate reflections of sunlight, as seen on the facades of the building 20 Fenchurch Street - The Walkie Talkie ( Figure 3). An example of smart transparent facade is the double-skin ventilated façade of the Agbar Tower (Figure 4). The outer layer was made with a glass Brise-Soleil system with different degrees of transparency and adjustable, which ensures natural ventilation in the cavity, especially in the summer months when the outside temperature is very high.

The multifunctionality of smart facades is constantly evolving, and some companies in the construction sector are experimenting with prototypes. through interoperability between multiple stakeholders. This is the case with the multifunctional module "Cellia", an interactive facade prototype created for the regeneration of buildings. Through the collaboration between the integrated design company CMR, Focchi Spa Group and Mitsubishi Electric, this façade integrates the air conditioning and ventilation system into a single module of the envelope, to which wiring and energy production can be added through photovoltaic modules that interface in a simple and direct way to the existing system, using plug-in envelope components -and-play.

The integration of plant components into the façade system was tested in the building "The

Edge” in Amsterdam. The transparent, south-facing façade is equipped with solar panels that provide enough sustainable electricity to power all the smartphones, laptops and electric cars of the building’s users. The Edge is an example of building in which the application of Internet of Things (IoT) is its foundational principle. Its design and construction did not use BIM in the prescribed sense but its implementation of smart technologies enables The Edge to achieve many of BIM’s benefits and it perhaps even serves as an exemplar for a few. Some of these are: automated energy performance visualisation<sup>1</sup>, building usage monitoring and post-processing for energy analysis. The data from city’s smart grids could be used by occupants of smart buildings. (Jalia, Bakker, Ramage, 2017). In this perspective, it appears that the digitalization act as an invisible infrastructure which connect the citizens and the buildings, meeting each other’s in the digital square.

## Conclusion

The changes in society have always had a direct impact on the definition of the urban form. At the same time, the main economic, environmental and knowledge factors of change in the city have also transformed the way the building envelope is perceived. While in ancient times the choice of façade construction systems depended on the availability of materials and the construction skills of the time, with the advent of industrialization, scientific and architectural progress, there was a separation between the volumetric form of buildings and the nature of their façade. It is therefore reasonable to assume that the construction techniques of façade systems have gradually reduced their ability to influence urban form.

Nowadays, however, urban design policies aimed at curbing land use and coping with climate change seem to allow a regression in the modification of urban form. In this context of necessary formal deficiency, performance plays an important role. As exemplified and not exhaustively analyzed in this article, smart facades, thanks to their adaptability, multifunctionality and integrability, both plant and digital, represent a powerful tool that can provide a resilient and dynamic response to the challenges of today’s society.

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## Illustrations and tables



**Figure 1.** Nuraghe Villages, Costa Smeralda, Sardinia, Italy  
(source: <https://unsplash.com/photos/BOC5stvUw2w>)



**Figure 2.** The Vertical Forest, Stefano Boeri, Milano. The Vertical Forest of Milan was one of the first tall buildings to make intensive use of green roof solutions with large trees  
(source: <https://unsplash.com/photos/dTQqLjGEj18>).

**Figure 3.** Building 20 Fenchurch Street -The Walkie-Talkie building, 2015, Rafael Vinoly Beceiro, London. Shortly after the work was completed, the designers noticed that the skyscraper's concave shape, combined with the reflection of the sun's rays from the windows, dissolved the plastic of vehicles parked near the building, creating an unexpected lens effect. (source: <https://unsplash.com/photos/q9tGlrHjacs>)

**Figure 4.** Agbar Tower, Jean Nouvell, Barcellona, 2007(source: <https://unsplash.com/photos/lmpFLSdf-fg>).





## From urban morphology to collective intelligence: co-designing public walks for a new neighborhood narrative

Silvia Tagliazucchi

University of Ferrara – Architecture department, Via Quartieri, 8, , Ferrara, Italy

E-mail: [silvia.tagliazucchi@unife.it](mailto:silvia.tagliazucchi@unife.it), +39 335 7484539

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**Abstract.** *The northern quadrant of the city of Modena, precisely Sacca District, is the area of the city that since the mid 1800s has undergone profound changes and transformations that have characterized its identity up to the present day. To date, the great changes in the production industry have made many of the companies, which were based in the neighborhood, large urban vacant, leaving the inhabitants without references and changing the political-social aspect of the neighborhood, perceived over the years as unsafe and degraded. Since 2015, the public administration has been working in the area to develop new projects, up to focus since 2018 the ministerial project of the "Periphery Plan".*

*How can we re-establish a connection with the territory by imaging a new strategic vision in order to trigger process of collective intelligence?*

*In the last part of the plan, thanks to the work of the artistic Collective Amigdala, the associations of the neighborhood have collaborated in a co-design process to find an answer. The desire was to work on their perception and analysis of the area to reflect collectively in order to create three public walks to feedback the process. Through the voices of volunteers and residents, thanks to the co-creation of the paths, the walks have become a tangible sign of their experience, re-signifying the context and giving a tangible sign of their sense of belonging, the prerequisites for the triggering of new strategic projects for the growth of the area.*

## Introduction

The northern quadrant of Modena, specifically the Sacca district, is today the subject of major urban transformation thanks to the new Periphery Plan of the Municipality of Modena promoted and financed by the Italian Ministry of Public Works. The area holds together distinctive elements that characterise its specificity and its predisposition for change from the social, infrastructural, and urban layout points of view. All these elements create a very articulated and morphologically complex basis in the vision of new transformative potential. The last part of the periphery plan for the Sacca district focuses on the relationship between the new transformations underway and the social fabric of reference.

Together with the Compagnia Teatro dei Venti - for the part of the first periphery from the historic centre adjacent to the Modena railway station, another area covered by the Periphery Plan - the Amigdala Collective, a cultural association and artistic collective, has taken care of the relationship between the Plan and the social and morphological context of the district, designing and implementing a project - called 'C come città' (C as city) - of co-creation together with the realities of the area: an artistic/cultural device to encourage the involvement of the social fabric in the exploration of the neighborhood and create a collective awareness of territorial and landscape change. Founded in 2005 in Modena, the Amigdala Collective works to create synergic relations, through cultural and artistic processes, between communities and areas of urban transformation. Through culture and art, the desire is to trigger a new vision on the part of the community through direct, active and immersive involvement in change in order to trigger an appropriation of change, with a view to the birth of new imaginaries within a dimension of collective consciousness and intelligence.

The complexity of the district that is the subject of the plan is rooted and stratified in the course of history that has formed its current morphology. In fact, in the nineteenth century the Sacca district was considered Modena's 'little Venice', an area completely different from the rest of the city in terms of morphology and function: the Modenese territory here was joined by the Naviglio Canal to the Panaro River, a affluent of the Po River. This part of the city was the river connection thanks to the port - as its name in Italian suggests - and allowed transport by boat to north-eastern Italy, an important dock for local and regional trade. As with the subsequent construction of the railway line after the loss of its importance as a harbour dock, sanctioned in 1931 with the silting up of the Canal and in 1935 with the closure of the Darsena, the district remained a system apart from the rest of the city, due to a physical closure of its layout, dictated by the boundary of the connecting infrastructure on the east-west axis that delimited its connection with the rest of the city to the south, in particular with the historic center. The railway line - which insisted on the east-west axis of connection to the Pianura Padana parallel to the central Via Emilia - became the main transport axis as early as the end of the 19th century, reaffirming the district's productive and commercial vocation. For this reason, the northern area of the city, particularly the Sacca district, over the years became home to important companies not only on a local but also a national scale.

Observing the urban landscape of the area today, the historical changes that have affected it from the 20th century onwards are immediately perceptible, making the changes in the social, economic-productive and cultural context tangibly evident. The district's manufacturing character inevitably conditioned its growth, becoming, from the post-war period onwards, an area of housing expansion, including residential housing for workers of large companies. Two particularly significant elements of this building development trend are the construction in the 1970s of the ErreNord complex (Vinicio Vecchi) and the construction of Viale Gramsci (see Figure 1).

The importance of this area has therefore also conveyed significant migratory-economic flows from other parts of Italy, becoming over time the city's 'migrant' district.

The consolidation of the residential and social aspect can be established in 1976 with the construction of Parco XXII Aprile, built on the site formerly occupied by Villa Pentetorri - severely damaged during an air raid in 1944 - of which one of the entrance gates, with its masonry columns, on a green area in the central part of the park remains as testimony.

Residential development followed in an unregulated manner the radial expansive trend - also in terms of infrastructure - of the city through its main thoroughfares until 1965. Thanks to the 1965 General Regulatory Plan (PRG) - already partly anticipated by the 1958 PRG for the road infrastructure - a new impetus was given to the city by innovating the relationship between industry/residence and the historic centre/periphery, seeking a new development that was no longer radial, but polycentric, in which services and new facilities were planned to free the remaining parts of the city from the historic centre. With this start, the radial expansion, which had led to the construction of Viale Gramsci as a continuation of the main artery to the north of Viale Vittorio Emanuele and as a possible settlement evolution in its future development, was interrupted to the north with the construction (1975-1982) of the North Carducci bypass section - a fast-flowing link connecting the east-west axis - and with the segmentation of important historic roads connecting with the northern province of Modena, including Via Canaletto North and South. This fragmentation of the historical road infrastructure has inevitably led to a diminished perception of the morphological layout of the district as a whole, giving a feeling of incompleteness and 'unfinished'.

Another important aspect influencing perception is the railway line, important for Modena's productive development and in particular that of the Sacca district, which over the years has also maintained a divisive connotation in the perception of the district in relation to the rest of the city, despite the strengthened connection with the construction of the Sacca flyover (1933). The Sacca district is still perceived today as being far from the city center: an erroneous perception given its physical proximity.

The dismissal of many businesses, which for almost a century have predominantly characterized the area, has further reinforced the lack of a vocation - and inevitably of the perception - of a solidity of the morphological and typological layout of the district, leaving large empty spaces or disused buildings that have exacerbated the perception of incompleteness and degradation. The neighborhood is still marked by the consequences of the transformations that have characterized it over the years: the great migratory flow - until the 1990s still from southern Italy, then of people from other countries (in 2015 in the Sacca neighborhood one in four residents was foreign) - and the perennial state of 'territory in transformation' dictated by the radical change of vocation from the decommissioning of large companies.

These aspects make the critical issues particularly visible and reconfirm the perception of incompleteness, and consequently of degradation, with which the district is usually referred to in the media, without however considering what has been done at the local level over the years - first and foremost by the public administration and also by third sector entities and commercial/receptive entities - to make up for these shortcomings and to enhance the multicultural richness that the district has thanks to the influx of migrants that characterises it.

At the economic-social level, many support actions have been put in place for families, for social assistance, but also at the commercial-receptive level to maintain a fervent convivial activity and a constant cultural ferment. (see Figure 2).

Also at the urban and building level, the area over the last 15 years has in fact been the subject of various public - mostly - and private actions for the architectural and urban redevelopment

of the district.

Plans for building and urban re-development:

- . Neighborhood Contract Urban and Social Redevelopment of the R-North Housing Complex (2008)
- . Redevelopment Program and Integrated Program to Promote Residential Social Housing (2012)
- . Periphery Plan: program for urban redevelopment and safety of the city's northern suburbs (2015-2021)

## **Methodology**

The entire project creation process was imagined within the theoretical frame of reference of cultural-based urban regeneration, a practice that supports integrated processes that, starting from a cultural approach, become generative and transformative of the territories. In particular, a path was imagined with a "bottom-up" approach, through punctual interlocutions and a presidium of the area for the engagement of resident communities and active realities on the territory.

### *Working tools*

- Research: Mapping, historical, sociological and demographic analyses, urban morphology, study of territories, cognitive questionnaires
- Proximity: Interviews and collection of direct testimonies
- Cultural welfare: Public art and theatre as inclusive languages
- Storytelling: New points of view and participatory storytelling
- Crossing: Collective walking as a practice of knowledge of the territory
- Participatory construction: Cooperating in the creation of a collective work to activate informal relationships and opportunities for collaboration.

The project path was developed over 11 months, namely from December 2020 to October 2021 through 4 macro-actions:

Action 1 - engagement and knowledge of the territory

Action 2 - coordination and process definition

Action 3 - co-design

Action 4 - generative outcomes and public walks

### *Action 1 - engagement and knowledge of the territory*

In the project path imagined by Amigdala, it was fundamental to delve into the reference context of the project, starting from the morphological, historical and social analysis of the neighborhood, in order to render the complexity of the various transformations (particularly significant compared to other areas of the city) that the territory has undergone over the years, which have also continued recently through the Periphery Plan.

At the same time, precisely in order to make knowledge of the area broader and more transversal, several punctual interviews (using an approach based on active listening) were conducted with the area's actors: associations, social cooperatives, foundations, representatives of the Municipality of Modena actively involved in the area, shopkeepers, owners of accommodation activities, planners involved in various ways.

The analysis of the context, together with the dialogue triggered off with the various actors, led to an in-depth knowledge that enabled the working group to identify the most relevant morpho-typological aspects (Landmark) to be investigated within the co-design process, and



at the same time to acquire the necessary knowledge of the actors involved to form the working groups that took part in the urban exploration co-design workshops.

#### *Action 2 - Coordination and definition of the process*

In order to design the imagined participatory process, it was essential to maintain an open dialogue with the public administration - technical and political sides - referents of the Periphery Plan and external experts through the constitution of a Scientific Committee for the project composed of architects, urban planners, artists, curators, critics and sociologists. The multidisciplinary desired for the Committee was determined in order to have a transversal vision on the approach imagined for the project and to combine artistic and cultural identity with the participatory and inclusive approach that the project envisages.

The relationship with the public administration allowed for a constant dialogue during the individual phases, maintaining a sharing of intentions and will on the outcomes, in the desire that what emerged would in any case have a feedback and a concrete purpose in the future transformations of the area.

At the same time, a questionnaire was submitted to the various bodies in the area with which to obtain further elements of analysis and direct knowledge, so as to have a triple vision: a social and political vision; a historical-morphological vision; and a physical-perceptual vision. These three visions were brought together within the analysis and cartographic representations of the territory.

#### *Action 3 - Co-design*

The co-designing process was marked by collective public moments, individual interviews with the individual realities involved, and sessions divided into working groups.

The alternation of the different moments was designed to work both on the construction of new relations between the organizations involved, and on the processes of empowerment of the individual realities: trying to focus their attention, through work tools designed specifically for the pathway (questionnaire and canvas), on a more internal reflection concerning the activities they carry out, their vocation, their value and above all the consequent relationship with the territory that they trigger.

The local organizations worked together in the construction of the pathways through collaboration even between subjects with whom they had never had contact, to trigger new relationships and possible future alliances. In order to facilitate the project's operation and make the engagement of the vast area that defines the Sacca district more transversal - going beyond the political boundaries, but based on the perceived boundaries, the area from Parco XXII Aprile/Via Due Canali Sud to Viale La Marmora was considered - the associations involved (a total of 20 subjects also involved as referents of networks) were divided into 3 groups in relation to the areas on which their activities insist and according to the relationship in areas of interest with other realities.

#### *Action 4 - generative outcomes and public walks*

No.3 urban explorations (co-designed with local actors) + No.3 public meetings

The public walks organised, as an outcome of the co-design process, were developed individually with each group, differing from each other in terms of the route, realities engaged and themes addressed, in relation to the same organisations participating in the co-design meetings. (see Figure 3)

The Urban Explorations thus had the desire to observe the territory in a collective moment of

shared action, where associations are the guides - through their voices - while representatives of the city's institutions (together with citizens) take part in the walk.

The structure of the walks, co-designed with the respective groups, was articulated following a precise methodology:

- identification of the route;
- definition of representative streets and places (landmarks of the area) for the associations and characterisation of the part of the neighborhood crossed, highlighted during the walk with a performative action of "naming" on the ground the various places crossed (temporary thanks to the use of washable colored chalks);
- articulation of a sound dramaturgy that would gather the voices of the inhabitants, in particular the atmospheres evoked by the associations in the first place and by the various interlocutors who contributed to the knowledge of the area during the initial cognitive phase;
- design of sound tracks conceived with the Vibes Collective, precisely to emphasize the concept of atmosphere, which accompanied the walks, alternating musical pieces with the sound dramaturgy of the neighborhood's voices.

The Public Meetings - each at the conclusion of each exploration - were intended to gather impressions of what had been explored. Each meeting was realised through the temporary setting up of a public lounge together with the associations involved. Each public meeting was attended by a member of the Scientific Committee as an observer of the meeting, as well as officials and representatives of the public administration (municipal and regional) and representatives of local cultural institutions.

The meetings were held in the associations' headquarters (or in representative locations for their activities) with the same methodological structure identified by the working group:

- introduction to the discussion through the use of a map
- moment of presentation and suggestions shared by the representatives of the associations involved in co-designing
- conclusions and suggestions to continue the collective reflection given by one of the members of the Scientific Committee.

Furthermore, at the end of the meeting, a concluding moment of comparison and collective restitution of the impressions of the walk was planned through the participants' written testimonies on the map, prepared ad hoc by the working group, representing the route and the "nominations" of the places.

### **Measurement and analysis**

In the threefold vision of the territory - 1) socio-political; 2) historical-morphological; 3) physical-perceptual - the development of the project made it possible to use tools specifically designed to assess each aspect: from a qualitative and quantitative point of view - through interviews, collected testimonies and questionnaires -; from a representative point of view - through canva for co-designing, linguistic reworking with a network of occurrences and mapping.

#### *Interviews and testimonies*

All the interviews were reported in the form of a form for each reality interviewed that followed the same format, in order to standardise the contents that emerged and to be able to compare them more easily in the subsequent analysis.

The form was divided into four macro-areas:

- Biographical data: legal form, positioning in the district and the forms of communication used;
- Identity: activities carried out, history of the reality, constitution (volunteers, professionals, etc.)

- Relationship / Context: the areas of the neighborhood in which the activities are carried out, with which other associations they have current or past collaborations, broader considerations on the neighborhood (needs, requirements, potential and criticalities)
- Imaginary: ambitions and dreams for the future of the neighborhood, any projects already imagined.

### *Cognitive questionnaire*

The questionnaire, as a further individual cognitive reflection of the realities and their connection with the area, made it possible to introduce the concept of atmosphere, a fundamental basis for the subsequent co-design and the collective outcome of the walks. The atmosphere, within this path, was conceived as that flow of sensations that passes through us when we come into contact with a place and that can make us feel welcomed, at ease, relaxed, intrigued, or alienated, repelled, uneasy, uneasy... The sensations that each of us feels, individually, when we relate to a place (even if only by imagining it) are the result of the composition and particular aggregation of the elements that make up that place: the colours, the smells, the presence or absence of a certain order in the composition, the people who are present in the space, the noises and sounds or their absence. But they also depend on one's own perception, the familiarity we have with the space, subjective habits and tastes, and personal experiences. Through the questionnaire, the working group was able to investigate how the places and spaces in the association's area of action are represented in the imagination of those who pass through them on a daily basis.

Again thanks to the questionnaire, the joint meeting with all the realities was planned, allowing the answers given to be collectively shared through the processing of the data developed and at the same time being able to broaden the reflection thanks to the comparison of what emerged.

The concept of atmosphere was thus the cornerstone of the retrospective work requested of the associations, with the aim of triggering a deeper and more sensitive reflection on their perception and imagery.

### *Canvas for co-designing*

In the desire to create tools to facilitate dialogue and confrontation with common elements, during the co-design meetings, the activities were set up with the use of graphics of the participatory process thanks to the tools developed through the methodology of systemic design: modelling of the elements under investigation useful for coordinating each step of the confrontation.

In particular, a specific canvas was created to further investigate the various elements of the territory and individual organizations that could best represent the atmospheres identified.

The preliminary work during the collective meeting planned for the sharing of the results of the questionnaire became preparatory to the subsequent development of key words that represented each distinctive element of the territory and could best represent the qualitative aspects of the physical-perceptual vision of the various participating realities.

The modelling of a specific tool made it possible to make the values and different meanings that each reality could attribute to a place or its activity in the territory more comparable, allowing for greater validity of the data collected for the subsequent linguistic analysis through the network of occurrences.

*Words network* (see Figure 4)

The descriptive keywords of the territory that emerged from the co-designing meetings following the preliminary survey of the questionnaire made it possible to formalise a network of occurrences in which the major polarities were indicated as the places of reference in a scaled manner: the Sacca district - as the broadest sphere -; Parco XXII Aprile, RNord, Viale Gramsci - as specific areas of recognition, landmarks of the territory of reference for the inhabitants and association referents.

With respect to the identified ambits - general and reference - through the constriction of the network of occurrences it was possible to connect the qualitative adjective to the indicated places. The connection - represented by a connecting line between the descriptive keyword and the place - has a greater graphic weight, through its thickness, proportional to the number of times the word has been attributed to the place. This tool also made it possible to emphasise the distance between the media perception - often attributed to degradation - and that of the people who live there - multicultural, alive, beautiful... - .

### *Maps*

The cartographic representation played a fundamental role in two specific areas of the project: to report every relevant aspect with respect to the analysis of the territory developed by the various tools in a shared and univocal form in order to keep track of what was discovered (see Figure 5); become the element of dialogue with the participants of the co-design for the definition of the walks in close dialogue with the route taken and what they wanted to bring out in a dramaturgical narration of the territory, in relation to the testimonies given and from which the pieces part of the sound dramaturgy of the walk were extrapolated (see Figure 6). The cartographic elaboration of the walks produced interactive mappings in which, in addition to the three routes created, the various landmarks of the territory identified with the associations combined with the testimonies (directly listenable from the map) are shown.

All mappings were developed thanks to a web app for the creation of open source collaborative maps - umap - to allow access to all participants and direct reporting of the tool.

### **Conclusion**

The 'C come città' project initiated a new look at the neighborhood at a twofold level of awareness: from the outside towards the inside: for the public administration and public institutions to acquire a greater awareness of the resources within the neighborhood and how these can play an important role in stabilising the transformations underway, with the potential to integrate the new organically within the urban framework. At the second level, from the inside out, the project made the organizations involved in the process more aware of their potential and limitations - dictated mainly by a lack of attention to a strategic vision of change - which did not allow for collective and networked reasoning in the construction of possible activities for the neighborhood. The knowledge of the other actors in the area; the activation of collaboration processes between the various actors; the development of skills thanks to a greater awareness of their capacities and the generative network on the part of the community members led to the initiation of greater collective responsibility in a collaborative vision without distinction of roles and functions.

The exploration of the territory in a collective manner brought forth further food for thought for future transformations of the territory, especially in the vision of a systemic change in the relationship with institutions and between associations. A more organic coordination in dialogue with the public administration can make up for the current estrangement between institutions and the third sector, creating a joint intervention strategy that already has a long-term vision



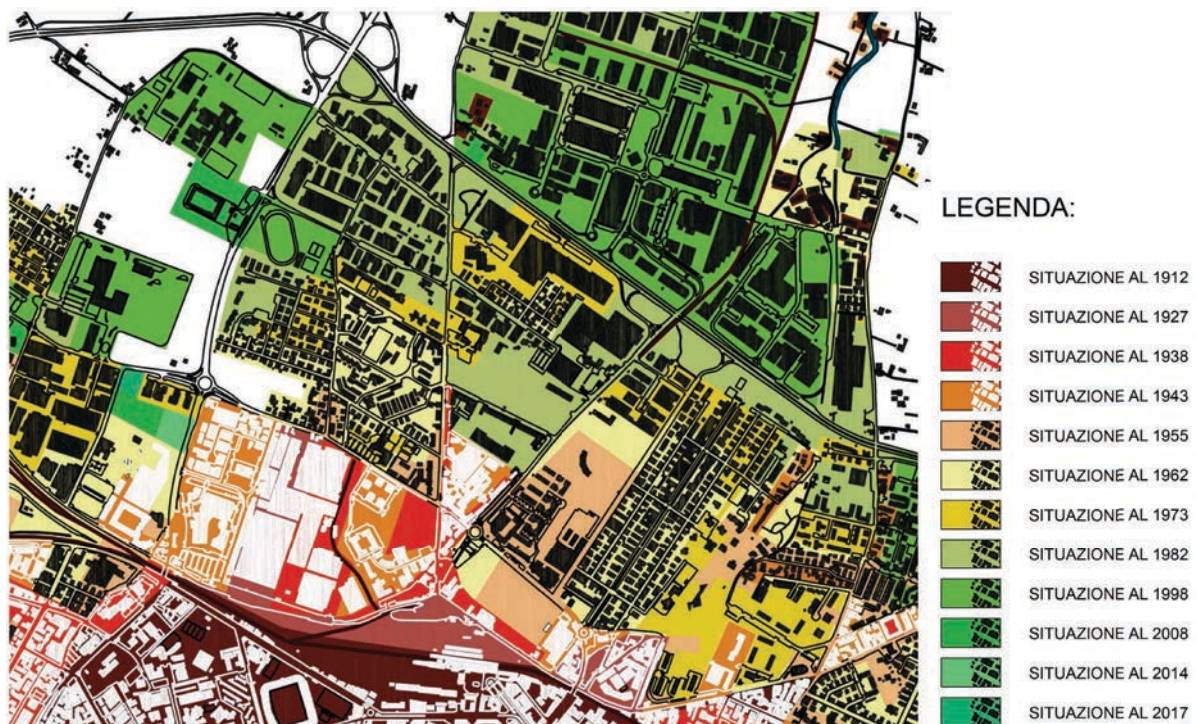
and at the same time can be more receptive to potential transformative needs.

This new governance will thus be able to systematize the aggregative and new places that have been identified and at the same time raise the possible potential of new spaces that can fulfil the needs of the neighborhood's necessary functions.

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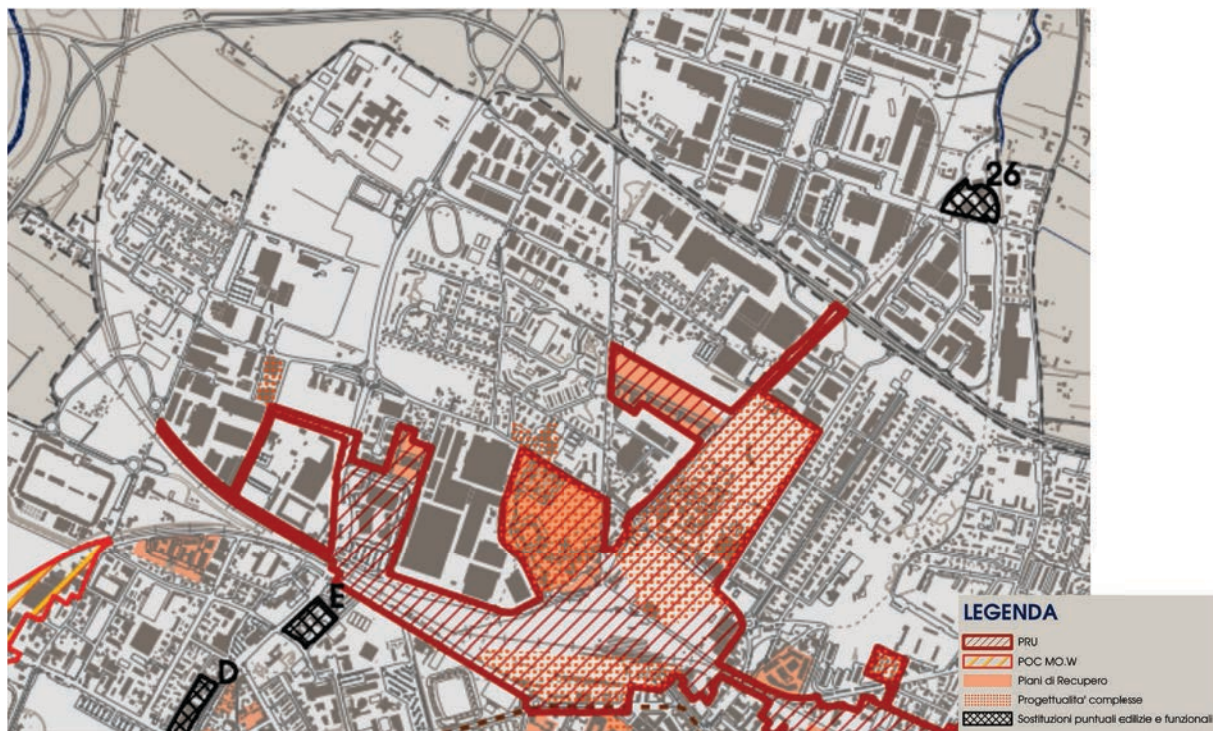
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## Illustrations and tables



**Figure 1.** Portion of the graphic design taken from the Knowledge Framework of the PUG 2021: QC\_C1\_1\_7\_10\_Anthropisation\_process | Public Administration of Modena.





**Figure 2.** Portion of the graphic design taken from the Knowledge Framework of the PUG 2021: Table C1.1.5 - URBAN TRANSFORMATIONS IN THE LAST TWENTY YEARS | Public Administration of Modena



**Figure 3.** Urban exploration – action4 – group visiting a vacant part of the neighborhood.



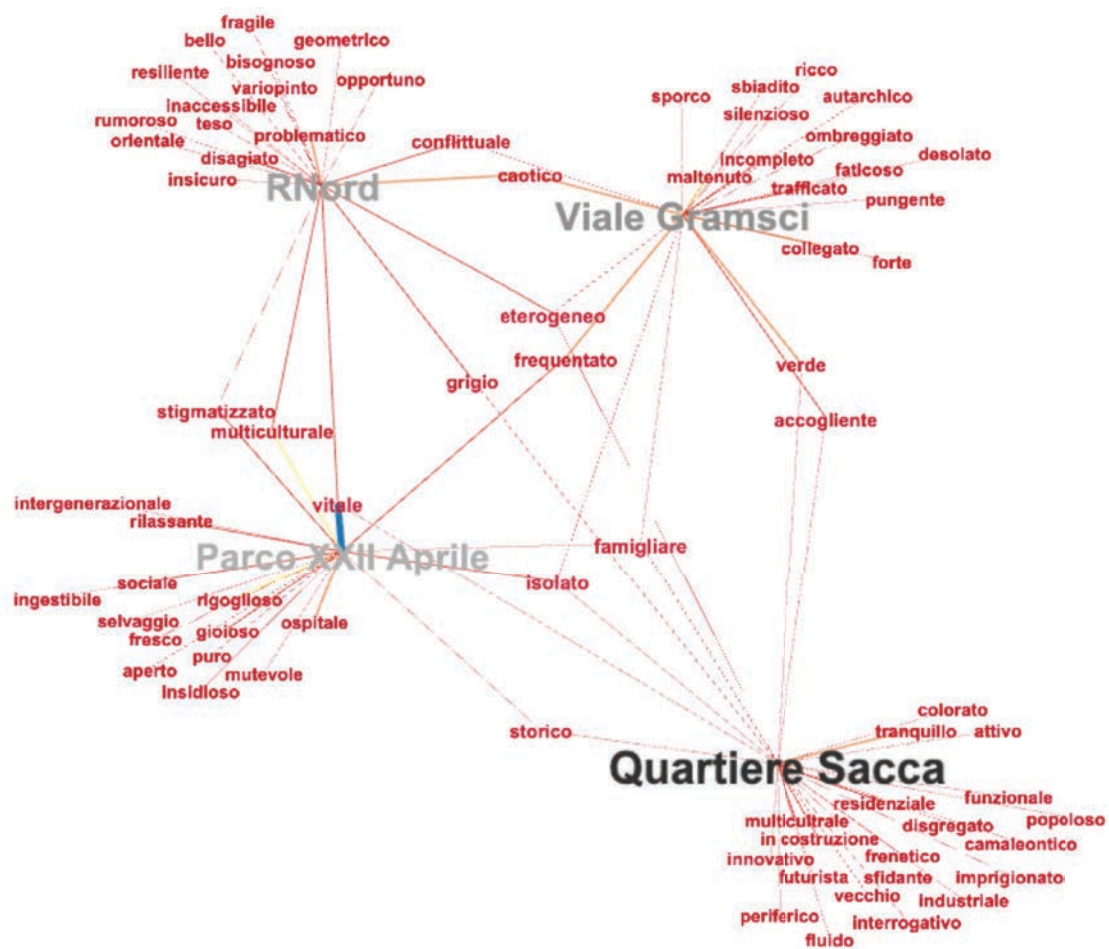


Figure 4. Graphical representation of the Words Network.

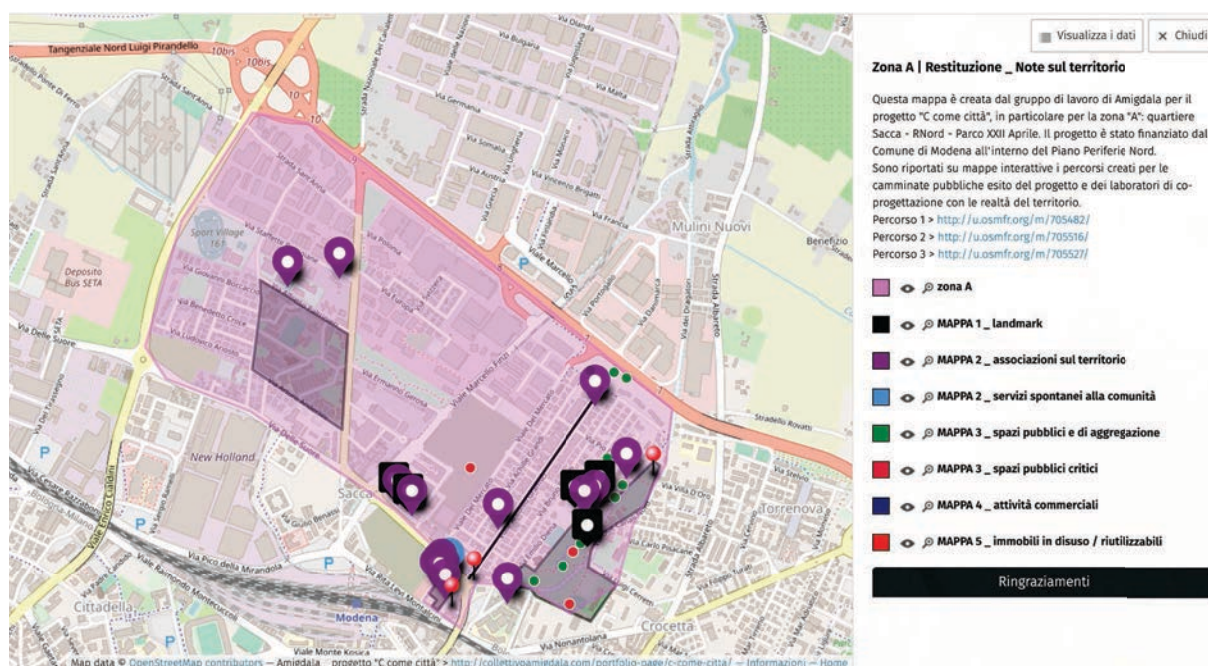
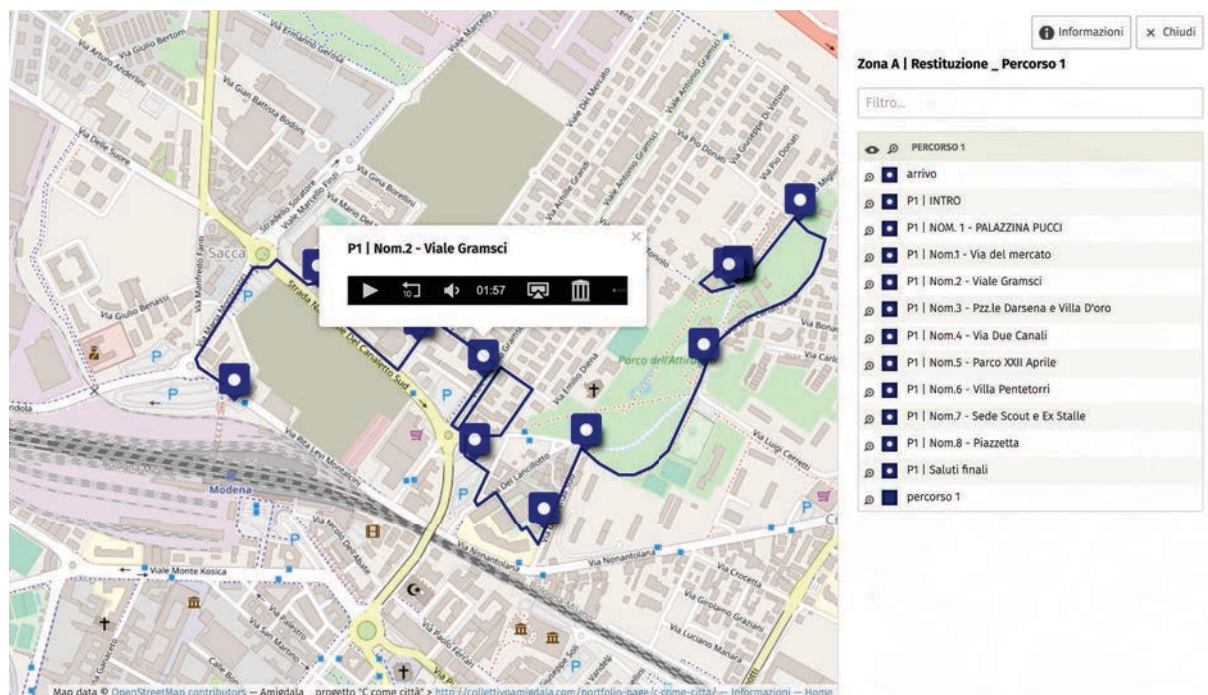


Figure 5. Cartographic representation of the elements that emerged during the co-design process – interactive map link: <http://u.osmfr.org/m/698901/>



**Figure 6.** Cartographic representation of urban exploration with evidence associated with each landmark – interactive maps link: Exploration 1: <http://u.osmfr.org/m/705482/>; Exploration 2: <http://u.osmfr.org/m/705516/>; Exploration 3: <http://u.osmfr.org/m/705527/>

# Architects' roles in community regeneration with "Residents' Deep Participation"

Han Wang<sup>1</sup>, Li Bao<sup>2</sup>

<sup>1,2</sup>Department of Architecture, Southeast University, No. 2 Sipailou, Nanjing, China, 210000

E-mail: <sup>1</sup>2977996299@qq.com, <sup>2</sup>baoli@seu.edu.cn

Keywords:

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**Abstract.** As one of the historical districts of Nanjing, Xiaosongtao Block is gradually declining with dense population, low-quality high-density housing, deficiency of functional facilities and potential safety hazards. It has the dilemma of protection and development, the diversified property rights and different demands of various groups of residents have shown the certain complexity and representativeness of urban community regeneration in current China. Upon the practice, this paper aims to explore the multiple roles of architects during the dedicated urban regeneration process, especial in historical block. Meanwhile, the approach, procedure and residents' participation need to be paid more attention. Architect starts the whole work with historical study as researcher. The new plans are formulated based on in-depth investigation and accurate classification. As designer, the urban texture, architectural form traditional scale and street interface are the key themes to be consideration to architect. Based on individual interviews and collective meetings, architects can understand the demands, explain the schemes, collect the opinions and address the solutions as consultant. As the project progresses, architects are always the coordinators between the goals of city managers, the interests of developers and the wishes of users, and provide the most reasonable solutions under various constraints through professional capabilities. Community regeneration requires the cooperation of the government, investors, builders, residents, designers, etc. As a key one in this multi-patties cooperation, architects need to focus on both living quality and social benefits. It effectively optimizes the design results, creatively solves urban problems, and also meets the diverse needs of residents.

## Introduction

With China's urban development entering the era of stock renewal, China's urban renewal has put forward the goal of transitioning to refined urban design. In the top-down policy context of the central government, the overall goal of refined urban design is to promote "social repair" and "ecological restoration", and contribute to "innovation in urban governance" and "refinement of the city" management". Under this line of thinking, social issues such as public participation and community communication gradually emerged and became the focus.

Published research on "public participation" in China's community renewal began in 1997, with the 2011 State Council's "Community Service System Construction Plan (2011-2015)" promulgated, "encouraging and supporting social organizations, enterprises, institutions, and residents to participate in community service, and improve the democratic decision-making mechanism". Since then, the research on public participation has shifted from the discussion of participation roles, influence mechanisms and learning from Western countries to a stage of rapid development, and increased research on the establishment of public participation platforms and public participation paths.

This "process of establishing close social connections between residents and between residents and the community environment" shows a "bottom-up" design idea, emphasizing the concept of "community building", and the government Top-down control leads complement each other.

For residents, personal participation can give full play to their subjective initiative and obtain effective solutions that truly meet their needs. The joint participation of the government, planners, neighborhood committees, residents and non-profit organizations makes community renewal gradually transparent, and residents' democratic rights are effectively respected and guaranteed, allowing users to better lead the future community life.

For cities, the extensive participation of different subjects gradually breaks down the single barrier centered on the government, allowing different social forces to display and integrate their own characteristics, and to carry out multi-channel practice in a more flexible, comprehensive and spontaneous way, creating a plan that is truly beneficial to people's livelihood and society.

In this model, architects who act as professional guides become the backbone to promote the progress of the project, showing an extremely important intermediary role, and the scope of work is more specific and extensive. The joint participation of multiple actors means that more groups have different degrees of decision-making power, and architects need a reasonable balance and effective communication to maximize comprehensive benefits. Especially when these problems face the "community" that is closely related to life, their solutions become more complicated. Therefore, in today's community renewal work, architects need to clarify their own positioning and responsibilities as soon as possible, so that the renewal work can be carried out in an orderly and smooth manner.

## Methodology

Xiao Songtao is one of the historical areas of the old city of Nanjing. The low-quality and high-density houses, the lack of functional facilities and many hidden dangers have gradually sunk the value of the block in the densely populated and decaying environment. At the same time, the intricate relationship of property rights and the different demands of different interest groups make the protection regeneration and material space renewal have certain complexity and representativeness. Facing the new round of urban renewal, the project focuses on the methodology, process and participatory nature of community renewal in historical areas. It is



an important practice where innovation and effectiveness coexist.

This paper aims to use Xiao Songtao's practice to propose how architects can use their own identity transformation to connect the "top-down control and guidance of the government" and the "bottom-up dynamic characteristics of residents' participation", and to demonstrate the multiple roles of architects in refined urban design.

## Measurement and analysis

### 1 Architects as researchers

As a design team from a university, architects first represent professional researchers. It is possible to explore problems through careful and in-depth research, to think about problems from the perspective of the city, to solve problems from a historical perspective, and to explore more innovative solutions in the research process. The problems uncovered by researchers should not only include the intuitive phenomena observed by the eyes, but also the specific demands implicit in the phenomena.

On the one hand, problems are analysed in a multi-dimensional way from the perspective of urban planning in the design process. Attention was paid to the inheritance of historical context, the harmony and unity of urban style, and investigate from the dual dimensions of time and space; On the other hand, the detailed design pays attention to the building volume and physical environment; combs the applicable green technology, pavement, façade and various facilities, and repeatedly polishes the apartment design.

Xiaosongtao is located in the golden section of the city center, which is still similar to the surrounding Jinling Sutra Carving Office and Zhongnongli in height and style. However, the indiscriminate construction everywhere not only affects the lighting of residential buildings, but also seriously damages the original street texture, blocking the connection between east-west and north-south. At the same time, the poor construction quality and simple materials bring serious fire hazards to the site. The high wall in the middle of Xiaosongtao Lane defines a quiet and leisurely living area. But it also brings another problem - a shortage of parking spaces, inefficient transportation, and an imbalance between real life and urban needs.

As a result, in urban centers where land is expensive, it has become the norm for three or four people to live in bungalows of ten square meters. These old dilapidated houses have long lagged behind the basic needs of modern life, not only unable to provide residents with independent kitchens and bathrooms, ventilation and lighting are difficult, indoor privacy is lacking, and there is even a risk of housing quality at any time.

Therefore, the Xiaosongtao project is not limited to partial building renovation, but is to improve the overall environment of the area and improve the space quality more comprehensively, so that residents can benefit substantially.

### 2 Architects as planners

As planners, architects need to face the many requirements put forward by residents, builders, and managers, and make rational and bold creations on the premise of meeting needs and specifications.

#### 2.1 Facing city managers

In terms of macro control, the project earnestly solicited the opinions of members of the Planning Committee and the Famous City Committee, and responded positively to traffic diversion, control of urban style, and continuation of historical context, so as to meet the specific needs of the planning for sponge cities, greening rates, and basic facilities, to ensure the unity,

continuity and standardization of the design of the city.

The design makes full use of the historical and cultural resources inside and outside the site, and forms extensive connections with the surrounding buildings such as Zhongnongli and Jinling Classics; the original site is preserved and the existing historically protected buildings in the site are restored and repaired, forming a group of architectural streets and alleys of the Republic of China; The Zhongnong Lane is aligned, and the existing street texture, scale and interface of Xiaosongtao Lane are preserved to the greatest extent; the new building forms and the surrounding old and new buildings synergistically echo to form a reasonable and rich urban skyline.

In terms of municipal administration, in order to better create the community boundary, protect the street and lane interface on the east side of the plot, and optimize road traffic, the design has adjusted the road red line of Xiaosongtao Lane several times in combination with the east interface of historical buildings, forming a two-way street from north to south. The roadside buildings are in the form of arcades to increase the road space (layered right confirmation), increase the pedestrian passage, reasonably determine the road section, and ensure that both pedestrians and non-motor vehicles have independent road rights.

In addition, the design also meets the requirements of sponge city planning and construction by optimizing the ground pavement and creating green roofs to meet the needs of green space balance and residents' leisure activities.

## *2.2 Facing the Builders*

Fully listen to the construction party's functional positioning and value needs of the project, meet its control of specific indicators such as building height, density, and floor area ratio, and achieve atmospheric beauty to the greatest extent through reasonable structural selection and design concepts. Win-win with economic cost.

In terms of overall planning, aiming at the organic nature of renewal, the project takes the reform of the property rights system as the starting point, and proposes the idea of combining "retention and demolition" for renovation. According to the characteristics of different buildings, different levels of renovation plans are adopted to accurately implement the space. Quality is effectively improved.

The new building is designed to combine commercial and residential buildings according to the construction requirements. The ground floor space is equipped with commercial functions, combined with some property service rooms, living facilities and entrance and exit halls, which not only facilitates the people, but also increases the connection of residents and community vitality; the boundary is aligned with Zhongnongli, continue the original small-scale street texture, and connect the building of No. 27 Youfu West Street to form an open and flexible overall commercial experience, and fully realize the protection and reuse of historical buildings. The setting of ground activity nodes combined with roofs of different elevations creates a three-dimensional, multi-level public space in the compact city center block, which fully meets the needs of neighborhood communication.

The second to seventh floors are equipped with a sufficient number of residences. In addition to meeting the needs of in-situ resettlement, there is still a surplus for sales to compensate for the economic investment of the renewal project. The residential area ranges from 20 square meters to 74 square meters, which fully meets the relocation requirements and the needs of different families. In the limited urban space, the floor area ratio has been fully improved.

### 2.3 Facing the User

For the users of the design and the direct beneficiaries - residents, the urban renewal is effective as a people's livelihood project, and the people are truly happy at the most economical cost, and the quality of the living space environment is improved. In addition to the conventional apartment design, under the premise of meeting the relocation area replacement requirements, not increasing the cost burden for the investor, and meeting the architectural design specifications to the greatest extent, the design proposes to break through the floor height of a single-bedroom, and achieve efficient use of space by setting up a mezzanine. Under the condition that the area remains unchanged, the actual usable area will be increased by 70%, so that the extremely small building area can also ensure the complete set of units, which meets the needs of residential use, and the indoor space can also obtain better lighting and ventilation conditions, and achieve north-south permeability. It provides more variety of house type matching options for the households who are resettled in translation, effectively solves the problem of poor living space for the poor people at the bottom, and effectively improves the living conditions and housing quality of the residents.

### 3 Architects as participants in community building

In the context of community building emphasizing the participation of multiple subjects, government departments, investors and builders, neighborhood committees, residents and architects have jointly become the "builders" of community renewal, and the connection between all parties has become closer.

Among them, architects, as a professional force, should actively communicate with other participants, actively communicate and guide with design thinking, and strive for maximum design autonomy to make the plan achieve more ideal results. The continuous guidance of architects can effectively help government input and residents' participation to maintain a clear direction and clear goals.

For example, in terms of municipal administration, road traffic optimization is carried out to better create community boundaries and protect the street and lane interface on the east side of the plot; In terms of structure, in order to better show the design features and increase the actual indoor space for use, repeated detailed design and polishing are carried out ; And the historical level, fully integrate the surrounding historical resource points, so that the historical buildings in the site can be protected and reused.

Facing government departments, investors and grassroots units, architects should maintain a good cooperative relationship with them, guide the renewal process to develop according to the design goals, and remove obstacles in the design process with their assistance. Architects should have a forward-looking vision in the update process, make forward-looking predictions with a future-oriented vision, disseminate advanced design ideas to other participants, and provide them with professional questions and reasonable suggestions. These diversified practice methods and innovative ideas are also conducive to enriching the single working mode of community streets and promoting the innovation of the renewal mechanism of grassroots units and even the government.

When dealing with the relationship with the vast number of residents, on the one hand, community renewal touches the essential issues of residents' lives. Architects should listen carefully to the real needs of residents and try their best to give them feedback in design; on the other hand, architects should give full play to their professional advantages to lead residents and grassroots to contact advanced planning concepts, and cultivate a sense of deep participation in community development and construction. Only by understanding all aspects

of design and construction can they participate in the update process more deeply. In the long-term mobilization process of the project, the investor and the builder had many in-depth exchanges with the residents, imperceptibly made the residents accept the concept of renewal, and obtained the understanding and support of the residents for the renewal project. The residents' consent rate successfully exceeded 90%; During the design process, the architect team has held discussions and shared many times to connect with the residents about the proposed house type and design results. Based on the actual demands of the residents, the plan can be adjusted... Let the residents see the attitude and intentions of the architect, improve their taste pursuit and participation level, and truly gain respect and voice as the owner of the community in the process of updating.

#### **4 Architects as Coordinator**

##### *4.1 Coordination of benefits*

Planning and design services do not need to deliberately pursue pure professional self-discipline and interest, but become a medium and catalyst for coordinating all parties, making the most of the situation, encouraging participation, and seeking consensus.

The Xiaosongtao Renewal Project is a composite result of multiple objectives, including multiple participants in the community renewal issue, detailed and complex needs, poor material conditions in the old community, outdated facilities, intensive site, and multiple requirements for the continuation of the cultural context. Therefore, in the renewal process, architects are more tested for the coordination of the city's comprehensive benefits, the interests of all participating subjects, and the synthesis and sublimation of multidisciplinary viewpoints.

In terms of economic benefits, design focuses on culture, geography and humanities, paid attention to function and efficiency to achieve comprehensive improvement of space quality. After the renovation, the overall improvement of the floor area ratio and the investment attraction of the ground floor business have brought economic benefits to the builder, and activated the site economy to a certain extent; the application of green technology can also reduce investment of energy in the later stage.

In terms of social benefits, architects effectively balance the history and the present, and promote the organic development of the building industry; care about people's livelihood, and use design to effectively improve the living conditions of residents and improve the quality of life; rationally coordinate building boundaries and urban roads, and realize the separation of people and vehicles to get a more more smooth and orderly traffic.

In terms of environmental benefits, take the long-term ecological economy as the goal, comprehensively use a variety of green technologies, and fully research and organize ventilation and lighting, thermal insulation, sunshade, water circulation system, etc., to achieve the design standard of sponge city; While improving area ratio of the site, the building density is reasonably controlled, enough open space is reserved and three-dimensional greening is set up to achieve a comprehensive improvement in ecological harmony, environmental facilities, and space utilization.

##### *4.2 Coordination of interests*

As one of the multiple participants, it is necessary to comprehensively balance the interests and needs of developers, investors, government departments, residents, and neighborhood committees, and provide effective solutions to the problems raised by all parties.

For example, in the design of the apartment, it respects the design specifications and urban standards, does not increase additional investment for the investor, and meets the relocation

regulations of the builder, and adopts the plan of raising the floor height for the actual users. It provides a variety of options for units of the same area, fully taking into account the rules and feelings of all parties.

In addition, the project brings hidden additional benefits to all parties.

For the government, the project has provided a successful pilot scheme, and provided a reference and template for urban renewal in other areas; the project has attracted wide attention from various social groups (including the media) is also of great significance for the continuous development of government planning concepts and renewal work.

For investors, the gradual expansion of the influence of the project also gives them more exposure and new investment opportunities.

For residents, their needs have been fully resolved, and they have obtained about 170% of the area and better living conditions with the same house purchase funds. Being respected in the decision-making process can also stimulate their awareness of loving the community and enhance sense of well-being, participation and belonging.

For the neighborhood committee, the inner satisfaction of residents enhances the ability and enthusiasm of them to participate in community life and community autonomy, which is conducive to the smooth progress of community workers in the subsequent continuous renewal and development process. Build an autonomous, progressive, organic and long-term community self-renewal mechanism.

## Conclusion

Xiao Songtao's practice as a multi-subject participation emphasizes the process and participatory nature of urban regeneration. As an important researcher, designer, coordinator and participant, the functions of architects are constantly enriched and transformed, becoming an important link between decision makers, stakeholders and citizens in the process of urban transformation.

The participatory process pays attention to the connection between different participating subjects - mutual restraint and mutual promotion. Architects coordinate in real time as a professional, actively guide, and take into account the overall situation, respect the opinions of all participants at every stage, and leave room for their needs, so that the project can be advanced and implemented in an orderly manner.

Participation is even more important in the regeneration process of residential historical sites. Historical sites have intensive land, complex relationships and diverse needs. Only when all stakeholders, especially the main users of the community, can effectively participate and express, design can get rid of idealism. Therefore, giving residents the right to speak and allowing residents to deeply participate in the process of community renewal can realize the community's independent participation and sustainable long-term autonomy.

The method of refined urban design and regeneration needs to be further explored and deepened. The role of the architect has not yet been defined. With the thinking of decision-makers, the attitude of researchers, the identity of participants and the role of coordinator, architects should continue to explore and innovate to create new ideas for the community.

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## Illustrations and Tables



Figure 1. Neighboring important cultural relics protection units. (Picture: Han Wang)

The random constructions by residents everywhere

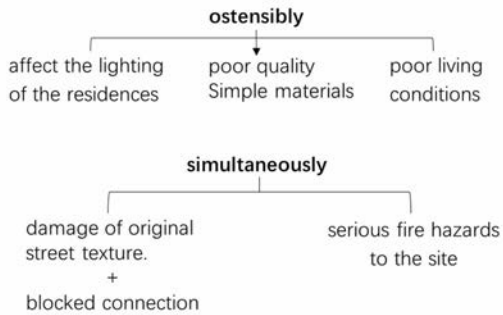


Figure 2. Basic situation and Aerial view of the southwest of Xiaosongtao. (Photo: Han Wang)

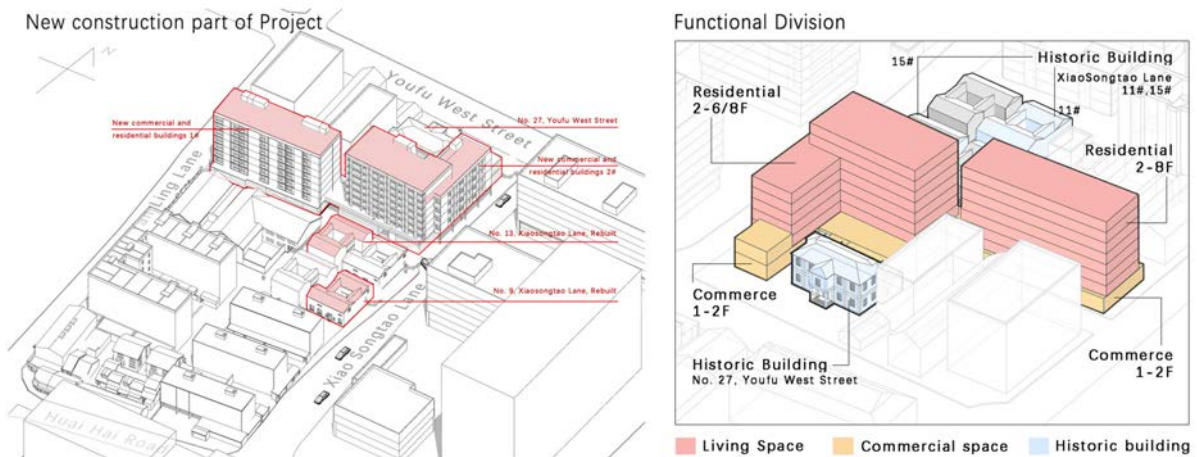
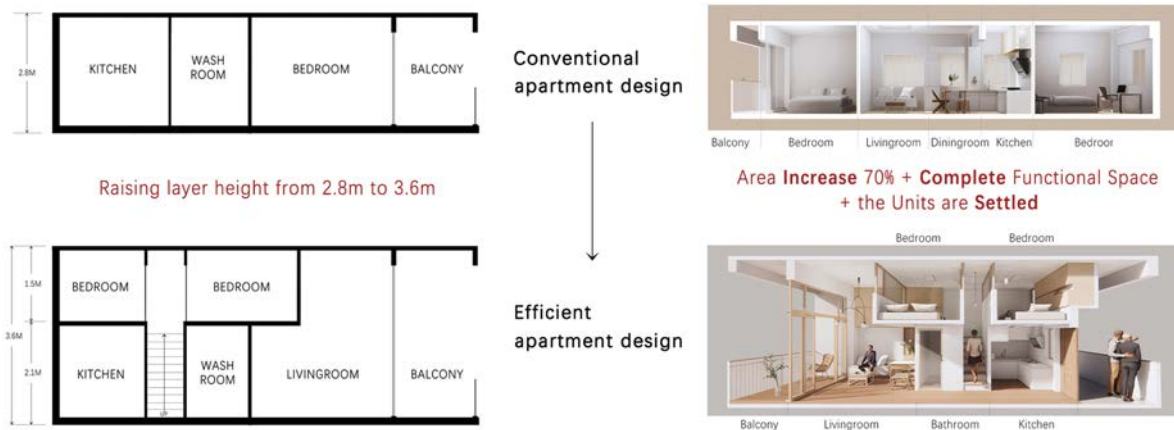


Figure 3. Analysis chart of building function organization. (Picture: Han Wang)



Figure 4. Traffic organization. (Picture: Han Wang)





**Figure 5.** Diversified house hype design - conventional house type and efficient house type. (Picture: Han Wang, Zixuan Liu)

## Exploring how Amman's Abdali project is considered state-led gentrification using Topic Modeling technique

Ruba A. Alomary<sup>1</sup>, Jarvis Ebuga Otia<sup>2</sup>

<sup>1</sup>Department of Architecture and Urban Planning, Ferrara University. Via Quartieri, 8, 44121 Ferrara

<sup>2</sup>Department of Economics & Management, University of Ferrara. Via Voltapaletto, 11, 44121 Ferrara

E-mail: <sup>1</sup>[ruba.alomary@unife.it](mailto:ruba.alomary@unife.it), <sup>2</sup>[javisebuga.otia@edu.unife.it](mailto:javisebuga.otia@edu.unife.it)

Keywords: State-led gentrification, text mining, Urban Redevelopment

Conference theme: New methods and Technologies for the urban analysis

**Abstract.** The purpose of this research is to explore how the Abdali project is considered state-led gentrification through Topic Modeling techniques. We aim to investigate the key drivers the state has adopted since the start of the Abdali project and use it as a tool to examine how states can assist or drive gentrification in a similar context. The Abdali redevelopment project was launched in 2003 on government-owned land, which is considered stark for neoliberalism. Embodied the largest single plot of land within the city of Amman that is available for private development, by relying on the agendas of privatization and liberalization, considering the private sector to be the main engine for growth. The researchers will employ text mining for performing qualitative data analysis, also known as text data mining or knowledge discovery from textual databases, which is an extension of data mining to quantitatively process and analyze the text data. Utilizing a theoretical framework identifying the key drivers and state roles to examine gentrification in the context of the Abdali redevelopment project using text mining. Applying codes to collections of unstructured data text represented in the literature on the Abdali project, legislations, official reports, and articles. The prospective findings will define state-led gentrification in the Abdali project and identify its special characteristics by quantifying these contextual key drivers.

## Introduction

The notion of gentrification has considerably changed during the previous few decades. Scholars expanded the definition of gentrification in the 1980s by connecting it to processes of social, economic, and spatial change. The conceptions of gentrification develop new derivatives or mutations as a result of this linkage. Contrasting traditional gentrification with the idea of rehabilitation, “new-build gentrification” seems unusual. In this scenario, the developer creates a luxurious lifestyle for people with the financial means to purchase these new developments. The result will be indirect displacement, which may take the form of “exclusionary displacement,” in which gentrification prevents lower-income groups from participating in development projects. “Super-gentrification” or “financification” is another derivation (Aalbers, 2019; Lees, Slater, & Wyly, 2013).

In this regard, it was inevitable that gentrification would be described as:

“The investment of capital in the urban core creates space for a more affluent class of people than those who already reside there. Gentrification mostly involves urban reinvestment. In addition to residential rehabilitation and reconstruction, it now also encompasses commercial redevelopment and “loft conversions” (for living or office) (D. P. Smith, 2002).

The definition from Neil Smith above clearly demonstrates that despite the concept of gentrification expanding to include redevelopment as well as rehabilitation, urban centers or inner-city neighborhoods continued to be the primary focus of studying as the case of this research Amman’s urban center.

## State-led gentrification

Before the early 2000s, scholarly interest in the role of state actors in gentrification was limited, despite the calls of certain authors for a greater focus on the connection between gentrification and public policies (Van Weesep, 1994). This was accompanied by a significant change in the definitions of gentrification over the past few decades. One of these changes is the emergence of state-led gentrification, in which state actors employ gentrification as a tool for creating more expensive housing in (low-income) neighborhoods by attracting higher-income individuals there (Hackworth & Smith, 2001b; Lees & Ley, 2008; Uitermark, Duyvendak, & Kleinhans, 2007). Despite calls for additional research into the link between gentrification and public policy, the academic community paid limited attention to the role of state actors in gentrification until the early 2000s. Changes in neighborhoods were primarily explained from a supply and demand, market-oriented point of view (Marcuse, 2013).

However, gentrification as a technique for revitalization has been widely adopted by governments worldwide in the previous decade (Smith, 2002; Wyly, 2004). As a result, there has been an increase in scholarly studies examining the causes and effects of gentrification in connection to public policy (Andersson & Turner, 2014; Lees & Ley, 2008; Van Gent, 2013).

It is important to distinguish between the classical and unprompted gentrification and gentrification that is planned, commanded, or supported by state agencies at the national, regional, metropolitan, or municipal level as part of a countrywide or local-level restructuring program. Gentrification by the state typically takes the form of land valorization policies, plans to encourage the expansion of economic prospects for the creation of high-end housing, or the implementation of social displacement measures in previously low-income residential neighborhoods or public spaces (López-Morales).

State actors are typically treated as a single group in studies on the relationship between gentrification and state actors since it is considered that they share similar perceptions and goals for neighborhood development. Neoliberalization did, however, lead to the creation of



new governance structures, and neighborhood regeneration now frequently includes several actors, each with objectives and agendas that also differ by country (Teernstra, 2015).

"Nowadays, multiple actors are involved in neighborhood regeneration, each with their own goals and agendas, and the shift towards governance '...moves away from fixed ideas about power as a commodity rooted in particular institutions to more fluid ideas of power developed and negotiated between partners" (Taylor, 2007)

The neoliberal transformation was marked by a rescaling of state power and an emphasis on "market-oriented" and "market-dependent" measures. Financial authority was shifted to upper governmental levels, while direct communal consumption shifted to lower levels. As a result, the government began actively encouraging gentrification through a shift toward liberalization and the reduction of financing for affordable housing (Tok & Oğuz, 2013).

In contrast to Smith's Rent Gap theory, an economic explanation of gentrification, third-wave gentrification emerged as a result of the state's decision to play a more active role in neighborhood transformation. And as a result, new-build gentrification became the primary mechanism for achieving the state's urban regeneration goals. External capital necessitating large-scale investment repairs (Christophers, 2016) and shifting urban policies and legislative framework paved the way for new-build gentrification to become a driving force in contemporary urbanization (Lees & Phillips, 2018).

Mega-redevelopment projects in recent years have shown the rise of state-led gentrification, which attempts to sanitize and commercialize urban space while changing public space into an exclusive consumption area for urban elites (de Queiroz Ribeiro & dos Santos Junior, 2007; Sánchez, 2013). Different institutional and housing market arrangements have varying effects on patterns of neighborhood development. Understanding the mechanism in which state-led gentrification evolves and the objectives of the parties involved in each context may contribute to our knowledge of the "geography of gentrification." (Teernstra, 2015).

The state started to see gentrification as an efficient way of applying neo-liberal urban policies in the inner city and satisfying its middle and upper-class people's housing demands. While neglecting the working class and poor inhabitants' needs in the process can cause various problems such as displacement and social polarization.

This policy shift signifies the emergence of "third-wave gentrification," a new form of gentrification is mostly the result of governmental intervention, is dominated by huge development businesses in terms of investment and redevelopment, and typically involves the construction of new residences on formerly industrial property. Furthermore conversion of commercial industrial land or structures for residential and other use. Here, the transformation of key districts, supported by the state and spurred by private capital, results in the reclassification of the urban area, displacing existing residents and businesses. The state's role in the legislative framework, incentives, and building regulations plays as 'amplifiers' of potential gentrification (Hackworth & Smith, 2001a; Lambert & Boddy, 2002).

### **Case Study: The Abdali Redevelopment project**

Amman is the Kingdom's largest urban center and one of the most important cities regionally due to the pivotal role Jordan plays in the political landscape of the Middle East (Biegel, 1996). Amman accommodates a variety of governmental institutions and public services, including education and health organizations, religious organizations, political parties, and international development organizations (UN, 2022). According to the Department of Statistics, DoS last published a report for the estimated population of Jordan, Amman's population exceeds four million inhabitants (DoS, 2019). More than a third of Jordan's urban population lives in the urban

boundaries of Amman (42% of the total population). Since 1948, the city has witnessed the greatest levels of population and urban growth in the Middle East (Potter, Darmame, Barham, & Nortcliff, 2009).

The concept of a contemporary city center in Amman's Abdali neighborhood first emerged in late 2001. Figure 4: marketing the new vision for Amman, relying on the agendas of privatization and liberalization, considering the private sector to be the primary motive for growth. The Abdali Redevelopment Project luxury development is a case study of the types of planning practice carried out as part of the city's neoliberal transformation aiming for regional prominence and synchronized with the acceptance of investments made with international capital (Daher, 2008). 'Mawared' (National Resources Investment and Development Corporation) was founded in 2002 as part of the army structure as a financially and administratively independent state that would invest in important projects throughout Jordan. "Mawared" declared themselves to be in charge of Jordan's urban redevelopment and "inner-city development" (MAWARED, 2021 b). By 2005 Amman began to attract more regional capital and investments. The focus on neoliberal urbanization by King Abdullah began to pay off, and the boom of privatized development in Amman changed the city's skyline. Amman had around 350 plans for high-rise buildings (Debruyne & Parker, 2015).

The Abdali Redevelopment Project is considered a stark symbol of neoliberal urban transformation in Jordan, the most ambitious of these schemes, with agendas and goals that would turn Amman into a Global City (Hanshaw & Ryan, 2018). It also illustrates the shift in investment focus towards privatization and a neoliberal economic environment. The project's receipt of a unique set of policy discourses makes it "ripe" for redevelopment. The proximity to the city center and the Shmaisani commercial and business district makes it appealing to both commercial investors and prospective residents who desire an urban lifestyle.

The goal of the Abdali redevelopment project is to create a Central Business District as a mixed-use development that will benefit from a central strategic location in the heart of Amman in the Abdali neighborhood, figure 2 adjacent to the banking and business district of Shmeisani, and home to such iconic governmental and institutional buildings as the Parliament, Palace of Justice, the King Abdullah Mosque, and the Jordanian National Gallery of Fine Arts. The proximity to the city center makes the Abdali redevelopment project appealing to both commercial investors and prospective residents searching for "inner-city" and luxurious lifestyles. It is inclusive of both upscale residential and retail components, with the goals of attracting private sector investment, fostering economic growth, and offering employment opportunities.

The ambitious objective of the project is to relocate Amman's ancient downtown. A redevelopment project is expected to result in the creation of a "new downtown" that would usher Jordan into a new era and serve as a shining example of modernization and towering architecture. It was anticipated that the built-up area of the two stages is 1,800,000 square meters, while the megaproject itself extends over 477,000 square meters. with an investment value of well over 3 billion USD, to accommodate the predicted population of 40,000 permanent inhabitants and 50,000 daily visitors. It comprises a mix of different types of properties, such as residential, business, hospitality, and retail (AID, 2016, 2021 b, 2021a; R.Omari, 2014).

Previously used for military purposes, Abdali is now the largest plot of land available for private investment in the city of Amman. Abdali Investment and Development AID company on their website (AID, 2021 b) claims that the Abdali redevelopment project secured the construction of pedestrian-friendly road systems and traffic management strategies within and around the development to facilitate the daily flow of around 100,000 residents, workers, and visitors once the project is fully operational. Overall, New Abdali establishes a modern downtown that was

previously lacking in Amman. This will accommodate both lifestyle and business needs, with promises from the government to increase job prospects, as well as the stimulation of an unparalleled flood of capital coming from Jordan and the neighboring area. (Bagaeen, 2006).

## **Methodology**

This research employs Topic Modeling as part of text mining for performing qualitative data analysis, also known as text data mining or knowledge discovery from textual databases, which is an extension of data mining to quantitatively process and analyze the text data (Hotho, Nürnberger, & Paaß, 2005).

## **Data collection**

Concerning the data used for this research, we collected data through web-scraping for those that we couldn't download (PDF, WORD, etc), we did so using different python libraries, for example for news articles, we used the python package Newspaper3k, twitter, etc., each data sources use a different package., the rest of the data were either download directly, for example, research articles, or publications, etc., Our search for data was purely guided by two things, the time frame, and the subject matter, that we looked for dates published between 2004, the initiation of the Abdali project and now, the other criteria of subject matter was guided by the keyword search in table one below. After data collection, we eliminated materials that were not related to our research by skimming through each document, while skimming through we searched for an unrelated text that is text not strongly related to gentrification or core issues like policy and investment of the Abdali project, most of the text eliminated were from the Twitter, for example, the post announcing a conference not relating to the development of Abdali.

## **Data analysis**

### **Data preprocessing**

After a rough screening, the next aspect was cleaning the data and preparing it for text mining, but before that, we had to combine the data into one data set.

For that date cleaning and preprocessing, we were largely aided by python libraries such as Natural Language Toolkit Library(NLTK)(Bird et al, 2009) which contains built-in tools like the Porter stemmer(Porter,1980,2001), clean-text, Gensim(Reburk and sojka,2010), through these packages we performed the following task: removing stop words(DiMaggio et al 2013), removing punctuations(Guo et al 2016), lemmatization and part of speech tagging, removing terms with numbers and non-numeric letters(Jacobi et al 2015), tokenization and stop words(Newman et al 2006), removing tweets with less than 3 words(Zhao et al 2011), HTML tags(Koltsova and Koltcov 2013), removing words with only a single letter or number(Levy and Frankling 2014), replacing hyphens with space character (Rauchfleish,2017).

We did some of the cleaning techniques above partly due to the nature of the data we were using, such that blog posts, tweets, etc. After the data cleaning, our data was ready for the applications of data mining algorithms, in this study, we adopt topic modeling as a text mining technique capable of extracting topics from a large corpus, through topic modeling, we can extract the hidden thematic structure of a large corpus(data). This is exactly what we needed to attain the aim of our paper, which is using text mining to extract factors that supports the Abdali project to be state-led gentrification. This can be done manually by reading through documents one by one, a labor-intensive activity, text mining here will automatically in a very short space of time enable us to attain this same labor-intensive activity.

## Model

Over the years different text mining algorithms (mostly probabilistic) have been proposed for example LDA (Blei et al.,2003), and PLSA, recently D.Angelov (2020), proposed a new model called "top2vec", due to its recency, strives to avoid the weaknesses of previous models and based on that a more sophisticated tool was built leveraging the most recent and efficient tools in NLP such as UMAP, HDBSCAN, etc. Top2vec was recently developed, it's a topic modeling algorithm that generates jointly embedded words and document vectors, it clusters these. We choose top2vec because, it has a track record of being more appropriate in finding information and representative topics in a text document, with top2vec, topics generated can be used to extract the text(sentences) that relates to that topic from a document. Top2vec can be implemented using the following 5 steps:

The first step or first thing to do is to convert each input document and word to vectors using Doc2vec(Le and Mikolov,2014), BERT sentence transformers (Vaswani et al,2017), etc. Through that semantic contents of the document are captured, and these vectors, are in a high dimensional space, for dimension reduction which is the second step, used UMAP(McInnes et al,2018), this helps reduce the numeric representation into a lower dimensional space, this enables the next step, which is clustering, clustering here is done using HDBSCAN(Campello et al, 2015), it helps greatly in the topic generation process. Once the clusters are obtained, a centroid of each cluster in the original high dimension is calculated, this is known as the Topic vector, the final step focuses on finding the n-closest word vectors to the resulting topic vector. All these steps give top2vec a high-performance ability to detect topics matching the document, for more detailed explanations see (D.Agelov 2020).

## Conclusion and Interpretation of results

First, We employed a bag of word (BOW) model using libraries such as Spacy, and Gensim(see figure 1), the previous data cleaning was mostly done to extract the bag of word model, as for top2vec, the package automatically takes care of data cleaning, so we use our original text when performing topic modeling with top2vec. The BOW was performed just to see the frequency of words in our corpus, but this was not so useful in our task of getting a text that justifies state-led gentrification activities in the Abdali project. to do this we implanted the top2vec topic modeling approach. Appendix 1 shows an excerpt from our python script, amongst the different things you could do with the top2vec package, the "search\_documents\_by\_topic", a function that was so useful in helping us attain our objective. It uses the semantic meaning of topics to automatically

We next move to our focus, which is topic modeling applying using the top2vect approach. From table 2 below, Following the definition of gentrification by Evans and Jones (2008)" Gentrification is about attracting new people and new business to run-down areas, where the wealthy population will attract investors. At the same time, public bodies negotiated the development to provide some affordable homes, subsidized services, and other social benefits" the key features of state-led gentrification extracted from the literature, we simply match the topics extracted through top2vec, to those features based on their similarity.

Top2vec enables the grouping of individual topics by their numerical corresponding value. As illustrated in our python script Appendix 1, we extracted the first 10 documents semantically linked to topic 0(in python programming vectors start from 0,1, 2.etc), the model, "spits out" the top 10 documents, most similar documents in the cluster starting from the centroid of the cluster and moving outward.

Each document is identified by a number and a score, the score simply shows how similar that document is to the cluster. The lesser the score, the less similar and far from the centroid of the cluster. We extracted just 3 documents (i.e. 4724,1025,740) in our appendix for illustration purposes, carefully looking at the scores, you will realize they are in descending order from the centroid of the cluster. In our case the difference between the first 3 topics is minimal, this is due to their degree of similarity, we realized, the above documents were derived from the same story, narrated by different authors.

We print the most relevant topics and their corresponding documents, with this we match the topics and the documents to the predefined feature of state-led gentrification in table 2, once again we selected documents closer centroid of the topic cluster. The outcome of this process gave us table 2, a summary of excerpts from a large text date, about state-led gentrification.

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## Illustrations and tables

Data Types	Sources	Searched Keywords	durations
Newspapers, online conferences, seminars, websites	Jordan Times, 7iber, The Daily Star, <a href="http://www.abdali.jo">www.abdali.jo</a> , <a href="http://www.mawared.jo">www.mawared.jo</a> , Magazine for the Real Estate Sector in the Middle East	Search on Keywords, such as Abdali project, boulevard, Greater Amman Municipality (GAM), Abdali, The Daily Star, <a href="#">Qger</a> Jordan, al Abdali Regeneration project, The Abdali Central Business District, Metropolitan Growth Plan (using a Jordanian IP address)	From 2004-present (The initiation year of the Abdali Project)
Research Journals/books	Urban Affairs Review, JOURNAL OF URBAN AFFAIRS, Middle East Critique, Routledge, etc.	Amann, gentrification, urban regeneration, state-led gentrification, neoliberalism	From 2004-present
Social media	Twitter, Facebook, YouTube	Search on Keywords, such as Abdali project, Zahran Boulevard, Greater Amman Municipality (GAM), Abdali, The Daily Star, <a href="#">Qger</a> Jordan, al Abdali Regeneration project,	From 2004-present
Official documents and reports	Abdali Plan Handbook Amman Master Plan PMU CIS manual Metropolitan Growth Summary Report The Amman Institute for Urban Redevelopment Report	<a href="#">CIS</a> (corridor Intensification Strategy) MAWARED (National Resources and Development Corporation) PSC (Abdali Investment and Development) AID (Abdali Investment and Development)	2007-2009

**Table 1.** Data Summary (Sources: Author's compilation)

Key drivers Category	Codes & subcodes in Literature, reports & media	Topic Modeling extracted topics	Sample Sentence automatically extracted from Our data set corresponding to Topics (note this was also aided by Top2Vec' command >> <a href="#">top2vec_model.search_documents_by_topic</a> )
<b>facilitator state role</b>	<ul style="list-style-type: none"> <li>Expropriations- demolition</li> </ul>	GAM, Law, regulatory, restrictions, body, prevented, land, confiscate, The municipality, appropriate	<p>"In short GAM used its authority to appropriate land and disperse previous forms of socioeconomic behavior that populated Abdali. The coercive arms of the state were deployed to quell public outrage and to facilitate the empowerment of its "private" partner, the Abdali company, over tenants and occupants." <a href="#">Hanshaw</a> and Ryan</p> <p>"According to Jordanian law, the government can only confiscate land if it is for projects of public benefit. To get around this, the municipality published a map showing that the land to be confiscated will be used to open a street and for parks. <a href="#">Fahed Fanek</a> wrote a commentary practically dismissing the municipality's claim that the confiscation is for public benefit. The municipality in term responded by insisting that the confiscation was necessary for expanding the road system in the area" <a href="https://www.7iber.com/2007/08/talal-abu-ghazaleh-and-the-amman-municipality/">https://www.7iber.com/2007/08/talal-abu-ghazaleh-and-the-amman-municipality/</a></p>
	<ul style="list-style-type: none"> <li>Tax exemptions (Reducing the building, lands tax and evacuate land tax by (50%)</li> <li>Incentives</li> </ul>		<p>"MAWARED was formed in 2001 as an entrepreneurial arm of the Jordanian military and was soon tasked with selling military land to private companies."</p> <p>"An analysis of the investments in the Abdali project, for example, reveals that the state provides large-scale subsidies for the business elite of the region to create such flagship or mega-projects of urban restructuring. Contrary to formal declarations and propaganda of the state essentially advocating its disappearance, it is very clear that the state is still very present, heavily involved, and there to stay (Daher, p. 2008). The financial contribution of the state is considerable, with prime urban land made available at very cheap prices forming a greater part of the subsidy." <a href="#">Hanshaw</a> and Ryan</p> <p>"Other forms of subsidies include tax exemptions, infrastructure provisions and the elimination of all barriers and red tape in addition to the passing of favorable building regulations and zoning ordinances (e.g., greater building heights, increased floor area ratios and flexibility in zoning ordinances) (Summer, 2005; Daher, 2008)"</p> <p>"The PSC benefitted greatly from its partnership with the state. It exploited its links with the regime to form site-specific regulations like tax holidays for investing partners and developers, eliminate 'red tape,' remove GAM-imposed height restrictions on buildings, and suspend duties and fees for imported material in the development process" -Hourani, "Urbanism and Neoliberal Order;" Interview with Rami F. Daher, 21 March 2018</p> <p>"Amman, May 11 (Petra) -A Cabinet session held Wednesday, headed by Prime Minister Dr. <a href="#">Bisher Khasawneh</a>, approved the renewal of special exemptions granted to Abdali Investment &amp; Development and its subsidiaries, as well as other businesses investing in the company for 2 years." The decision also included reduction of the building and land tax and the vacant land tax by 50% for projects operating within Abdali project." <a href="https://petra.gov.jo/Include/InnerPage.jsp?ID=42551&amp;lang=en&amp;name=en_news">https://petra.gov.jo/Include/InnerPage.jsp?ID=42551&amp;lang=en&amp;name=en_news</a></p>

supportive state role	<ul style="list-style-type: none"> <li>▪ Infrastructures &amp; amenities inside the Abdali project</li> </ul>	<p>"State-of-the-art technology and environmentally friendly design promote Abdali as the future of Amman. It signals to the world that Jordan is open for business, while at the same time, it is reforming its economy to encourage private sector growth and foreign investment."</p> <p><a href="https://www.anthropology-news.org/articles/t">https://www.anthropology-news.org/articles/t</a></p> <p>"The area already hosts and will further host nearly all of the tallest buildings in Amman, including the current two tallest completed buildings of Amman which are Amman Rotana and W Amman."</p> <p><a href="https://en.wikipedia.org/wiki/New_Abdali">https://en.wikipedia.org/wiki/New_Abdali</a></p>
	<ul style="list-style-type: none"> <li>▪ GAM/Amman Municipality supportive role</li> </ul>	<p>"(GAM) put a "hold" on all the land to make it difficult for the landlords to sell unless they are willing to sell it for the investors. Shortly, these holds were transferred into acquisition. Justification: Public interest. to provide proper vehicular access in the area."</p>
	<ul style="list-style-type: none"> <li>▪ Roads Network and intersection</li> </ul>	<p>MAWARED immediately sold half of its shares to the Rafiq Hariri-owned Saudi Qger as a partner in the Abdali Regeneration Project to create a new, centralized downtown for work, play, and leisure -Parker, "Tunnel-Bypasses and Minarets of Capitalism,</p> <p>"These towers imbue the Boulevard with a distinctly modern character and architecture; the Rotana Tower is now the tallest building in Amman. The built environment of this space is designed as a consolidated place where individuals can find all the amenities they might need. According to the elites' vision, it is this consolidation of activity that will make Abdali the "New Downtown." <a href="#">Hanshaw</a> and Ryan</p>
	<ul style="list-style-type: none"> <li>▪ Displacement/Moving of the Abdali Busterminal and Friday market from the nearby</li> </ul>	<p>"In 2014, GAM decided to move the market outside of Abdali to provide parking spaces for the new project. Despite protests and vigils, with banners pronouncing loyalty to the King and pointing out the importance of the market to their livelihoods, the decision to clear the site went forward."</p> <p>"the riots were a continuation of protest that began on Friday when the Great Amman Municipality (GAM) began removing street stalls</p>
		<p>from Abdali to turn the area where the weekly flea market has been held into a parking lot"</p> <p>Jordan times-oct 11,2014-street vendors clash with security forces over Abdali market move.</p> <p>"In August and September, the Municipality began to talk about what they planned to do with the site that the Market has occupied. According to nearby business proprietors, there has been discussion of developing this site – without progress – since at least 2007, when the Abdali Bus Terminal was moved." What is Behind the Abdali Market? Move November 26, 2014-<a href="https://www.7iber.com/2014/11/what-is-behind-the-abdali-market-move/">https://www.7iber.com/2014/11/what-is-behind-the-abdali-market-move/</a></p> <p>"Abdali Military Camp (the Jordan Armed Forces (JAF) Headquarters and the General Intelligence Department) was relocated and allowed for a new transformation of the area. The state had announced for investment invitations" Abdali urban regeneration project power of place</p>
entrepreneurial state role	<ul style="list-style-type: none"> <li>▪ <a href="#">Mawared</a></li> <li>▪ Abdali Company</li> </ul>	<p>"Abdali Investment and Development (AID) was created as a Public Private Partnership (PPP) master development company with an estimated value exceeding USD\$5 billion. It was established in 2004 as a partnership between the National Resources and Development Corporation (MAWARED) and Horizon International for Development Ltd. <a href="#">Co.This</a> joint venture expanded when United Real Estate Company - Jordan, under the group of Kuwait Projects Company(KIPCO), became a partner." <a href="https://www.theabdali.com/about-us">https://www.theabdali.com/about-us</a></p> <p>"Abdali PSC is the result of a partnership between The National Resources Investment and Development Corporation (MAWARED) and Horizons International Development."</p> <p>"Begin with the anatomy of Abdali PSC, the institutional expression of the public-private partnership. The representative of the public sector is <a href="#">Mawared</a>, a military parastatal founded in 2001. Its role, as an "autonomous" developer, was to contribute cleared land and infrastructure</p>



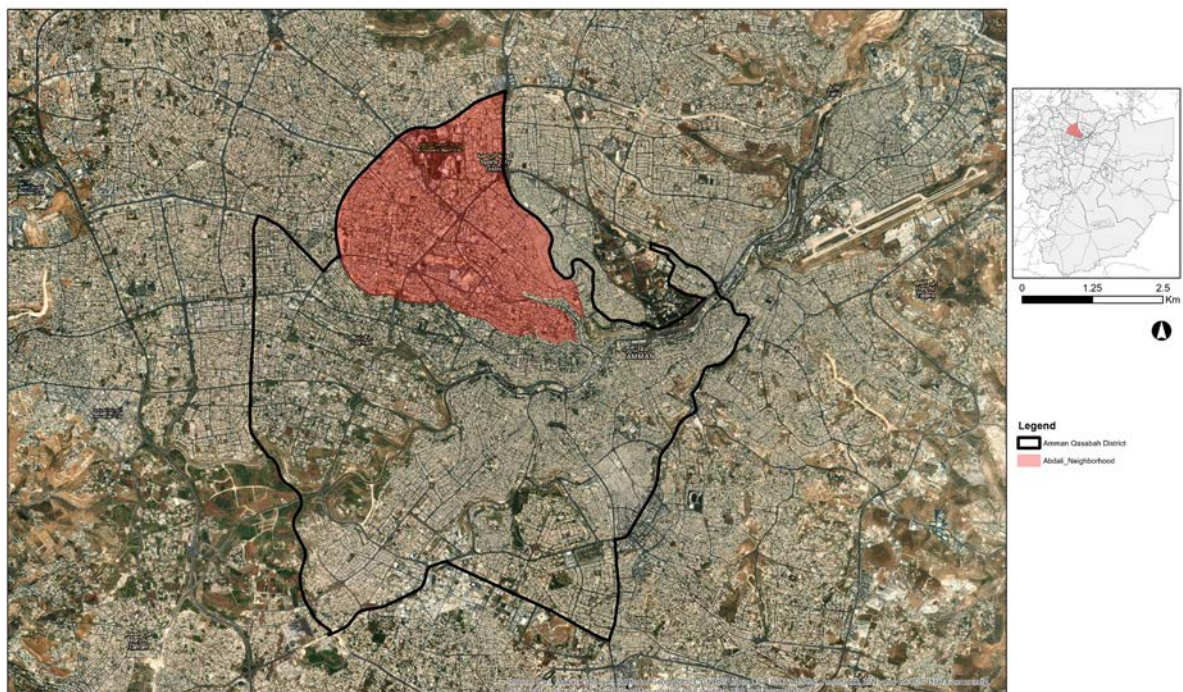
		<p>costs to schemes such as the <u>Abdali project</u> (Bagaeen, 2006; Cronin, 2008). The private sector investment was initially limited to <u>Qeer-Jordan</u>, a subsidiary of <u>Qeer-Saudi Arabia</u>, one of the region's largest multinational contracting firms. <u>Mawared</u> and <u>Qeer</u> participated equally in the <u>Abdali Investment and Development Corporation</u> (Abdali PSC). One year later another regional investor, the <u>Kuwait Projects Company (KIPCO)</u>, which boasts multinational holdings in financial services, banking, and real estate, joined to make it a tripartite venture (<u>MEED</u>(Middle East Economic Digest (MEED)), 2005)." Hourani 2014</p> <p>"<u>Mawared</u> is a financially and administratively independent state-owned corporation leading Jordan's drive towards urban regeneration and inner-city development. The company is in the process of developing sites and camps for the Jordanian Armed Forces. Its New Abdali downtown project is considered to be the largest integrated development project in the heart of Amman, covering 384,000 square meters". <a href="https://www.forbesmiddleeast.com/lists/top-real-estate-developers-in-mena/the-national-resources-investment-development-corporation-mawared/">https://www.forbesmiddleeast.com/lists/top-real-estate-developers-in-mena/the-national-resources-investment-development-corporation-mawared/</a></p> <p>What is clear is that the 'private' Abdali PSC is not entirely private. It is, in an indirect sense, a publicly owned company with links to the military establishment, the Royal Court, GAM, the Hairy, the Kuwaitis, and the royal family.</p> <p>"The PSC was able to bypass ordinary working procedures; for example, as opposed to working through the regular building permit bureaucracy, the PSC could receive immediate permission on a permit from the head of GAM-General Amman Municipality, "Special Regulatory Provisions for the Abdali Project Area."</p> <p>"Abdali Public Shareholding Company (PSC) is an entrepreneurial "public-private partnership" for which the government, through its representative, National Resources Investment and Development Corporation (known locally as <u>Mawared</u>), provides the land, and three "private sector partners" provide start-up capital." Hourani (2014)</p>
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interventional state role	<ul style="list-style-type: none"> <li>Privatization partnership</li> </ul>	<p>"Privatization" of state land provided the ruling regime with a ready excuse to absolve itself of demands for participatory planning while also allowing for intimate involvement in the land's subsequent development. This is most readily seen in the creation of the Abdali Private Shareholding Company (PSC)"</p> <p>"A public-private partnership does not represent a withdrawal of state power from the economic realm, even if it operates, as Abdali PSC claims it does, as a "privately owned master development company" (<u>MEED</u>(Middle East Economic Digest (MEED)), 2005)" Hourani 2014</p> <p>"Under the prudent leadership of H.M King Abdullah II, Jordan has embarked on a set of financial and judicial reforms aimed at encouraging larger involvement of the private sector and transforming the role of the government from that of a domineering actor in the economy, to that of a regulator and ultimately a stimulator in competitive markets providing a level playing field for the private sector to lead the process, as well as attracting foreign direct investment. To this end, the Government of Jordan has initiated a rigorous privatization program aimed at freeing up tied investments and labor, inculcating business incentives and motivation, attracting foreign direct investment, and developing the financial market. Since 1998, ten privatization transactions have been completed and many more are in the pipeline. The new Privatization Law stipulates the use of privatization proceeds to repay loans owed by the privatized firms to the government and finance economic and social development projects" (MAWARED, 2010a)</p>
	<ul style="list-style-type: none"> <li>State planning</li> </ul>	<p>The continued fusion of political and economic power within the context of contemporary neo-liberalization in Amman indicates that what has taken place over the last 20 years of "market reform" is not a shift from state-led to market-led development, even though the discourse of market reform has been central to its justification" Hourani 2014</p>



		<p>"Parker (2009, p. 116) stated that the Master Plan uses different techniques to represent regulatory diversity within a scheme of unity. The Master Plan notably "scales up the various spaces of exemption and privilege by creating a 'one-stop shop' (single window approval process) that allows investors to browse and compare between investment opportunities in spaces under GAM jurisdiction." Daher(2013)</p> <p>"The Abdali project represents a clear realization of neoliberal urban restructuring and is facilitated by the State's socio-economic transformation program. The project, boosted by the State's concentration on economic prosperity and encouragement of international investment and turning its back on Amman's original downtown just 1.5 km away, is likely to lead to urban geographies of inequality and exclusion and spatial and social displacement" Daher 2008</p>
	<ul style="list-style-type: none"> <li>▪ CIS manual (corridor intensification strategies)</li> <li>▪ HDMU high-density, mixed-use real estate projects</li> </ul>	<p>HDMU projects are mega-projects financed by multinational investors, typically located in urban cores where they can catalyze economic development figure 11. According to the official resources, these initiatives are all about boosting the economy and improving the lives of citizens. Opponents of these projects, however, argue that they serve primarily the interests of a select few, rather than the public at large (Abu-Hamdi, 2017)</p> <p>the Corridors Intensification Strategy (CIS) is a plan that provides development policies, strategies, and guidelines for application along important traffic corridors in the City of Amman. Following the Interim Growth Strategy (IGS), the CIS continues to introduce essential aspects (Road Hierarchy, Transit Corridors, Zoning Guidelines, and Development Charges) that will become permanent in modified form in the MGS and the new Amman Master Plan.</p>

**Table 2.** Characteristics of state-led gentrification In the Abdali Project and Text Mining extracted Topics and quotes.



**Figure 1.** Map of Amman's (Qasabet) showing the Abdali district and the Abdali Project( by Authors).



## The new form of the old city. The case of Les Halles, urban reasons and project's choices

Claudia Angarano

Dipartimento di Culture del Progetto. Università IUAV di Venezia, 191 Sestriere Santa Croce, 30135 Venezia.

E-mail: [cangarano@iuav.it](mailto:cangarano@iuav.it)

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**Abstract.** *This essay aims to focus on the tied duality between the study of urban morphology and the project. Antonio Monestiroli's project for les Halles in Paris seems specifically appropriate in relation to this theme, proving how thinking of a new form for urban places can be a possibility also in stable contexts such as the historical ones. And how as well, starting from urban analysis, it can be possible to propose a new form for central places of the modern city, way differently concerning the elements of their definition and their dimension but fitting for the reference context. In this case, starting from urban reasons, the project appears in continuity with the existing, but it also proposes a transformation which tries to assume relevant places and elements from the historical city as parts of the project, in order to recompose them together with new elements in an original system of connections able to define the quality of the project for itself and to enhance the characters of the urban landscape. A project which seems still extremely current for its purpose, that is the capability to specify the urban places of the contemporary city, with its historic center, its next expansions and its peripheries as well, and to define their quality and their character through architecture, in such a way to shape its significant places within a complex system properly to a different idea of building the form of the city but appropriate to the entirety of the present urban phenomena.*

The project for Les Halles area in Paris is made for the occasion of the international competition in 1979, concerning the architectural definition of that part of the city which held the market pavilions designed by Victor Baltard. The area stands in the "belly of the city", according to Émile Zola, in the topographic centre of the city, near Place du Châtelet, where the north-south axis and the east-west one of the Grand Croisée by Haussmann intersect each other. In this system, les Halles area has historically had a central role within the urban form, not only for its geographical position (Figure 1). The years following the Revolution in 1848 represent the period of maximum transformation of the city of Paris, a process that engages into Les Halles as well. Indeed the area, since 1842 is in the main subject of many debates regarding its urban and functional role.

The construction of the twelve pavilions by Baltard, ended in 1936, sets off the area as the market place of the city and as the huge food centre in the world. In the following years the whole city changes radically. This is the period of Haussmann's intervention with the opening of wide boulevards, which with the aim to decongest and give an order to the urban structure, takes relevant modifications with inside the gothic pattern. Those modifications concern Les Halles' area as well, which had the same problems in terms of urban disorder. In 1965 the City Council established the transfer of the market from the city centre to Rungis and to the peripheral area of La Villette and, in the mean time, to make the regional underground transport, the RER, pass through the area. Those choices set off the downfall of this area, up to the demolition of the pavilions in 1971.

This way, the destiny of the area is completely overturned, from urban reference point with a clear identity to a simple intersection point of the public transport line which linked Paris with the suburban parts of the city. In any case, the demolition of the halles, despite criticism, brought the opportunity through the competition to think again of the architectural definition of this huge void in the inner part of the city. This was a matter related to the place itself and to the city in general, made fascinating and complex as well by the relationship with an exceptional monumental context just like the historical pattern of the centre of Paris.

The city of Paris, perhaps way evidently among the other european cities, displays an urban structure in its historic part organized on a system of monumental places built by huge voids which open up inside the compact city. This system, with a simplification, is composed of two ways to shape the open space, which coexist but which are different in term of measure, form, principles and elements of definition, meaning related to the city (Figure 2).

The first one follows the principle of the enclosure; it defines in a clear way the physical boundaries of the open space. The principal references in this case are the royal places of the XVII century. Instead the second one, based on a principle of linear composition, shapes the void towards the construction of long perspective axis which meet along their development some elements and exceptional parts of the urban structure, which measure and define at the same time, through their rhythm, the open space. This way takes its origin from the tradition of the french gardens of whom Versailles is the first reference.

To the first type belong the enclosures of Place des Vosges, Place Vendôme, Place Dauphine and the courtyard of Palais Royal. They stand as exceptions within the urban pattern and define a punctual system of relevant places. In these cases, the quality of the open space is represented by difference from the compact historic city that marks its boundaries. The inner void, completely defined by residential buildings, has a measure that is referred to the scale of the built environment comparable to the one of the plazas of the historic city. Indeed its form, in opposition compared to the context in which it stands, is defined by clear geometries - the square in Place des Vosges and Place Vendôme, the rectangle of the courtyard of Palais



Royal, the triangle in Place Dauphine.

Then, for being shaped with the only residence, following the principle of the forum, the open space become unitary thanks to an unifying element (the colonnade of the garden of Palais Royal, the internal facades of the buildings in Place des Vosges, the uniform built curtain of Place Dauphine and Place Vendôme). The result is the definition of a circumscribed and introverted place that keeps out any relationships with the outer space, in which the homogeneous facades of the surrounding buildings turn into the stage of the formal representation system of the city in those points.

On the contrary, to the second principle are referred the complex of Louvre-Tuileries-Champs Élysées, Champ de Mars and the Invalides' Esplanade. Concerning these places, one of the most evident difference from the previous ones is the relevant leap of scale of the open space defined this way. Its dimension takes the measure of the natural environment rather than the one of the built. For the same reason, the form of the place is no more tied to the precision of the fenced space to open itself up to the relationships with the surrounding landscape. The linear compositional principle, on which the construction of these places is set up, in fact dismantles the centrality and, consequentially, the homogenous form of the space, to organize a sequence of spaces which defines and measures these places in their whole extension.

The optical relationships, get with the definition of these long radius perspectives, bring the system back to unity despite its complex articulation. In this way, it is composed on the variety of its parts and of the elements which it is made of. This is a manner of definition of the relevant places of the city which is typical of the transition from the "closed city" to the "open one" which, referring to the design of garden, brings back in its construction the natural element and its compositional rules as well inside the urban structure. In these so built places, another crucial change, regarding both their shape and their character and role, concerns the singularity of their elements of definition. This happens because the spatial limits move from physical to visual ones. That is the quality of the open space is specified no more by its boundaries, but by the compositional tension generated between the elements placed along the perspective set up on the axis, which serves as the backbone of the entire composition, showing differences of course from place to place also internally of a unique system. In this sense the complex Louvre-Tuileries-Champs Élysées is the most emblematic example in the city, and complicated as well, of this way of shaping the open space based on a linear principle of composition. Indeed, along the development of the axis, different places but each one defined in itself follow one another in a series - the courtyard of the Louvre, the gardens of Tuileries, Place de la Concorde, the Champs Élysées, until they visually stop in the Étoile. The elements of definition are collective buildings, buildings of the Institutions or also punctual elements which give to these spaces a relevant urban propriety, such as the Triumph Arc or the obelisk in Place de la Concorde.

The quality of openness of the space, together with the character of the architectures, marks the variation of meaning of these voids which display themselves within the urban structure. They move from systems of simple formal representation such as the royal places, to collective places, relevant places defined as space of relationships, opening themselves toward the built environment and interjecting in their inside connections at a distance with the other exceptional elements and parts of the city (Figure 3). The complex Louvre-Tuileries-Champs Élysées is still the most relevant in this sense. It holds within it some other axial systems, hierarchically subordinate, which bring inside the structure of the main axis many relevant urban elements, getting back relationships at a distance with some parts over the river. This is the case of the direction which links the Orsay's Museum to Place Vendôme, as well as the one that links the Borbone's Palace



to the Madelein Church passing through Place de la Concorde and the axis that changes into the main one of the Invalides' Esplanade. In this way, the open space becomes the "breaking element" in the continuity of the built environment and, at the same time, the place of the points of view of the inner parts of the composition and of those parts of the city which overlook the place, with the possibility to return some renovated relationships in order to define a new urban topography.

Monestiroli's project makes a synthesis of these two spatial conditions and brings the attention on the principles and the rules of construction of the significant places of the modern city according to a double order of matters: on one hand the relationship with the compact city built of dense blocks and, on the other, the reference to the idea of the open city built in the nature (Monestiroli, 1997), already developed by the masters of Modern Architecture, as a possibility to give quality and recognizability to the collective places of the city. The case of Les Halles was in this sense an extraordinary occasion to try to give form with architecture to a crucial place of the city rethinking its urban meaning. Indeed the unclearness of the announcement opened up to a free interpretation concerning the problem of the definition of the new "central places" of the city, in its historical part in this case. But how to do it, by means of which elements and especially according to which principle of composition?

Monestiroli's proposal considers the open space as an element with its own quality worth to be preserved by defining architecturally its limits. In his project the theme, that is the definition of a modern plaza, has a complexity which is referred not only to the specific case but it concerns the scale of the city.

The project area specified in the announcement stands inside a rectangle defined by four streets - rue du Louvre, rue Rambuteau, rue Pierre Lescot and rue Berger -, while the one involved in Monestiroli's project considers the importance of this part of the city, both for its position and for the interpretation given to the theme. Indeed it is included between the four traffic ways of the Haussmann's track - rue Etienne Marcel, boulevard Sébastopol and rue de Rivoli - which define the four-sided area assumed as project area according to the urban relevance of this part of the city. The aim of the project is the definition an urban island (Monestiroli, 1997) within the historic centre, that is a part of the city with an appropriate and clear formal identity. That is why the traffic is left out from the area that became exclusively pedestrian. For the same reason the project proposes the demolition of two blocks next to the building of the Bourse de Commerce and of four other blocks on the east side of the area, in order to define a place included between the two arterial roads of rue du Louvre and boulevard Sébastopol.

The disposition of the designed architectures, composed together with the objets trouvées of the historic city, follows the idea to build a place in which the open space becomes the principal element of the composition. How to give an architectural form to this huge free space, that is a recognizable quality to the place, this is the problem that the project tries to give an answer to.

The main idea is to place a large field in the inner centre of the city. This field, 600 meters long and 100 meters wide, takes on the character of a modern plaza, both for its measure and for its nature, within the historical pattern (Figure 4). As the first operation to define the place, a freestanding new Auditorium is placed in line with the Bourse de Commerce, freestanding as well. In this way, the two collective buildings, thanks to the relationships they establish each other, measure the huge void and specify the link between the whole open space and the border streets.

The place is so characterized by the large field which contains the two halls and defines the

quality of the place. Its rectangular shape marks with geometrical precision the hierarchically prevalent role of this central space. The long borders of this field, on the north and the south sides, are defined instead by some linear residential volumes which delimit, together with some existing elements, the central place of the project. Despite the clear delimitation of the field, these volumes are arranged so that they don't exclude any relationships with the next parts of the city. Indeed, their length, the points they interrupt and the measure of these interruptions depend on the surrounding built environment with the different characters of those parts overlooking the central void.

Then these buildings, in the composition with the elements of the monumental pattern, give form to other secondary places put in continuity with the principal one. The north part of the area is characterized by the presence of the church of Saint Eustache, overlooking the field with its most beautiful gothic facade. Thanks to its slight rotation compared to the limits of the central field, the direction of the rue Turbigo of the track by Haussmann merges into the central field. This direction intersects, exactly on the apse of the church, another important way, so the rue Montmartre of the ancient track. Next to this exceptional point of the urban structure, both arrival and departure point of these two ways, it stands a couple of towers, which brings back in the composition a system of relationships at a distance. The fact they are two and parallel to each other, in addition to mark a strong axuality that recalls the rue Montmartre bringing it back to the project, states the presence of a place in that particular point between the towers. The towers, built as twins of glass and iron, take on the character of a urban gate in that point, clarifying their leading role within the whole composition, as a reference point at the scale of the city which identifies the central field in different ways depending on the direction of approach to the area. Then, due to their disposition, the towers define together with the longitudinal facade of the church a secondary space in the figure of a trapezoid, different and with its own identity, in relation to the central field but in direct continuity with it.

On the south limit, instead, the area is characterized by the presence of a series of streets, parallel to the direction of Pont Neuf, which intercept one of the most beautiful historic streets of Paris, so that rue Saint Honoré that continues in rue de la Ferronnerie, where an important residential building for its architecture divides it from the Innocent's plaza. The six residential volumes of the project, put in correspondence of this part of the city, stand horizontally to the central field, in order to define its limit but keeping the quality of openness of the space. Their disposition and their shift from the line marked by the residential volumes parallel to the long borders of the field specify a minor space which assumes the role of a threshold over the central place of the project and that part of the city that, through the void between the volumes - as in the case of the twin towers -, overlooks the field and, in this way, becomes part of the main composition.

The large central field could be defined even without the residential buildings parallel to the long sides of the green rectangle, because according to Monestiroli the project could stop here, in the sense that the borders of the field could be defined by the existing residential blocks which overlook it with the rental houses and their standard height and their homogenous facades (Monestiroli, 1980). Their presence responds essentially to the requests written in the announcement, however their construction with the homogenous facades and the same height of the blocks they cover does so that the place becomes a modern forum, a wide free space, delimited but open at the same time, defined by the visual east-west axis identified by the compositional tension between the two collective halls and by these linear volumes on the opposite sides, which emphasize the extended figure of the central place while having the role of an unitarian element such as the portico in the ancient forum, even if they interrupt in some

specific points to hold within the composition both elements and relevant urban directions. Despite they are not directly tied to the central space, then, the architectures of the project and the elements of the historic city give form to some minor places, separated from the central field but defined in such a way that the open space results articulated in many places, different from each other in quality and measure as well, but without a break (Figure 5).

The residential building on the north-west side, for example, shapes together with the block behind and the entry facade of the church, a triangular space such as a parvis for the church, being interrupted in a specific point in order to built a secondary space for importance but so precisely defined in its form to have its own character. In a similar way, also the two towers define, by means of their architecture and their position, on one hand the reference point at the urban scale, on the other hand they give form to two minor places, one directly tied to the central field and specified by their shorter facades and the head board of the residential volume on the north-east side, and the other one which is measured by the north-east facade of the tower and the two bordering existing blocks. In this way, coming from rue Turbigo and gradually approaching the large field, it is possible to run into a series of different spaces which makes the project defined by a variety of places that specifies the worth of the composition. The last volume of the complex of the six residential building on the south border, delimits then the four-sided space of the Innocent's plaza, freed from the next block on the west side and brought back to its original measure, in memory of the ancient Innocent's Hospital. Also in this case, the residential volume that marks the limit of the field has a dimension such as the Innocent's plaza, so that even if formally defined, it's not separated from the system of the places of the project, getting back at the same time its previous condition before the construction of the halles and restoring the continuity of the rue Montmartre with the ancient Hospital.

Every direction, runout, slipping or interruption - referring to the disposition of the architectures - has a clear reason within the project. The main reason is to establish in the natural void a new system of relationships between the north and the south parts of the city, with the possibility to transfer in this void their particular characters. Thus, the field becomes the place of the points of view (Monestiroli, 1980) of the urban elements, both the ancient and the new ones, which are recomposed in an articulated space with a specific formal quality. So that the elements which give formal definition to the place face each other from the borders of the open space such as characters at a distance and, through their positioning, get back within this wide urban theatre the complexity of the parts which overlook the huge void.

According to this principle, the open space is no more defined, such as in the historic plazas, as needed from the specific function of each building but it contains them and does so that they can represent themselves in it as individual urban facts (Rossi, 1966) through whom recognize the quality of the entire place. The complex of the towers for example, as already said, marks a significant point of the urban structure on the north side of the project, where two relevant directions join up. These two towers though are not placed in the exact meeting point of the streets, but they stand, on one hand, horizontally to rue Turbigo keeping the line drawn by the blocks which define its limit and, on the other hand, they are in the midpoint of rue Montmartre in parallel to it, such as a urban gate for those who reach the place of Les Halles coming from that way, establishing the link with the Innocent's plaza beyond the central field. In this way the system of relevant directions and the characters of these different parts of the city are introjected in the centre of the composition. Still the towers then establish a relationship with another relevant direction insisting in the area on the south side - this time intercepting it - which is rue Pont Neuf. From this way the towers make them visible and always recognizable as a

double thank to their disposition slightly turned compared to the axis of the bridge. In this way they mark the presence of the place defined by the project for those who pass through the monumental bridge, which, crossing the Île de la Cité, ties the void of the project to the void of Place Dauphine in an unexpected system. Concerning the complex of the parallel residential buildings on the south side of the area, their way to overlook the central field is able to mark the limits without physically circumscribe the space. Their form and their disposition break the continuity of the blocks in order to open the space and to establish some relationships with the ancient street of rue Saint Honoré, bringing back into the project its specific characters. In an analogue way, the demolition of those blocks occupying the Innocent's plaza gets back the original measure of the Hospital establishing meanwhile the direct relationship between the field and the plaza, giving form to a spatial articulation which ties the two different ways of shaping the void, - the modern one of the project, which is a clearly defined space but open, and the enclosed one of Innocent's plaza referred to the historical plazas - however keeping their continuity. The interruptions of the residential volumes on the long borders of the field are referred to the aim to open the project to the relationships with the surroundings, acting like two scenes which let the monumental system of the city enter the stage represented by the natural void.

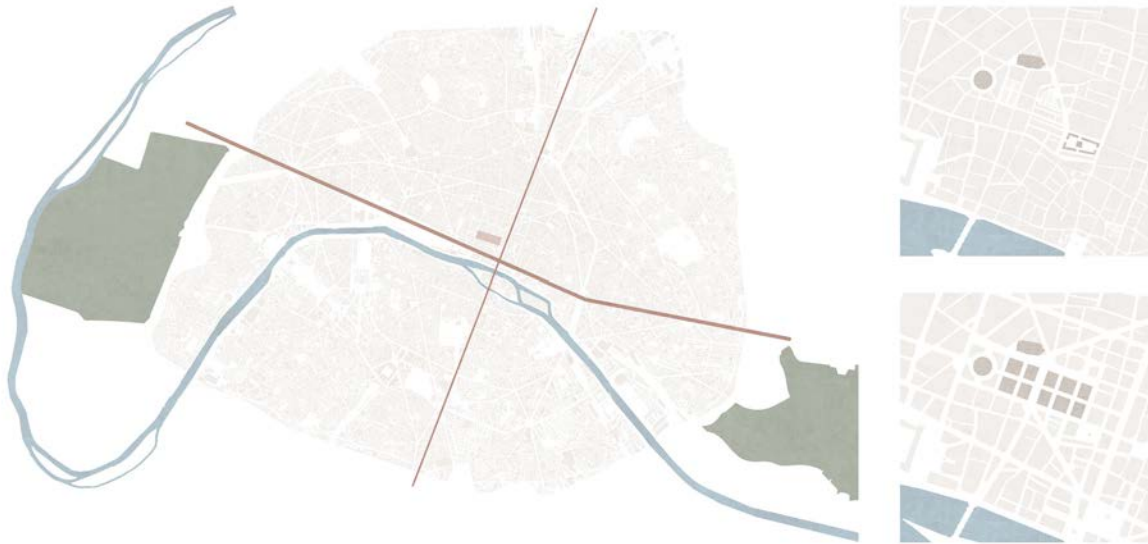
Through these choices the objective of the project is to define a place built as a perspectival place in analogy with the Renaissance scenic apparatus which transfers on the stage the architecture of the city (Figure 6). The city itself becomes a complex system of theatrical places specified according to the principle of the representation of the urban elements. However, in an inverted way as compared to Aldo Rossi's idea of the architecture as fixed scene, this time it is the void within the project to turn into the stage in which the architectures as characters represent themselves and make them recognizable.

In this void the contradictions of the existing city find the right synthesis and in it we can read the dramas of the city and of one part of it among the most beautiful of the monumental system of Paris, which becomes, in this way, taken in the project and, thanks to the project, enhanced at the same time.

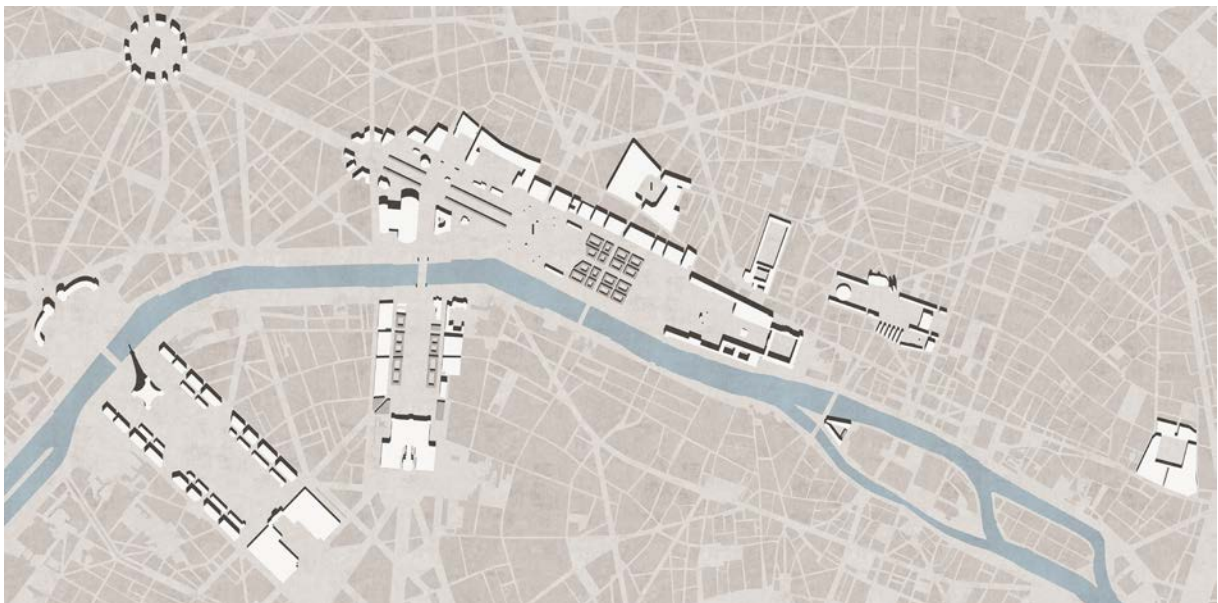
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## Illustration and tables

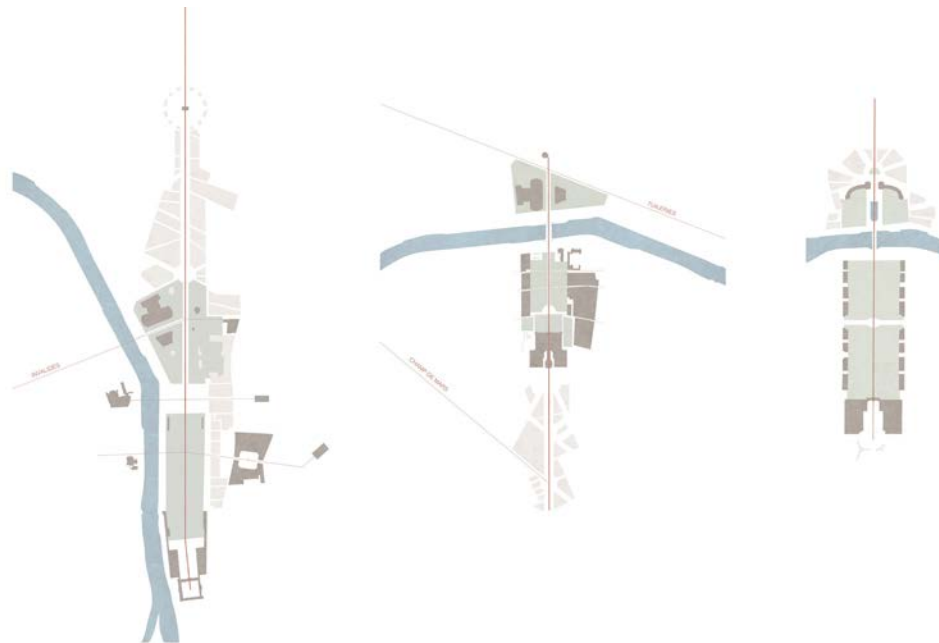


**Figure 1.** The area within the city pattern and its form before and after the building of Baltard's halles.

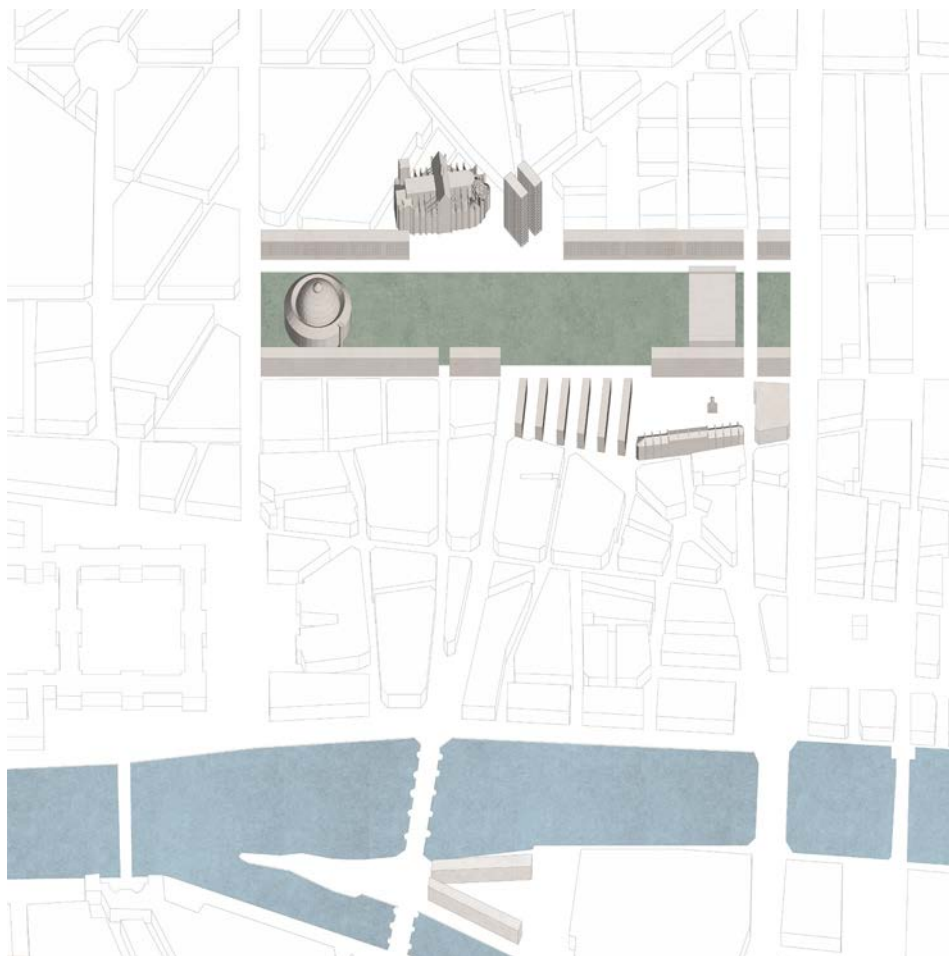


**Figure 2.** The system of the monumental voids of the city of Paris.

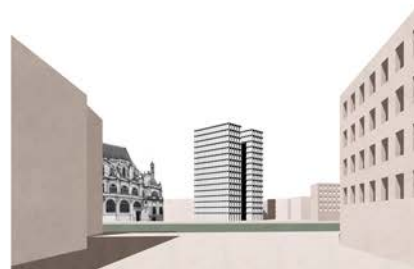
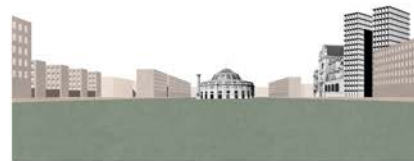
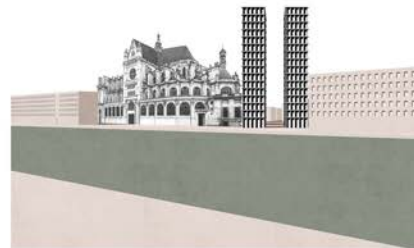
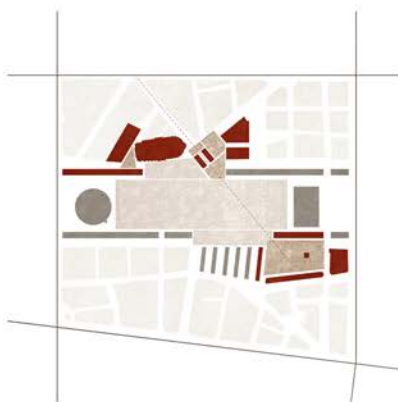
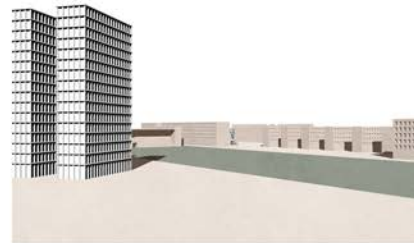
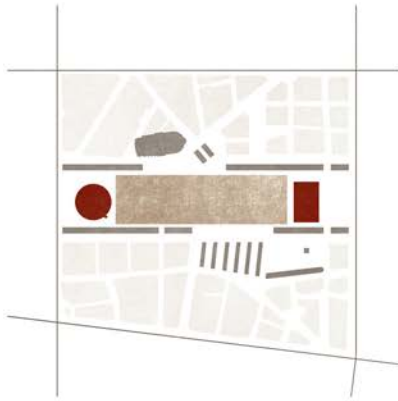




**Figure 3.** (The linear compositions, places and relationships)



**Figure 4.** Monestirolli's project for Les Halles.



**Figure 5.** Articulation and hierarchy of the places defined by the disposition of the elements.





## A GIS-based procedure for residential urban fabrics characterisation

### The case study of Bologna

Anna Chiara Benedetti<sup>1</sup>, Carlo Costantino<sup>2</sup>, Riccardo Gulli<sup>3</sup>

<sup>1,2,3</sup>Dipartimento di Architettura. Università di Bologna. Bologna. Viale del Risorgimento, 2. 40136 Bologna

E-mail: <sup>1</sup>[annac.benedetti@unibo.it](mailto:annac.benedetti@unibo.it), <sup>2</sup>[carlo.costantino2@unibo.it](mailto:carlo.costantino2@unibo.it), <sup>3</sup>[riccardo.gulli@unibo.it](mailto:riccardo.gulli@unibo.it)

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Conference theme: New methods and Technologies for the urban analysis

**Abstract.** The digitalisation process of the urban context by creating 3D-city models/digital twins is significant in supporting sustainable urban planning and development. A digital twin/3D-city model is able to meet various objectives at many scales and spatio-temporal dimensions, serving different disciplines and sectors and offering predictive simulations. GIS (Geographic Information System) is the basis of the City Information Model and is responsible for data collection, interpretation, visualisation, analysis and interaction. In the case study of Bologna, GIS allows to (i) formalise a procedure for the characterisation of the urban fabrics, mainly residential and built between the first and the second half of the XXth century; (ii) visualise density analyses on the territory; (iii) identify a set of urban areas for evaluations at the building scale by integrating data from building permits archival documents for validating the characterisation procedure. The addition of new information layers directly viewed on the territory in GIS software (i.e. energy and environmental performance resulting from Life Cycle Analysis) contributes to the definition of a decision-support tool for urban planning. The simulations of different scenarios and rates of interventions on the building heritage in a predefined time interval aim to support the assessment of decarbonisation goals and to define mitigation and resilience strategies to climate change at a large scale.



## Introduction

The digitalisation process of the urban environment by creating 3D-city models/digital twins is significant in supporting sustainable urban planning and development (Ketzler et al., 2020). Geographic Information System (GIS) is widely used as a supporting tool for municipalities, with the main interest in creating a tridimensional virtual model. In fact, cities are growing and result from the urbanisation process with increasing densification scenarios characterised by expansion on multiple layers, both over and under the ground. For these reasons, bidimensional representations (i.e., maps, cartographies, etc.) are not suitable for representing the cities' network of relations (Spirou-Sioula et al., 2013), and the transition towards tridimensional models is more coherent with the level of complexity of the urban environment.

The City Information Model (CIM) defines the conceptual reference framework consisting of the following layers: data layer, information layer and knowledge layer, and GIS and digital twins/3D-city models are integrated within this system. GIS is part of the data layer, which is the foundation of the framework, while digital twins/3D-city models belong to the information layer, and they both are used by the upper layer, namely the knowledge one, that is intended to disseminate knowledge and to engage the citizens and other actors involved in urban planning processes (Gil, 2020).

A digital twin/3D-city model is able to meet various objectives at many scales and spatio-temporal dimensions (Bolton et al., 2018), and it serves different disciplines and sectors. Some documented uses are solar radiation estimation, energy needs and consumption, classification of building types, 3D cadastre, urban density studies, demographic analyses, urban planning, earthquake damage prediction and seismic vulnerability analysis of the territory (Biljecki et al., 2015).

The study of some open-access 3D-city models allows for defining the necessary steps for developing this research about the characterisation of urban fabrics. The final aim is to identify targeted strategies for renovation/replacement intervention on the existing building stock in Bologna (Italy). The 3D-city model of Helsinki (Finland) is a reality mesh model with two integration: "Energy and Climate Atlas" (Helsinki Energy and Climate Atlas) and "Solar Energy Potential Atlas" (Helsinki Solar Energy Potential Atlas). The 3D-city model realistically represents the urban environment and provides information about the height, the construction year, and the number of floors for each building. The implementation of the "Energy and Climate Atlas" make accessible more detailed data about buildings (built surfaces and volumes, construction year, status: renovated or not, function, location), energy behaviour, water consumption, electricity and district heating. Also, it proposes energy refurbishment interventions with the simulation of several determined scenarios to improve the energy efficiency for a group of buildings constructed between the 1970s and the 1980s in Merihaka, a central residential area of Helsinki. This Atlas was used to estimate the heating demand with the simulation of some intervention scenarios with the final aim of measuring the greenhouse gases (GHGs) emissions reduction in relation to the 2035 zero-emission goal of the city (Rossknecht et al., 2020, Helsinki Heating demand prediction).

Another research work (Mastrucci et al., 2020) proposes a GIS-based methodology to characterise the building stock. This method aimed at estimating the environmental performance of the existing building stock in Esch-Sur-Alzette (Luxemburg) using Life Cycle Assessment (LCA) and defining some intervention rates and scenarios to evaluate the future reduction of GHGs emissions in respect of EU goals. The results' integration within GIS allows for visualising directly on territory the carbon footprint reduction per hectare per year and carbon footprint intensity per square metre per year according to different scenarios. Also, in this case,

the results are distributed on the territory after the definition of a detailed building stock database used for energy modelling and LCA.

These research studies emphasise the importance of having precise and accurate building stock databases consisting in several information packages that can be used for many different purposes. This contribution proposes a GIS-based methodology for characterising the building stock constructed between the first and the second half of the XXth century in Bologna in order to support the definition of targeted intervention strategies.

## Methodology

This contribution is part of a broader research aimed at investigating the advantages of demolition with reconstruction intervention by comparing it with renovation one. The assumption which leads this research work is that in Italy, the majority of existing building stock has been constructed during the period of the booming economy (1945-1970) and does not meet the current requirements in terms of structural safety, fire resistance, energy and environmental performance. These weaknesses depend on the construction techniques representative of that period, and renovation/refurbishment interventions are often not sustainable in terms of cost-benefit analysis. The main interest is the existing residential stock, built in 1945-1970, located in the first urban peripheries of Bologna (Italy) with no protections or restraints regarding architectural and cultural interests.

The methodology envisages three phases:

1. The first preliminary phase is based on archival research on building permits registered in 1945-1965 at the municipal offices and currently available at the historic municipal archive and one-stop shop's digital archive for construction;
2. the second one focuses on structuring the databases and integrating the information collected in the previous phase into municipal geodatabases with the GIS software ArcGIS by Esri;
3. the third one consists of several density analyses, data interpretation and energy simulations to identify common characteristics of the urban fabrics and buildings with the final aim of defining some archetypes which appropriately represent the existing stock.

During the second phase, using the GIS software allows for structuring and managing the significant amount of data about buildings from archival documents and accessing that information easier. The matching between georeferenced municipal databases and archival data is based on an association key determined by an identification (ID) code for each building (provided by the Municipality both in geodatabases and archival documents). This code is then combined with location information to identify the buildings on the georeferenced map (Benedetti et al., 2021) organised in the following layers of information: (1) built environment, (2) regulatory and urban planning, and (3) chronological data (Benedetti et al., 2022). The layers (1) and (2) were created using municipal geodatabases, available on the "Open Data, Comune di Bologna" website (Open data, Comune di Bologna) and the "PUG, Comune di Bologna" website (Piano Urbanistico Generale PUG, Comune di Bologna). Further analyses were carried out by overlapping the aerial photo of the city in 1971 (SIT Sistemi Informativi Territoriale, Cartografie e foto storiche, Comune di Bologna) and by joining and checking the last census data (ISTAT, 2011) in order to add the chronological information in terms of construction epochs with the intention to identify those parts of the city built after 1971. This georeferenced map is the basis for defining a sequence of almost automatic operations aimed at characterising and classifying the urban territory in accordance with the scope of this research. Combining in-force restrictions and protections, buildings' uses and functions, and

parts of territory built out of the period of interest, it was possible to identify a set of urban areas to be studied using density parameters and frequency analyses. This sample of urban areas represents mainly residential, with no restrictions or protections building stock constructed before 1971 and located in 210 urban blocks inside the municipal territory. The operations intended to identify the sample of urban areas were led by arbitrary choices by the authors. However, this does not affect the validity of the methodology as it can be adapted to different research interests and questions.

The last steps of the research consist of density analysis based on the application of the “Spacemate” chart (Berghauser Pont et al., 2005) to the Bologna case study. More specifically, the following density parameters were calculated for each urban area:

- Floor Space Index (FSI): impact of horizontal built surfaces on the territorial area;
- Ground Space Index (GSI): sum of buildings’ footprints and impact of built coverage on the territorial area;
- Open Space Ratio (OSR): impact of horizontal built surfaces on the unbuilt area;
- Layers (L): indication of the buildings’ height in terms of the number of floors.

The representation of the urban areas in the “Spacemate” chart and the comparison with another research work on the Bologna territory (Bartolini, 2013) allows for identifying eight clusters with recurring characteristics. Finally, in order to find out the archetypes, several information packages are defined and analysed (Benedetti et al., 2022) and then integrated with simplified dynamic energy simulations results to determine winter and summer energy consumptions/demand to be used in the Life Cycle Analysis of the building stock, which is currently being investigated.

The building information packages are the following:

- Association key information: building ID code, GIS polygon code;
- Metric/dimensional data: built area, volume, height, compactness, vertical surface, gross floor area, gross floor residential area;
- Building data: neighbourhood, number of floors, number of residential floors, presence of underground floor, construction year, roof type, building type, vertical load-bearing structure, ground floor main use;
- Construction data: external wall thickness and materials, external finishings, roof thickness and materials, intermediate floor and materials, ground floor thickness and materials;
- Potential inhabitants: number of housing units, the average area per housing unit, and average number of potential inhabitants.

These data are then applied to different urban areas, namely a subset, to obtain urban fabrics’ representative values. These representative values determine the archetypes: simplified buildings defining a virtual model, which is used to integrate into GIS the results of LCA carried out on the archetypes and then redistributed on the entire building stock currently being examined. This methodology is based on the bottom-up approach that, in the case of GIS integration of large-scale LCA, consists of a representative model of the building stock made of a proper number of archetypes, energy analyses and simulations, interventions scenarios (renovation, refurbishment, replacement), life cycle assessment in terms of CO<sub>2</sub> emissions in determined time intervals. The integration and visualisation of these data within GIS software to produce georeferenced maps depend on the relation between the archetypes and the existing stock (Mastrucci et al., 2020) (Figure 1). It is, therefore, essential to spend efforts on the identification of the archetypes and the definition of their recurring characteristics. The number of archetypes must be adequate for research purposes and application scale (Sousa Monteiro et al., 2017).

Energy analyses and simulations have been conducted using Energyplus within the HoneyBee software in Grasshopper, starting from the geometric and construction data in the GIS database. These simplified dynamic energy simulations are useful for qualitatively estimating the heating and cooling energy consumption of residential building stock in order to assess their relevance in the life cycle and provide for possible intervention types. Through the assumption of 8 typical intervention scenarios (insulation of roof or walls; window replacement; insulation of the envelope; photovoltaic installation; advanced; deep renovation and demolition and reconstruction), the reduction of energy consumption during the operational phase was evaluated with the related environmental impacts due to the production, construction and end-of-life of the materials used (Fregonara et al., 2018). The proposed workflow (Figure 2) shows the main steps leading from georeferenced data to the definition of the analysis. The 2D GIS polygons are imported into Grasshopper using the block identification number and related database with archival information as input data. Afterwards, through the use of algorithms and the two environmental analysis software, Ladybug and Honeybee (Ladybug Tools LLC), the polygons are semi-automatically transformed into simplified 3D models. This type of simplified building energy model is defined Conceptual Urban Model and contains information regarding metric/dimensional data associated with the building morphology and material properties (density, thermal conductivity, etc.) assigned to the surfaces of the corresponding building elements. The results of EnergyPlus simulations were calculated using one thermal zone per floor, then averaged to obtain a single value for each building and finally averaged again to reach a meaningful value for the residential block. Finally, based on this annual consumption, the environmental impacts associated with using natural gas and electricity and the associated costs were calculated (Spickova et al., 2015). The same methodology was applied for comparisons with the other intervention scenarios.

### Measurement and analysis

The third phase of this research focuses on density analyses and the application of the "Spacemate" chart to the Bologna case study to identify the archetypes. The "Spacemate" matrix was developed to support urban planning and to highlight the relationship between density and urban form. The matrix is then implemented in the sample of 210 urban blocks to obtain a type-morphological classification of the urban fabrics based on density parameters and supported by qualitative descriptions/interpretations.

This chart highlights the connections between GSI, FSI, OSR and L. These parameters have been calculated for every urban block through the municipal georeferenced databases. Also, the relationship between the value of L and the Number of floors (NoF, as the ratio between the total height and the hypothetic storey height of 3.50 meters) was investigated. Combining different values of GSI, L and NoF, eight urban fabrics' clusters are identified (Figure 3), and they are listed below:

- a: Low-rise medium compact buildings (1-3 floors)
- b: Low-rise compact buildings (1-3 floors)
- c: Mid-rise medium compact buildings (3-5 floors)
- e: Mid-rise compact buildings (3-5 floors)
- f: Mid-rise extremely compact buildings (3-5 floors)
- g: High-rise compact buildings (more than 6 floors)
- h: High-rise spacious buildings (more than 6 floors)
- i: Low-rise isolated buildings (1-3 floors).

Then 55 urban blocks belonging to "Mid-rise compact buildings (3-5 floors)" and "Mid-rise

compact extremely compact buildings (3-5 floors)” clusters, including also the outsiders (i.e., urban blocks with ID codes: 203, 116, 93, 29, 279), were identified with the application of the following condition:  $GSI \geq 0.4 \wedge L \geq 3.25 \vee NoF \geq 3$ . This criterion is defined by the Authors in compliance with this research interests; however, it could vary and be adapted to different research questions.

The methodology section has synthetically described the procedure to identify the sample of 210 and 55 urban blocks and eight clusters. These results will not be discussed in this contribution, as they were already presented in a recent publication.

Further analyses aimed at archetypes identification were carried out in a subset of the 55 urban blocks consisting of 20 urban areas. Each urban area is characterised by the most frequent and average values included in the following information packages, coming from the building information ones, and collected in Figures 4(a) and 4(b):

- Density analyses: GSI, FSI, OSR, Population density [inhab/m<sup>2</sup>], Occupancy density [inhab/m<sup>2</sup>], Maximum number of floors, Average number of floors;
- Metric dimensional data / Building capacity: Territorial Area [m<sup>2</sup>], Number of Main Buildings, Total Number of Buildings, Number of Polygons (GIS), Total built Area [m<sup>2</sup>], Built Area Main Buildings [m<sup>2</sup>], Total built Volume [m<sup>3</sup>], Built Volume Main Buildings [m<sup>3</sup>], Total number of housing units, Average Gross Floor Area per housing unit [m<sup>2</sup>];
- Building construction data and typology [percentage values]: Presence of Underground Floor (YES/NO), Prevalent Roof type (PR: Pitched Roof, FR: Flat Roof), Prevalent Ground Floor Use (R: Residential, RTP: Residential & Tertiary & Production, TP: Tertiary & Production). Residential ground floor use includes building units and service areas for houses, i.e. garages, small warehouses, etc.; Residential & Tertiary & Production ground floor use includes housing units and other commercial activities and/or productive activities; Tertiary & Production ground floor use includes commercial and productive activities; Prevalent Building Type (MD: Multi-family Detached houses, MR: Multi-family Row houses, MCR: Multi-family Closed Row houses), Prevalent Vertical Load-Bearing Structure (M: Masonry, RC: Reinforced Concrete, MRC: Masonry&Reinforced Concrete).

Some data were calculated from two sources (archival permits consultation and georeferenced municipal databases) and then validated to find the most reliable results. The variations do not affect the methodology validity and “Spacemate” matrix implementation but depend on the presence of many small and low-rise service buildings within every urban area. In the % variations\* (Figures 4(a) and 4(b)): (+): values calculated from geodatabases are higher than those calculated from archival permits data; (-): values calculated from geodatabases are lower than those calculated from archival permit data.

Data elaboration and 3D representation in ArcGis Pro by Esri (Figure 5) allows for the identification of recurring and shared characteristics within the subset of 20 urban areas and the definition of seven different archetypes. More specifically, the density parameters’ results are the reference to link the archetypes with the “Spacemate” clusters, while the other information is combined to obtain the archetypes.

1. High-rise extremely compact buildings with multi-family row (or closed row) buildings, more than six storeys high, no prevalent type of roof (equally alternating flat roof and pitched one), with underground floor and mixed-use ground floor (with commercial and service activities), and reinforced concrete or mixed masonry and reinforced concrete as prevalent vertical load-bearing structures, high population density (> 8%) and FSI > 2 and GSI > 0.5;
2. Mid-rise extremely compact buildings with multi-family row (or closed row) buildings, five storeys high, prevalent pitched roof, with underground floor and mixed-use ground floor (with



commercial and service activities), and reinforced concrete or mixed masonry and reinforced concrete as prevalent vertical load-bearing structures, high population density ( $> 8\%$ ) and FSI  $> 2$  and GSI  $> 0.5$ ;

3. Mid-rise compact buildings with multi-family row (or closed row) buildings, five storeys high, prevalent pitched roof, with underground floor and residential ground floor, and mixed masonry and reinforced concrete as prevalent vertical load-bearing structure, 7% population density and FSI  $\approx 2$  and GSI [0.43, 0.49];

4. Mid-rise compact buildings with multi-family detached buildings, five storeys high, prevalent pitched roof, with underground floor and mixed-use ground floor (with commercial and service activities), and mixed masonry and reinforced concrete as prevalent vertical load-bearing structure, 7% population density and FSI  $\approx 2$  and GSI [0.43, 0.49];

5. Mid-rise mid-compact buildings with multi-family row (or closed row) buildings, five storeys high, prevalent pitched roof, with underground floor and prevalent mixed-use ground floor (with commercial and service activities), and mixed masonry and reinforced concrete as prevalent vertical load-bearing structures, 6% population density and FSI  $< 1.8$  and GSI  $\approx 0.4$ ;

6. Mid-rise low-compact buildings with multi-family row (or closed row) buildings, four storeys high, prevalent pitched roof, with underground floor and residential ground floor, and mixed masonry and reinforced concrete as prevalent vertical load-bearing structures, 4-5% population density and FSI  $\approx 1.5$  and GSI  $\approx 0.4$ ;

7. Low-rise low-compact buildings with multi-family detached buildings, three storeys high, prevalent pitched roof, with underground floor and residential ground floor, and masonry as prevalent vertical load-bearing structure, 4-5% population density and FSI  $< 1.3$  and GSI  $\approx 0.4$ ;

The seven archetypes identified by analysing the 20 urban blocks show different urban fabrics belonging to the sample, namely mainly residential building stock constructed before 1971, with few industrial and protected buildings. The building type clearly distinguishes different kinds of urban fabrics: multi-family row (or closed row) buildings must be distinguished from multi-family detached buildings. If we combine this information with the NoF and vertical load-bearing structure, we find that the majority of dwellings has a mixed masonry and reinforced concrete load-bearing structure that is coupled with reinforced concrete structure prevalent only in high-rise buildings (more than 6 storeys high) and lesser used in the other cases (mid-rise buildings). However, masonry structure prevails in multi-family detached low-rise buildings (3-storeys high).

Moreover, other shared characteristics have been found if we cross this information with density parameters and population density.

Energy simulations integrated with GIS to obtain average results for each urban block constitute further support for characterising urban fabrics and will complete the information packages that can be used for the building archetypes definition. In this contribution, the results from energy modelling and simulations will not be presented and discussed as they are currently being implemented within the same sample (20 urban blocks).

## Conclusion

The seven archetypes describe urban fabrics' common features and will be used to validate and update the eight urban clusters determined with the "Spacemate" matrix application to the Bologna case study. Since these archetypes are referred to the urban fabrics and not directly to buildings, statistical analyses will be conducted on building information packages to down-scale the urban fabrics' archetypes to buildings to identify more accurate archetypes that can be applied to the entire building stock analysed (210 urban blocks). However, this is

the final step of the research; other intermediate steps and effective implementation are required.

The process of identifying the archetypes points out some significant improvements:

- The inclusion of other parameters to support the description of the building form through quantitative assessment, such as the Vertical Density (VD) as the ratio between the exterior vertical surface (envelope) and the territorial area, the Compactness (CO) as the ratio between the exterior vertical surface (envelope) and the built volume, the share of elongation (ELONG) as the ratio between the two main dimensions of each building footprint. In fact, looking at the 20 urban blocks analysed, some urban fabrics belonging to the same archetypes (i.e., ID 12, 107 to archetype 5, and ID 189 to archetype 6) are characterised by more elongated buildings than the others, and they should constitute another archetype.
- Extension of these analyses to the other 35 urban blocks belonging to the subset of 55 to identify additional relevant categories that can further support the following definition of the buildings archetypes.
- Database implementation for energy simulation with the following: (i) the energy consumption of existing buildings and their impact in terms of kgCO<sub>2</sub>eq for the use phase; (ii) the definition of materials and resources used in the proposed intervention scenario and the associated energy consumption; (iii) cost evaluation of energy consumption and possible intervention scenarios.

Completing the analyses and evaluations on the sample of 55 urban blocks is necessary to support and assess the definition of the building archetypes. In fact, these first seven categories are the reference for validating the building archetypes and, at the same, allow for refining the proposed subdivision into the eight clusters.

The definition of the building archetypes is essential for identifying each building archetype's average energy consumption and related GHG emissions per unit area. In this way, the building stock's energy and environmental impacts can be directly visualised on the urban scale in georeferenced maps. The georeferenced database can provide detailed information on buildings and become a decision-support tool for administrations and professionals and a valuable tool for engaging citizens. Moreover, it is the basis for the future definition of 3D-city models/digital twins for this case study. The actors involved in sustainable urban planning are able to prioritise interventions on objective needs and favour targeted policies and strategic actions taking into account possible effects produced at the urban scale.

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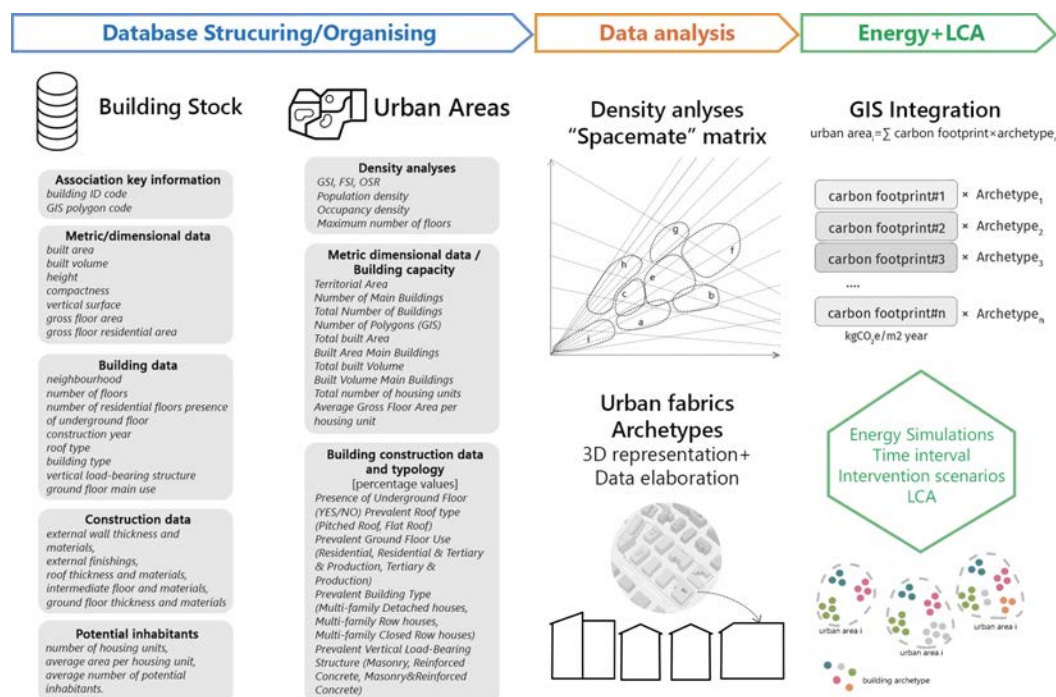
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## Illustration and tables



**Figure 1.** Information packages and methodology flow chart for the GIS integration of large scale LCA © Author1, 2022

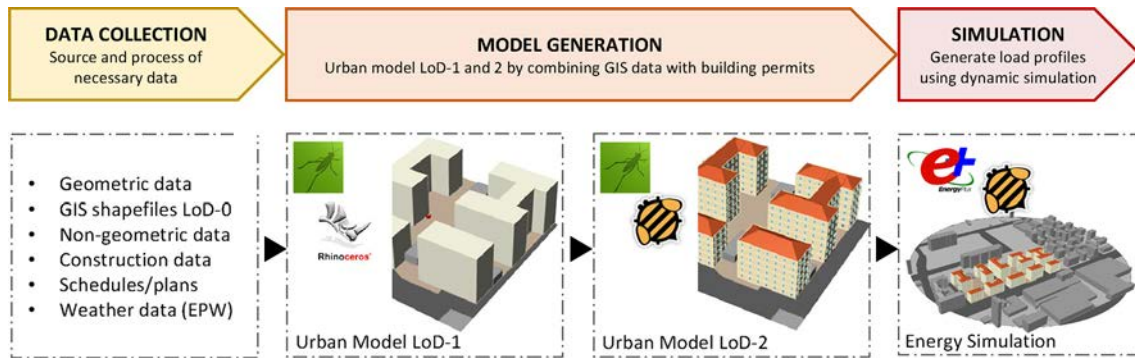


Figure 2. Energy simulation analysis workflow © Author2, 2022

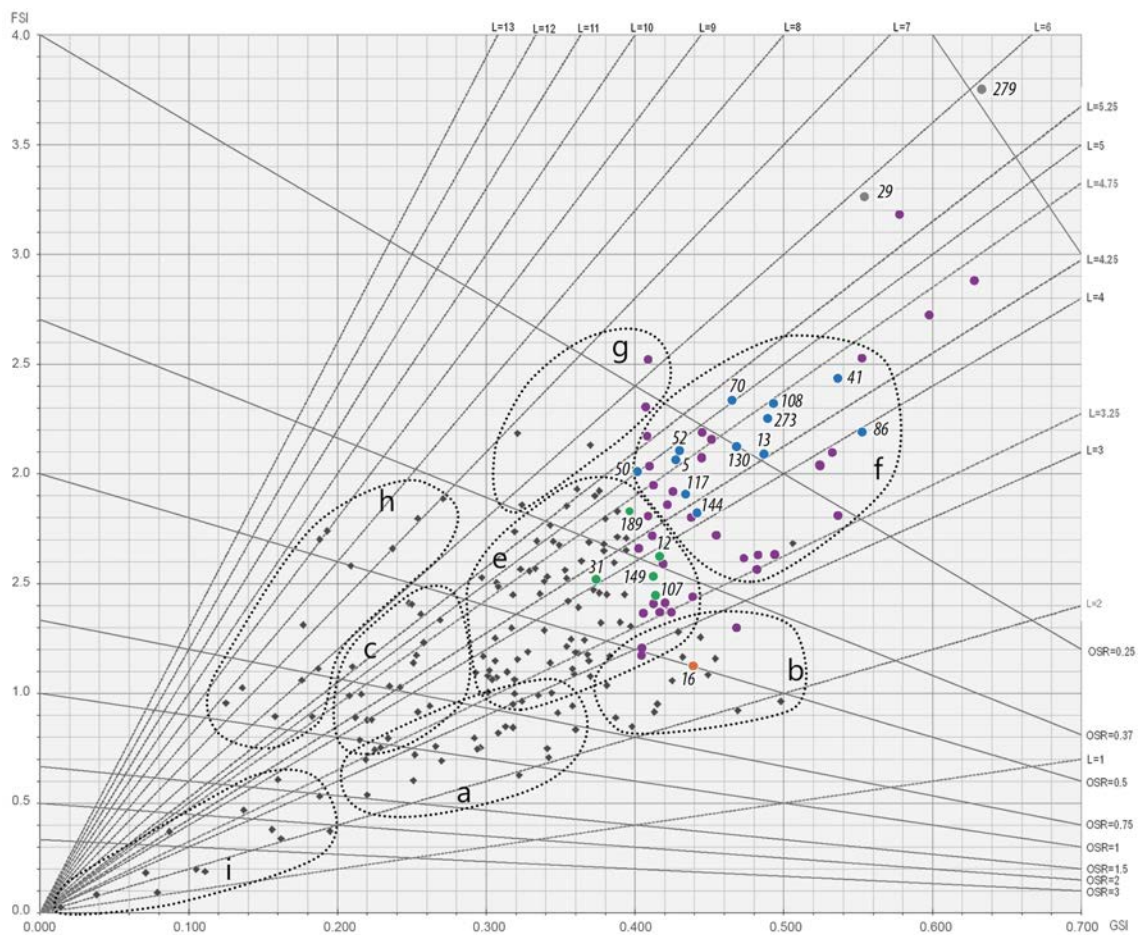


Figure 3. "Spacemate" matrix applied to the Bologna case study. Each point is one urban block, and it is identified by its ID code. The different colours show the different sets and subsets analysed: in purple colour the subset of 55 urban blocks; in green colour, that part of the subset of 20 urban blocks belonging to cluster e: "Mid-rise compact buildings (3-5 floors)"; in blue colour, that part of the subset of 20 urban blocks belonging to cluster f: "Mid-rise extremely compact buildings (3-5 floors)", in orange colour, that part of the subset of 20 urban blocks belonging to cluster b: "Low-rise compact buildings (1-3 floors)", and in grey colour the urban blocks outside the clusters © Author1, 2022



Urban Block ID code	5	12	13	16	29	31	41	50	52	70
Number of Building without permits	1/11	1/9	1/10	8/18	1/13	2/9	5/9	0/14	0/15	0/8
% of buildings without permits	9%	11%	10%	44%	8%	22%	56%	0%	0%	0%
<b>Density Analyses</b>										
<b>GSI Ground Space Index</b> = Buildings Coverage / Territorial Area [-]	0.428	0.412	0.487	0.439	0.554	0.374	0.537	0.402	0.430	0.465
(data from geodatabase)										
<b>FSI Floor Space Index</b> = Buildings Footprint x No. Storeys / Territorial Area [-]	1.765	1.571	1.959	NA	3.030	1.368	NA	1.848	2.065	2.198
(data from archival permits)										
(data from geodatabase)	1.789	1.325	2.175	1.104	3.458	1.392	2.506	1.840	1.834	1.506
<b>% FSI variation*</b>	14%	3%	6%	NA	7%	10%	NA	8%	2%	6%
<b>OSR Open Space Ratio</b> = Unbuilt Area / Buildings Footprint x No. Storeys [-]	0.324	0.415	0.262	NA	0.147	0.458	NA	0.324	0.276	0.243
(data from archival permits)										
(data from geodatabase)	0.277	0.401	0.246	0.499	0.137	0.412	0.190	0.297	0.271	0.229
<b>% OSR variation*</b>	-17%	-3%	-6%	NA	-8%	-11%	NA	-9%	-2%	-6%
<b>Population Density</b> = Potential Inhabitants / Territorial Area [Inhab./m2]	0.057	0.056	0.068	NA	0.087	0.047	NA	0.057	0.069	0.082
<b>Occupancy Density</b> = Potential Inhabitants / Residential Gross Floor Area [Inhab./m2]	0.039	0.038	0.036	NA	0.036	0.034	NA	0.038	0.035	0.038
Maximum number of floors	7	6	5	4	9	6	8	7	6	6
Average number of floors	5	5	5	3	6	4	5	5	5	6
<b>Metric dimensional data / Building capacity</b>										
Territorial Area [m2]	9,191	15,918	10,064	10,196	12,900	11,540	11,823	13,100	15,418	10,815
Number of Main Buildings	11	9	10	18	13	9	9	14	15	8
Total Number of Buildings	14	13	13	23	23	15	12	20	20	15
Number of Polygons (GIS)	16	14	22	23	31	23	24	30	19	15
Total built Area [m2]	3,934	5,589	4,898	4,473	7,144	4,321	6,344	5,271	6,636	5,033
Built Area Main Buildings [m2]	3,735	5,091	4,457	3,957	5,804	3,946	5,465	4,576	6,319	4,699
Total built Volume [m3]	66,262	111,686	75,773	42,661	145,976	62,784	101,131	93,767	115,932	90,096
Built Volume Main Buildings [m3]	65,445	109,476	74,363	39,812	140,925	59,026	96,882	90,938	114,938	89,429
Total number of housing units	146	224	167	80	339	100	144	254	342	252
Average Gross Floor Area per housing unit [m2]	95	86	108	76	102	70	80	80	84	85
<b>Building construction data and typology</b>										
<b>Presence of Underground Floor</b>	55%	89%	60%	50%	92%	78%	56%	93%	100%	100%
YES: There is an underground floor	YES	YES	YES	YES	YES	YES	NA	YES	YES	YES
NO: There is NOT an underground floor	36%	11%	30%	44%	8%	22%	44%	7%		
NA: Not Available	9%		10%	6%			YES	NO		
	NA		NA	NO						
<b>Prevalent Roof type</b>	80%	100%	80%	82%	62%	67%	56%	64%	100%	100%
PR: Pitched Roof	PR	PR	PR	PR	FR	PR	PR	PR	PR	PR
FR: Flat Roof	20%		20%	18%	38%	33%	44%	36%		
NA: Not Available	FR		FR	FR	PR	FR	FR	FR		
<b>Prevalent Ground Floor Use</b>	36%	78%	70%	39%	62%	78%	56%	72%	80%	62%
R: Residential	RTP	R	R	R	TP	R	NA	R	R	R
RTP: Residential & Tertiary & Production	36%	11%	20%	44%	30%	22%	44%	28%	20%	38%
TP: Tertiary & Production	TP	RTP	RTP	NA	R	NA	RTP	RTP	RTP	RTP
NA: Not Available	19%	11%	10%	11%	8%					
	R	NA	NA	RTP	RTP					
	9%			6%						
	NA			TP						
<b>Prevalent Building Type</b>	91%	89%	70%	56%	92%	78%	56%	79%	86%	100%
MD: Multi-family Detached houses	MR	MR	MD	MR	MR	MD	NA	MR	MD	MR
MR: Multi-family Row houses	9%	11%	20%	44%	8%	22%	44%	21%	7%	
MCR: Multi-family Closed Row houses	NA	NA	MR	NA	NA	NA	MR	MD	MR	
			10%						7%	
			NA					MR		
<b>Prevalent Vertical Load-Bearing Structure</b>	73%	56%	60%	56%	77%	56%	56%	57%	67%	75%
M: Masonry	MRC	M	M	M	RC	M	NA	M	M	MRC
RC: Reinforced Concrete	18%	22%	30%	44%	15%	22%	44%	29%	27%	25%
MRC: Masonry&Reinforced Concrete	M	MRC	MRC	NA	MRC	MRC	M	RC	MRC	M
	9%	11%	10%		8%	22%		14%	6%	
	NA	RC	NA		NA	NA		MRC	RC	
		11%								
		NA								

data from archival permits consultation; 
  data from municipal georeferenced databases; 
  not completely reliable results/incompleted results due to the high number of buildings without archival permit association (>30% of the buildings located in the urban area)

**Figure 4a.** Data analyses on 10 urban fabrics intended to find the most frequent, representative and average values. The results are divided in: density analyses; metric dimensional data / Building capacity; building construction data and typology © Author1, 2022



Urban Block ID code	86	107	108	117	130	144	149	189	273	279
Number of Building without permits	1/6	8/23	4/10	1/26	1/11	1/10	0/14	1/7	0/10	2/11
% of buildings without permits	17%	35%	40%	4%	9%	10%	0%	14%	0%	18%
<b>Density Analyses</b>										
<b>GSI Ground Space Index</b> = Buildings Coverage / Territorial Area [-] (data from geodatabase)	0.553	0.414	0.492	0.434	0.469	0.442	0.412	0.400	0.489	0.633
<b>FSI Floor Space Index</b> = Buildings Footprint x No. Storeys / Territorial Area [-] (data from archival permits)	2.073	NA	NA	1.883	2.103	1.748	1.525	1.508	1.990	2.983
(data from geodatabase)	1.787	1.318	2.635	1.369	1.914	1.263	1.139	1.605	1.887	3.964
<b>% FSI variation*</b>	5%	NA	NA	1%	1%	4%	1%	10%	6%	21%
<b>OSR Open Space Ratio</b> = Unbuilt Area / Buildings Footprint x No. Storeys [-] (data from archival permits)	0.216	NA	NA	0.301	0.253	0.319	0.386	0.393	0.282	0.123
(data from geodatabase)	0.204	0.406	0.219	0.297	0.250	0.306	0.384	0.374	0.263	0.098
<b>% OSR variation*</b>	-6%	NA	NA	-1%	-1%	-4%	-1%	-2%	-7%	-26%
<b>Population Density</b> = Potential Inhabitants / Territorial Area [Inhab./m2]	0.088	NA	NA	0.070	0.070	0.061	0.048	0.041	0.074	0.095
<b>Occupancy Density</b> = Potential Inhabitants / Residential Gross Floor Area [Inhab./m2]	0.043	NA	NA	0.038	0.038	0.038	0.037	0.037	0.040	0.037
Maximum number of floors	5	8	9	6	6	5	6	7	6	8
Average number of floors	5	5	6	5	5	5	4	4	5	7
<b>Metric dimensional data / Building capacity</b>										
Territorial Area [m2]	9,226	19,505	9,442	22,354	9,617	10,722	10,790	10,141	11,836	14,599
Number of Main Buildings	6	23	10	26	11	10	14	7	10	11
Total Number of Buildings	9	25	11	43	18	23	29	8	15	20
Number of Polygons (GIS)	10	32	13	43	31	22	29	12	15	37
Total built Area [m2]	5,097	9,078	4,645	9,709	4,507	4,743	4,441	4,133	5,204	9,242
Built Area Main Buildings [m2]	4,042	8,562	4,110	9,118	4,151	4,286	3,697	4,106	4,477	7,029
Total built Volume [m3]	71,978	98,855	76,924	154,427	71,511	68,171	60,090	89,786	88,076	194,438
Built Volume Main Buildings [m3]	68,345	96,321	75,588	152,979	70,542	65,494	57,785	89,786	85,587	183,743
Total number of housing units	222	151	165	516	180	176	177	134	289	420
Average Gross Floor Area per housing unit [m2]	70	88	84	80	86	81	73	74	75	78
<b>Building construction data and typology</b>										
<b>Presence of Underground Floor</b>	83%	62%	50%	81%	91%	90%	100%	86%	100%	82%
YES: There is an underground floor	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
NO: There is NOT an underground floor	17%	38%	40%	15%	9%	10%		14%		18%
NA: Not Available	NA	NA	NA	NO	NA	NA		NA		NA
			10%	4%						
			NO	NA						
<b>Prevalent Roof type</b>	100%	62%	60%	100%	73%	100%	57%	81%	100%	100%
PR: Pitched Roof	PR	PR	PR	PR	PR	PR	PR	PR	PR	FR
FR: Flat Roof		38%	40%		27%		43%	19%		
NA: Not Available		FR	FR		FR		FR	FR		
<b>Prevalent Ground Floor Use</b>	67%	38%	30%	88%	82%	50%	57%	71%	60%	73%
R: Residential	RTP	TP	TP	RTP	R	R	R	R	R	TP
RTP: Residential & Tertiary & Production	16%	38%	40%	8%	9%	50%	43%	15%	40%	18%
TP: Tertiary & Production	R	NA	NA	R	RTP	RTP	RTP	RTP	RTP	NA
NA: Not Available	17%	24%	20%	4%	9%			14%		9%
	NA	R	R	NA	NA			NA		R
			10%							
			RTP							
<b>Prevalent Building Type</b>	33%	62%	60%	77%	91%	67%	57%	86%	50%	82%
MD: Multi-family Detached houses	MR	MR	MR	MD	MR	MR	MR	MR	MCR	MR
MR: Multi-family Row houses	33%	38%	40%	19%	9%	33%	43%	14%	40%	18%
MCR: Multi-family Closed Row houses	MCR	NA	NA	MR	NA	MD	MD	NA	MD	NA
	16%			4%					10%	
	MD			NA					MR	
	17%									
	NA									
<b>Prevalent Vertical Load-Bearing Structure</b>	67%	52%	40%	62%	73%	57%	57%	43%	50%	55%
M: Masonry	MRC	RC	MRC	RC	RC	M	RC	M	M	MRC
RC: Reinforced Concrete	16.5%	38%	40%	19%	18%	43%	29%	43%	50%	27%
MRC: Masonry&Reinforced Concrete	M	NA	NA	MRC	MRC	MRC	M	MRC	MRC	RC
	16.5%	10%	20%	15%	9%		14%	14%		18%
	NA	M	RC	M	NA		MRC	NA		NA
				4%						
				NA						

  data from archival permits consultation; 
   data from municipal georeferenced databases; 
   not completely reliable results/incompleted results due to the high number of buildings without archival permit association (>30% of the buildings located in the urban area)

**Figure 4b.** Data analyses on the other 10 urban fabrics intended to find the most frequent, representative and average values © Author1, 2022



**Figure 5.** 3D modelling of the 20 urban blocks with ArcGis Pro by Esri supports the identification of the seven archetypes and recognises common features within the urban fabrics. Schematic model of each archetype © Author1, 2022



## Overwrite the real: grafting architectural “viruses” for metamorphic architectures

Alessandro Gaiani

Università degli Studi di Ferrara, DA (Dipartimento di Architettura), Via della Ghiara, 36, 44121, Ferrara, Italy

E-mail: [Alessandro.gaiani@unife.it](mailto:Alessandro.gaiani@unife.it), +39 3355346027

Keywords: Architectural syntagmatic overwriting, relational network, adaptive tools, digital network system, metamorphic architectures.

Conference theme: New methods and Technologies for the urban analysis

**Abstract.** *The system of thought, inherited from the last century, is based on simplifying and reductive principles which are no longer able to relate to an increasingly complex reality. Today we are witnessing an epochal change in our reality in which knowledge is no longer based on an objectual system, but on a more inclusive relational network. In the digital relational network, we can rewrite a constant present according to a temporality that is no longer in function of the storage history, but the temporality that we decide to introduce. We can also overwrite an external drive, cloud space, or hard drive, leaving traces of what existed in the past. These changes can also be transferred to studies about the city and its architecture, through a circular system that no longer replaces the physical layers of the past, as happened in the last century, but overwrites the already written, in analogy to the digital system, trying to activate a complex vision that tries to ‘intertwine’, ‘hold together’ and ‘relate’ the different elements that make up a whole. To operate with a syntagmatic overwriting of the existing means to work with the concept of tradere (‘to transmit, to emphasize’) and it authorizes to activate a system that creates architectures of relationships rather than objects, dynamic relational spaces instead of static spaces, interlacements capable of incorporating the different layers sedimented as a trigger to introduce new ones, integrating them to the existing ones. A system that hybridizes the past in the present, and makes itself a language, a new temporary code, made of adaptive tools conforming to the contemporary complexity.*



## Introduction

*'The challenge is to conceive the common membership in a global interweaving of interdependencies as the only appropriate condition for ensuring the quality of life and survival of humanity.'* Mauro Ceruti

Cities are set to expand in the coming years, as population growth projections illustrate how the population inhabiting them in the future, especially those in Asia or the Arabian Peninsula, will be doubled.

How to design the future of cities and their architectures will be a determining factor for human survival in a Planet that is already sending out alarming signals, starting with the current issues presenting within the city itself fragments of inequality, spaces of conflict, congestion, density, places of marginality and discarded spaces.

The Planet is a space that we should share with other forms of life and at the same time we have a duty, as Emanuele Coccia (2016) writes, to "recognize that there is some uninhabitability, that space will be never really be definitively inhabited," and that therefore we must find the conditions to better interweave with the environment.

We must therefore formulate a research path in which design proposals are dynamic, innovative, generative, non-dissipative, circular and inclusive of all natural, cultural and social resources.

A path that starts from the realization that man, through the epoch defined as the Anthropocene, but even more with what Andreas Malm called the Capitalocene, has devastated natural ecosystems, widened inequalities, created cities and architectures in which there are no relationships between the various forms that compose it, pursuing a globalized production system oriented to profit and the exploitation of human and natural resources.

We are in a situation of accumulation of elements that are decaying, corrupted, but through the introduction of fertilizing devices, we can activate in interrupted cycles, giving them new life, triggering a fair exchange with the ecosystem.

To propose a new possible path, we draw on the history of thought and knowledge within architecture in the early 20th century, where a break with the past has developed, starting with the tabula rasa of the Modern.

At the beginning of the 20th century, the design theorizing of Walter Gropius within the Bauhaus, where history had been eliminated from the educational program, introduced and popularized nihilism that led the formal language of Architecture toward dissolution and becoming a mosaic of fragments of different writings, as we can verify today, in our cities.

With the advent, at the end of the last century, of discoveries in the field of science based on complexity, and the exponential advent of the digital system, this approach appeared no longer capable of supporting an increasing complexity of knowledge.

The vision that the city and its architectures had to be a system composed of a varied but structured collection of codified objects placed in absolute space and time, proper to the scientific system that reduced complexity to a few controllable and manipulable variables.

A method that was used with great skill and wisdom by Italian architectural thought in proposing morphological and typological studies since the middle of the last century.

Despite their differences, type-morphological studies from Saverio Muratori to Carlo Aymonino, from Gianfranco Caniggia to Giorgio Grassi and others, used the scientific methodological approach and are a foundational part of the knowledge on Architecture: the outcomes of these researches based on the relationship between building type and design and on the reading of the urban fabric as a tool capable of linking architecture and the city. However, all



these studies have been based on the fact that history has a continuous diachronic and synchronic development and that the transformations of type, typology and urban morphology follow these rules, activating the concept of tradition understood in the Latin etymology *Tradere*, 'to transmit, to emphasize'.

Even the postmodern metaproject is today unsuitable for understanding the dynamics of contemporaneity, as it is based only on the individual and unable to provide a collective guiding framework on the kind of architecture (or society) one would like to build. The post-modern system of thought was expressed first through the rejection of History, understood as a chronological consequence of facts, and later through the commutation of technical solutions to aesthetic values (Servino, 2015).

In architecture, the result is evident: a mosaic of forms representing the fragmentation of proposals and a formal 'diversity', a consequence of individual architectural languages.

This approach is supported by the predominant role that Technology is playing in our time and that in architecture seems to have replaced the theoretical-practical scaffolding of the project no longer supported by critical thinking.

The anthropocentric approach to man has then exalted more the attitude oriented toward design strategies taking into account only the aspects of an 'object-based' response and did not relate to the habitat, considered in the broader sense of including the issues related to living on the Planet.

Most of the projects proposed and implemented in the new century, have rarely been interested in the relationship with Communities, identifying in that presence the relationship and interaction between man, gathered in collectivity, and the space in which he recognizes himself thus not obtaining, in the proposed solutions, the support of the inhabitants.

'As in the 'niche-building principle', so every presence on the land - individuals, collectivity, plants and wind - are an active agent of change, which can contribute to the resilience of communities' (Melis, 2022).

## Aim

We must therefore recombine the processes by which we read and design cities so that they once again become synonymous with the relationship between people and habitat, organisms capable of generating community, creativity and diversity.

The basic question, not only in architecture but also within the entire world of knowledge, is whether we are in the presence of a new way of interpreting knowledge or whether we are in the presence of an epochal change in our reality that deserves a new definition.

Certainly we represent a generation that is going through a substantial change due to the transition from the analog world, which has come to an end, to the digital one, which is still unknown, precisely because it is in its infancy, and therefore we are in search of a 'transition', an adaptation.

A digital scheme that, increasingly used by the profit system, makes us 'objects', raw materials to be exploited as data assets, and that, once used, makes us waste.

To such evidence we have the duty to correspond a different, inclusive approach, capable of emphasizing the existence of a relationship between man and the environment, activating a methodological and aesthetic resistance to the linear production system of capital accumulation proper to the system of consumption, which interfaces with the instances coming from the digital world.

Contemporary architecture has the task, given the current situation in which man has been transformed into 'thing' or 'data', of inventing zones of transition between 'different regimes of

being and different forms of life' (Bourriaud, 2020)

This entails a path of revising the fundamentals that architectural design theory has proposed so far, introducing into the research new reflections that go beyond the disciplinary boundaries of Architecture, involving other disciplines such as Philosophy, Digital, Communication, Biology or Sociology (and others) to try to formulate new hypotheses that lead to recognizing the authentic content of the spirit of the age.

The goal of opening up the project to a multitude of subjects is then to move away from the demiurgic vision of the architect, used to date, and to look at the design process with different eyes, open to any form and to the inclusive relationship that the spaces of the city establish with its inhabitants (Quinz, 2022).

Precisely because the city and its spaces are the place where people's lives take place and where contemporary spatial regeneration can take place, as Bachelard (1973) quotes 'what persists is always what is regenerated' .

To grasp the complexity of forms, it is then necessary to conceive of the whole as something that is not exhausted in the juxtaposition or sum of the parts, as was the case in the past, as a result of their mutual action and limitation, but to operate through an interweaving of the multiple factors that govern the project.

Today, contemporaneity confronts us with a different vision, based on the notion of uprooting, intended as awareness of being within a globalized world in which one is 'incapable of belonging to a place and a culture' (Mati Aris, 2019).

Isabelle Stengers (1991) clearly exposes how the era in which we live is more complex and its investigation 'expresses itself in the need for multiple narratives that reproduce, in a hypothetical way, the way in which a variable set of causes has been articulated to produce an evolving fragment'.

We understand, then, that contemporary Architecture needs a translation and mutation of fundamentals a theoretical approach that is as compelling and applicable as those of the past.

## **Methodology**

We can then propose four fundamental aspects of a possible as well as necessary rethinking, to be used as a web of relations rather than individual strategies, which refer both to the advent of the digital system within knowledge and to the overcoming of the nihilist approach:

1 - History can be read as intrigue or as new beginning.

Activating two different but complementary approaches: telling the present by serving History, where events can be told with a different chronology; or telling the present as a continuous refounding of itself, where everything is there, present, ready to be manipulated.

2 - The term 'contemporary' encompassing, in the proposal, an ideological meaning, and not, exclusively, a chronological observation. We are contemporary by virtue of our 'coming-after' what is past and in relation to our thinking and the technique we use: our interpretation of the spirit of the age (Servino, 2015).

3 - We are in the presence of a mutation that transitions from a culture of signs and meanings to one of proxies, i.e., that system which 'qualify actions that are possible insofar as something represents and replaces (acts or behaves 'in lieu of') something else' (Floridi, 2020).

4 - If, in the transition from one epoch to the next, there is objective, perceivable and analyzable progress and there are 'proxies', it means that the current progress can overlap, overwrite, with previous stages, confronting memory with respect to our current actions.

Trying to interpret the new thresholds that digital system narratives, complexity-based

philosophical theories or biological theories based on 'descent with modification' (Ceruti, 2019), even random ones, introduce into the world, and therefore also into Architecture, through a new relationship between knowledge and history, we can outline a process characterized by the unexpected emergence of new contexts, new methods, new tools, due to the presence, interaction and conflict of disparate and heterogeneous elements, different in nature and origin.

The trajectory we intend to expose is not the result of a simple reversal or the introduction of a new duality, but a transition to a system of interactions, relationships, hybridizations and inclusions between different forms and architectural elements.

In the contemporary, the relationship with history, comes to be changed as with the advent of digital we have the possibility to perform several tasks at once (multitasking) or be present in several places simultaneously (telepresence), and transform the temporality of the events of history (Floridi, 2020).

Through digital devices we narrate our temporality by manipulating chronology, changing the sequential order and thus meaning, using, therefore, the method of intrigue that makes use, however, of a different History-related system, no longer either synchronic or diachronic.

With digital we resample, process, manipulate information: we are contemporary. Our history can be overwritten, based on what we have archived (photos, texts, recordings, etc.) and based on the temporality we want to enter, (we unpick and paste) thus activating the concept of history, not as a discipline, series of events or narrative, but as a transcribed memory (Floridi, 2020).

Overwriting involves writing over an already written text, activating an authorial moment of the formal idea.

The digital world is also based on the concept of proxy, with whom it is possible to represent and surrogate something else, allowing one to change the nature of the object from which it derives into another, having within itself something that belongs to the donating object, that is, it acts in place of its referents.

Digital culture can, then, be manipulated by the architect if it does not fall into the technological paradigm of Smart cities, which are nothing more than cities into which digital technology has been coldly inserted for 'profit' purposes.

The proposed approach authorizes the activation of an 'expanded' culture that offers greater possibilities for mutation and activates new and unprecedented relationships.

Such a paradigm shift implies the abandonment, not only of a system of thinking based on the primacy of things (objects), but also of a system in which space and time are considered as rigid containers, in order to activate a transition toward which relationships are positioned, interact and mutate: we speak of relationships and no longer of objects.

I believe that it is then possible to observe how the contemporary propensity for a space, which is increasingly relational, flowing, hybrid, unstructured, comes from a specific approach of the knowledge system aimed at complexity and that also in Architecture, it can be introjected within disciplinary theories and current design practice, so that we can overcome both nihilism with the determinist approach proper to the last century, and post-modernist individual approach.

By drawing on experiences from the past that have conformed to the consumer society marking many advanced economies and intersecting with the age of the 'Infosphere' (Floridi, 2019), it is possible to ground transitional design on connection and inclusion, so as to conceive design as a result of the inclusive relationships between things and people, 'through' the interactions between ecosystems and the referencing physical and social universes..

Investigating this reversal of perspective leads us to an open and inclusive sharing process that operates on discontinuity and draws on logics that use open processes in continuous becoming, such as a digital network in which first there are threads, lines (i.e., relationships, links) and then nodes (things) that arise, however, from the interweaving of threads.

Operating through a system of networks and no longer mechanisms allows us to include all the entities present in the context.

We will have to focus no longer on grand narratives or individual approaches, but on the interweaving and connections, on the relationships between the facts we want to decipher, on the tools of organization and the hierarchy of the elements functional to the story we want to write, also willing to abandon linear chronologies, activate perturbations capable of activating the metabolism of the spaces in which we live.

We are then in the presence of a condition in which we are called to reformulate a new design system that differentially uses the legacies that history, unique all over the world, through oriented sediments, stratifications that we can read and interpret, fragments that can be the beginning of a new path.

An additive system of further layers to the structure of the city formed in history, so that the pre-existing elements are an active part of the new composition.

This approach involves a translation of architectural design through a relational overwriting in which the new and the known (Dionigi, 2019) are implemented with approaches ranging from minimal intervention to large scale and characterized by the ability for adaptation and metamorphosis.

Operating with a relational overwriting of the existing, authorizes the activation of a system that creates dynamic rather than static relational spaces, interweaving capable of incorporating the different sedimented layers as a trigger to introduce new ones, integrating them with the pre-existing ones, to propose multiple architectural writings to the new urban reader. A system based on reading otherness and not what unifies and reduces, to create speculative, reflective and adaptive architectures, hybridizing the past in the present, in a here and now, making itself a language, a new temporary code, made of adaptive tools that conform to contemporary complexity.

We must then design with adaptive devices, also corrupted and discarded or unused, that are capable of accumulating dispersed energies, cutting and pasting, reducing or disseminating, proposing continuous metamorphosis. Such devices aim to intensify reality, starting from our culture and history, to propose a new one that makes use, by dissecting the complex layers that make up the contemporary world, of multifocal adaptive devices, proxies, such as the 'graft,' the 'parasite', a 'new boundary as a margin or threshold', and the 'in-between' (Figure 1), placed below the ground, on the ground or above the ground: molecules derived from both the human and natural worlds.

They interpret previous layers and introduce new ones that act in the place of their referents, changing the state of the receiving organism, establishing a relationship with it, and include interventions at different scales and on different spaces, allowing for an 'expanded' relationship. They are operative, cooperative, aleatory devices open to shared experience that make it possible to operate no longer with 'determined' signs that risk to produce a self-referential culture, but with tools that are grafted into an organism provoking a reaction that introduces scenarios ranging from the preservation of the original building if this presents evidence of architectural value, up to operating with tools of metamorphosis that define solutions that allow on the one hand a functional reuse of spaces, and on the other hand the possibility of adaptation to future scenarios still to come, operating as "augmented systems" that change

their nature to acquire another one, in relation to the needs of contemporaneity. They are tools for connecting things together, without a predetermined form, defining situations, precisely because they express a condition of adaptability, and requiring a deep understanding of canonical aggregative logics in order to evolve them into a polyphonic system.

Devices responsive to the changing patterns of our living, which intersect our architectural history but, also, are able to connect, mix and integrate activating a new multiple and inclusive relational cartography, between the natural and non-human elements that compose the project scene. 'What we call nature is nothing more than a space of perpetual negotiation within which species try, but do not necessarily succeed, to cohabit. [...] Species, all species, are constantly changing the world, are constantly obliged to dialogue and seal pacts with others' (Bourriaud, 2020). They become active elements that propose an "augmented" space designed as an assemblage of elements onto which prostheses are grafted that cause both a complexification and a dissemination of space, and they stand as metamorphic mediators between different life systems and have the task of grasping real relationships and applying them before they become a product, giving concrete and singular value to each metamorphosis (figure 2).

Resilient devices, capable of activating a constant adaptation to the space and environment in which they are 'grafted,' which we can understand as molecules composed of atoms with concatenations that continually mutate to be safe, almost like viruses that graft into existing organisms infect it and produce continuous variations: 'Variations that are related to two essential factors: true mutations, i.e., transcription errors in the virus' genetic code, and re-combinations, i.e., substantial and massive alterations in the viral genome [i.e., architectures] related to 'crosses' of the genome of one virus with that of another virus (normally of the same species). Mutations are punctual and can be harmless, depending on where they 'fall' in the genome [read architectures], or extremely important, if they change certain proteins essential for viral replication' (Perno, 2020).

Viruses evolve by natural selection and modify themselves by storing 'mutations,' progressively differentiating themselves based on their relative abilities to survive and reproduce in different environments.

The proposed design exemplification, the transformation of the Pozzuolo del Friuli Barracks in Ferrara into a University campus, carried out in an educational setting, (Figure 3) takes up the challenge of applying this vision and these devices to a concrete case.

With the grafting of certain devices, the metabolism of the organism is activated, which is not changed in its most important architectural and symbolic values, but, by interacting, it proposes a different architecture, generative of new relationships and opportunities (Figure 4).

## Conclusion

Therefore, the architectural project is no longer and only a producer/depository of objects but operates a metamorphosis toward a creation of spaces of inclusion among the different forms present on earth, grafting 'viruses' capable of mutating the discarded organism on which it acts. Metamorphosis that must be understood as a physical reality and space of interaction, and that, through the use of active and adaptive devices, puts back into play and mutates the discarded spaces, 'augmenting' them, in which nature is no longer seen only as a backdrop or repository for/of objects, but becomes an active part of it by establishing cooperation with the built environment.

It is proposed to operate through a system that hybridizes the past into the present and makes itself language, new temporary code, made of adaptive devices (viruses), which are composed



of 'parallel processes, dynamic invariants, transient arrangements, terminations and layers' (Gatti, 2019).

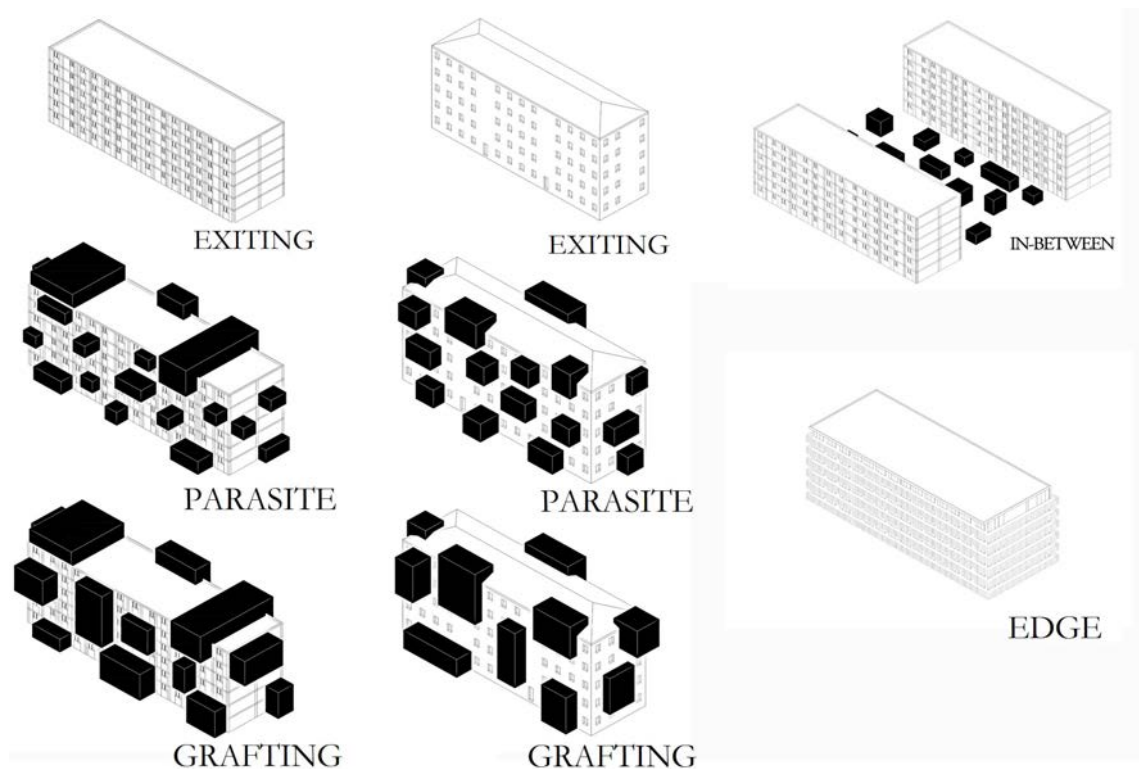
This attitude of mutation of the 'already written derived from other worlds' appears to us as the most interesting way to assert that architecture becomes an expression of the spirit of the age. Architectures thus conceived become porous, creators of possibilities, generators of new sustainable relationships with local and global ecosystems, enhancing the creative potential of past and present cultural diversity.

This will allow the overwritten architectures to establish a metamorphic relationship in which architecture, landscape and people become one condition of each other, in mutual relationship.

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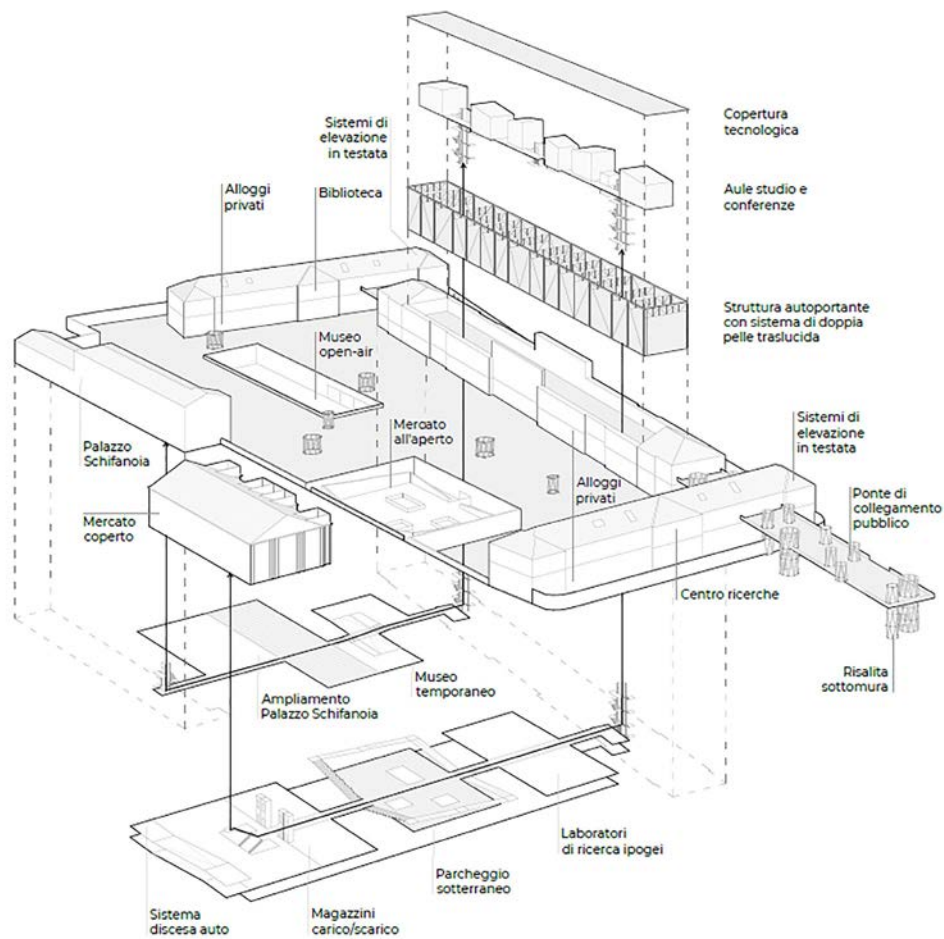
## Illustration and tables



**Figure 1.** Alphabet of adaptive devices. (Credit: Alessandro Gaiani, 2020)



**Figure 2.** CaixaForum, Herzog & De Meuron, 2001-2008, Madrid. The new arts center was designed through the reconditioning of an abandoned power plant using the grafting of adaptive “viruses” that totally changed its form and organization, creating new and metamorphic spaces. (Credit: photo Alessandro Gaiani, 2022)



**Figure 3.** Practical application for the reconditioning of the Pozzuolo del Friuli Barracks, Ferrara, into a student residence, overall axonometry of the intervention with the new destinations, accomplished by Davide Filipi, Giorgio Lana, Viola Murer within the Design Laboratory IV, Department of Architecture Ferrara. (Credit: Davide Filipi, Giorgio Lana, Viola Murer, 2022)



**Figure 4.** Practical application for the reconditioning of the Pozzuolo del Friuli Barracks, Ferrara, into a student residence, main building with student residence and study rooms, accomplished by Davide Filipi, Giorgio Lana, Viola Murer within Design Laboratory IV, Department of Architecture Ferrara. (Credit: Davide Filipi, Giorgio Lana, Viola Murer, 2022)

## METYS: MEtropolitan CarTographY for Sustainability Modeling Metropolitan Landscapes through maps for Urban-Rural Morphotypes Projects

Valentina Galiulo<sup>1</sup>, Antonella Contin<sup>2</sup>

<sup>1</sup>Dipartimento di Architettura e Studi Urbani. Politecnico di Milano. Via Bonardi, 3. 20133, Milan

<sup>2</sup>Escuela Técnica Superior de Arquitectura de Sevilla, ETSAS. Av. de la Reina Mercedes, 2, 41012, Seville

E-mail: <sup>1</sup>[valentina.galiulo@polimi.it](mailto:valentina.galiulo@polimi.it), <sup>2</sup>[antonella.contin@polimi.it](mailto:antonella.contin@polimi.it),

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**Abstract.** Modeling the urban and rural landscapes of the contemporary city through Metropolitan Cartography (MC) means comparing the geographical complexity of heterogeneous contexts with maps to drive designers' gaze toward a new spatial shape of the city. Metropolitan Cartography is an innovative practice tool that conveys the narrative of urban-rural metropolitan landscapes through digital design practice. It aims to model a new memorable image of the metropolitan landscapes through GIS systems. METYS' research stems from the need to investigate the quality of the interphase spaces between infrastructures and agricultural ecosystems, which are today subject to the acceleration of green-grey infrastructure breakdown dynamics. It is an issue of relationships, scales, and temporalities. So, it is necessary to define a new cognitive method in cartography to configure landscapes of transitions through open-source data. Specifically, the research outcome is a set of open-data Protocol Maps: they are interoperable, combinable, and scalable for shaping Urban-Rural Morphotypes projects. Nevertheless, to manage the complexity of the metropolitan scale in landscapes, it is necessary to represent and measure the quality of space with new spatial indicators that can support the authorities' strategic decisions in the new urban morphology field. METYS offers a practical methodology to map the state of care in urban-rural spaces through Rural Neglection Indicator. Therefore, designing Urban-Rural Morphotypes through Metropolitan Cartography means managing the complexity of typologies and urban morphologies in scales. Nevertheless, it means consolidating a theoretical-practical awareness of the cartographic tool following a context based-approach because it is necessary to measure before designing new land-use patterns in metropolitan urban-rural scenarios.



### **Introducing METYS: METropolitan CarTographyY for Sustainability**

Nowadays, the green-grey infrastructure breakdowns and Rural Neglection impacts, from the territorial to the local scales, demonstrates how Metropolitan Landscapes are hybrid spaces as the boundaries between city and country no longer exist. They are fluid and transition spaces as they are three-dimensional spaces considering the temporal dimension as distinctive feature. Transition spaces are places related to indefinite period of time among programmes, spatial practices and arrangements; so that they are suitable for the development of spontaneous processes of change and transformations. Therefore, they could be considered as resources (Lèvesque, 2002). They are spaces that can connect and alternate the structure of the urban dimension with nature, according to tran-scalar visions: from gray to green infrastructures, from the countryside to historical centres, from districts to neighbourhoods. Therefore, the scales of sets of landscapes undergo sudden changes; the semantic relationships between 'local/global/hybrid', 'urban/rural', 'culture/nature, and 'traditional/contemporary. This is our metropolitan complexity issue of investigation.

In metropolitan, urban and architectural design, contemporary cities call for spatial operations to re-organize urban-rural, rural settings through new projects in transitional and obsolescent landscapes. Acupuncture strategies on the ground could allow to re-connect the Green-Grey infrastructure continuity (TELLme, 2020) to urban proximity services from the rural interphase areas of the metropolitan Net-city (Shane, 2005). However, due to the climate change effect on physical and social background, there is a shared awareness of being in a new urbanity dimension and of the uncertainty processes to which the city and its landscapes are subjected. Besides green urban and architectural design technologies, the urban regeneration of the future calls for a desperate need for remedial landscapes within urbanism recombinant operations (Shane, 2005).

Therefore, the recombinant urbanism (Shane, 2005) operations proposed through the Metropolitan Cartography projects encourage reading, diagnosing, interpreting and modelling shades of neglect and potential transformations in metropolitan urban-rural places across the scales. Moreover, it is possible with METYS: Metropolitan Cartography for Sustainability Indicators. Our mapping investigation could allow us to structure sharable Knowledge: it is a systemic approach to analyzing and interpreting the spatial dynamics of Metropolitan Landscapes mirrored on mapping grounds (Waldehim, 2016). In particular, the Metropolitan Cartography methodology would demonstrate how the ability to use open data is now a prerequisite in professional and academic spheres of Landscapes design to generate a set of maps that can be compared and replicated in different contexts. The systemic work between Data Mining, map' projects and Cartographic representation starts as Open-access Knowledge with a contextual approach designed with local intelligences (Galiulo et al, 2021).

In order to structure an aware knowledge of Metropolitan Landscapes with MC maps, METYS starting research questions are:

- How mapping Metropolitan Landscapes? With which rules of form?
- How can it then map the spatial components that characterize the interdependencies of metropolitan landscapes' systems?
- How is it possible to qualify the spaces of Neglection in urban-rural contexts that can be reprogrammed for new adaptive patterns of land use?

METYS is a methodology for interpreting Metropolitan Landscapes in specific Urban-Rural contexts, demonstrating how an innovative practice tool is needed to structure and design new natures of Metropolitan Landscapes. In particular, the Metropolitan Cartography maps, tested in the metropolitan case of Milan, are technological, replicable and scalable tools for



re-designing urban-rural areas in which hybrid landscapes when different scales overlap. This scenario determines the need to define a new mapping code by identifying spatial information for broadening regenerative design actions on cartographic grounds (Waldehim, 2016).

### **Enabling Data and Methodology for Metropolitan Landscapes' Maps**

Since Metropolitan Landscapes are complex systems of space networks, Metropolitan Cartography contributes to rethinking the spatial form of specific hybrid urban-rural metropolitan contexts and their spatial ecology and public spaces average linkage according to new land-use patterns of URLs (Un-habitat, 2019). These new spatial interactions thus open up the design of the city to a range of creative agents and to an array of new spatial typologies and their corresponding effects (Lyster, 2019) able to stand despite the incidental spatial pressures generated by physical phenomena of uncertainty and vulnerability from climate change hazards, events and effects.

- How is it possible to represent and measure the quality of space (Contin, Galiulo, 2021), and according to which components, to understand the state of urban-Rural Neglection and exposure to which the landscapes of our cities are subject?
- Which indicators of spatial quality can support the authorities' strategic decisions in the urban morphology field that must respond to the predictions of physical and social crisis in the near future?
- How is it possible to identify the emergent places where it is urgent to operate with new sustainable urban and architectural design solutions?

The recent research outcomes, in which the METYS methodology has been tested, have made it possible to investigate the significance of Metropolitan Landscapes when they are investigated at local scales. Even before qualifying degree of formality in landscapes by employing indicators, metropolitan cartography maps operate with a new taxonomy of landscapes in order to investigate the invariable, labile, tangible and intangible spatial components that constitute their complex and systemic structure. These are open-source cartographic projects that precede the construction of an urban-rural linkage strategy.

METYS proposes a new taxonomy of Metropolitan Landscapes according to new spatial categories aimed at shaping Metropolitan Landscapes of Exchanges, Infrastructures, Transitions, and Obsolescences (Berger, 2019) at the local scale.

- Metropolitan Landscapes of Exchanges (MeLEX) are landscapes with the capacity to re-articulate (Lyster, 2006) the interstitial space between the infrastructure network and ecosystem services from the metropolitan, regional, to the local scale (Contin, 2022).
- Metropolitan Landscapes of Transitions (MeLOTS): They are spaces for commuting and transitions of people, products, services and information flows. Metropolitan Landscapes of Transitions are places of compression and decompression between the infrastructural arteries of the Net-City (Shane, 2005), the productive agricultural fields and rural wastelands where landscapes' time has different rhythms. They are spaces where the clash of heterogeneous spatial characters and consistencies occurs.
- Metropolitan Landscapes of Infrastructures (MeInf): They are technological landscapes made up of grids, patterns, matrixes, infrastructures, networks and commuting ecologies that are shaped and designed to be systematic and conceived as a unit. They are outlined as places where the looming presence of high-speed road and rail facilities and new large infrastructure projects make the interstitial spaces of the network neglected and limited in terms of green-grey infrastructure continuity. These spaces are most vulnerable to the logic of logistic real estate speculation and land consumption. Metropolitan Landscapes of

Infrastructures can be understood as live index of intricate technological systems and soft biophysical processes by design operations (Corner, 2020) when Infrastructures are viewed as Landscapes – that are conceived as a vertical field of systems and scales. At the Metropolitan scale, Landscapes of Infrastructures are indexical and interphase spaces.

- Metropolitan Landscapes of Obsolescence (Melos): They are obsolete spaces and landscapes related to landfills, abandoned areas not ecologically revalued or in the process of recovery, which can be understood as new drivers of the spatial continuity of the Green-Grey infrastructure. (Fig.1)

Protocol Maps (M,S) (Galiulo, 2020) exploit the reliability of global and local data, for the representation of metropolitan phenomena of green-grey continuity breakdown and Rural Neglection, comparable in heterogeneous case studies. The MC mapping methodology followed the three methodological phases of MC - data mining, data setting, and data graphic semiology.

Data mining finds unearths the primary associations, the recurring information patterns (geographical information patterns), and also anomalies in the information that might be received in open-source data from international, national, regional, and even local geoportals of the metropolitan city as keystudy. Although, this preliminary phase of data selection and critical analysis, allows selection of essential information for configuring the invariant and tectonic structure of the territory. According to the design principles of the metropolitan architecture project supported by Metropolitan Cartography (Contin et al., 2022), the dissemination of inventive (Naveh, Lieberman, 1983) and strategic knowledge occurs by planning a metropolitan database that makes multidisciplinary knowledge, logical sequences of choices, explicit according to a dimensional, textual, multimedia association of 'hybrid' data, which obtain an ordered, clustered, shareable, and reliable configuration and collocation in the data setting phase.

The digital design processes of MC advise the planner in modelling the data following an initial analysis and interpretation of the information layers concerning scalar relationships and the programmatic purpose of the map.

All information is gathered, processed and validated in the map. Thus, it is possible to make the data architecture interoperable to construct spatial quality indicators in the urban-rural contexts of the Metropolis.

It is, therefore, a matter of working methodologically on the construction of qualitative Urban-Rural Linkage indicators by exploiting the inter-scalar connections of the new information ecology for new readability of Metropolitan Landscapes. Why is it necessary to construct an indicator from the MC maps? The Indicator has a meaning beyond that of the single parameter from which it is derived. It has a synthetic meaning and is developed for a specific purpose: finding where to set the urban-rural morphotypes. Urban-Rural Linkage Indicator is set on specific criteria:

- Systematising the open-source data that structure the Protocol Maps through inter-scalar spatial applications that already give a planning vision as a reaction to the metropolitan dynamics that cause the territory's vulnerability (Contin, Galiulo, 2022);
- Designing (representation in space) the transitions of the metropolitan expansions in the urban-rural interphase spaces within the metropolitan infrastructure network (Fig.2);
- Identifying geographical points, contact areas and transition spaces between places of hybrid and heterogeneous Nature within a map;
- Determining the rules of forms for quality indicators' construction in urban-rural reconnection (Fig.3);

- Measuring the complexity of networked systems (ecological, social and mobility Infrastructure) of landscapes between the metropolitan, medium-sized and small cities qualitatively. (Fig.2)

The experimentation stems from the European call for Project ESPON 2015 and EIT-Mobility 2021 requests. The European project call drew attention to strategic Grey and Green continuity projects according to the principles of Ecological Transition and the new Green Deal. The health, climate and environmental crisis of recent years have shifted the focus of scientific research on the design of sustainable mobility systems (Ascher, 2007), intelligent conviviality spaces and form rules for the construction of logistics meta-districts in the vicinity of major European metropolises. This research opportunity has highlighted a specific metropolitan dynamic undergoing rapid transformation in the Milan territories: Rural Neglection in the urban-rural interface spaces of the networked infrastructures in the Milan Metropolitan Transect between Milan, Segrate, Pioltello, Melzo due to the logistic real estate market that is investing in public and private land exploiting agricultural area and resources.

### **Analysis of Urban-Rural Linkage Indicator: Rural Neglection**

The results of the cartographic projects from territorial to locale scale, were exploited to refine the selection of relevant geolocalized data (sorted and filtered from open-source data archives, geoportals and census databases), to build urban-rural linkage spatial indicators. The selected spatial indicators were analyzed through geographic information systems (GIS) to design a multi-layer map of the metropolitan transect from Milan to Melzo: a priority infrastructural centrality for the logistics real estate market.

The information levels of each map were classified according to spatial indices such as:

- Level of Spatial Productivity Index (LSPI): the level of productivity of the metropolitan landscapes in the agricultural and industrial fields, distinguishing industrial land use from logistics land use;
- Level of Spatial Amenity Index (LSAI): the presence and number of attractive and ecologically valuable urban-rural spaces in the metropolitan transect;
- Level of Spatial Heterogeneity Index (LSHI): defined by the level of heterogeneity of facilities, ecological and cultural services, and attractors within the project hybrid landscapes.

The definition of the weights of each index was based on: (i) interpolation between land coverage (2018), relationship with private public infrastructure ownership, (ii) definition of recurrency in terms of spatial forms and elements according to a spatial classification by keywords and related concepts (Contin, Galiulo, 2021); (iii) prediction of quality according to Degree of Rural Neglection concerning photographic field survey (Forecast Degree of Rural Neglection: H,M,L); (iiii) One-to-many correlation among the quantitative variables to express a possible relationship among spatial forms and quality prediction by photographic reportage. The result generates a new measurability gradient of metropolitan neglected landscapes subject to green-grey, urban-rural discontinuity dynamics on grounds.

The calculation of the Rural Neglection Indicator represents a synthesis of the 4 spatial indices proposed as a starting analysis for the representation and qualification of the Urban-Rural Linkage indicator. According to the methodology proposed by METYS, the degrees of variation of the indicator include: VVL:  $-70 < x < -40$ ; VL:  $-40 < x < 0$ ; L:  $0 < x < 40$ ; M:  $40 < x < 70$ ; H:  $70 < x < 100$ . (Fig.4)

It was therefore, possible to spatialize the following values by cross-referencing the Rural Neglection gradients with the administrative boundaries, agricultural plots and urban settlements of the municipalities that make up the metropolitan transect.

Therefore, the Urban-Rural Linkage indicator constructed and tested in the MC maps and methodology is the Rural Neglect (RN) on the Milan Metropolitan Transect. It is a qualitative

indicator of Urban-Rural Linkage that interprets the state of care of urban-rural spaces in the metropolitan system. It is an analytical device to establish progressions of spatial quality through the maps of the Metropolitan Cartography. It is an indicator constructed through interpolating open-source data (from the Data Mining, Setting and Project map protocol). RN aims to determine and report a scale of synthetic values for analyzing the spatial relationships between the multiple physical components of urban-rural spatial discontinuity. Rural Neglection Indicator's goal is to rule a value gradient of neglect, abandonment, disorder and lack of care of the place of original agricultural vocation, which, however, today is subject to new metropolitan dynamics. (Fig.5)

### **Guidelines for Urban-Rural Linkage Morphotypes project**

The quality gradient shows how, although a high level of Neglection was expected close to the peri-urban edges of Milan and Segrate (due to the presence of industrial activities and infrastructure linked to logistics), unexpectedly the urban-rural interphase areas among Rodano, Liscate, Vignate and Melzo are subject to a high state of neglect despite the presence of ecosystem services and effective mobility in the context.

The variables that can influence the result can be various, not least the state of neglect of agricultural areas near the borders, which are no longer distinguishable between urban and rural as they are now hybrid landscapes.

From the Rural Neglection indicator map, it is possible to deduce a disparity in accessibility and distribution and to environmental resources, mobility services as well as provisioning, regulating and cultural ecosystem services, between areas close to the centre of the metropolitan city or close to its infrastructural radials, compared to the rural and urban inner areas.

The mapping areas investigated through the proposed Rural Neglection (RN) indicator could be further refined by including other environmental, social and economic variables supported by cadastral, geological and statistical data to gather quantitative information on dynamic transformation processes across other disciplines involved in the analysis of physical space. However, this first experimental case could allow the construction of guidelines for the design of Urban-Rural Linkage Morphotypes in the Milanese metropolitan case and in comparable paradigmatic cases. Furthermore, it could constitute an analytical and comparative tool for implementing new spatial use practices in participatory planning and metropolitan governance. The METYS Methodology indicator is thus a replicable and refinable model, but it could support the hypothesis expressed above: it is a tool capable of identifying emerging places in a state of neglect within the complex system of metropolitan landscapes. The Rural Neglection indicator could be used in diagnosing the state of vulnerability of specific places claiming sustainable maintenance, replacement and transformation strategies in urban and architectural design.

However, the knowledge of modelling metropolitan landscapes and their spatial quality is still an unexplored and lacking field due to the absence of standard guidelines that can moderate the collection of open-source data and point studies aimed at sustainable urban-rural connection strategies.

In conclusion, Metropolitan Cartography, in its methodological phases and project operations, could help to declare scenarios of exposure and environmental impact in the neglected spaces of the landscapes of exchanges, transitions, infrastructures and abandoned places that require urgent new urban regeneration practices.

The future development of the research will continue with the formalization of strategic guidelines to territorialize Urban-Rural Linkage Morphotypes projects according to SDGs and

targets criteria of Global Agenda 2030. This phase of strategic design for constructing a punctual integration of intervention (Acupunctural Chart) will be compared with the current measures and benchmark in Urban and Landscapes Planning and Design; this is a correlative approach needed to process formal indication for Urban-Rural Linkage Morphotype projects.

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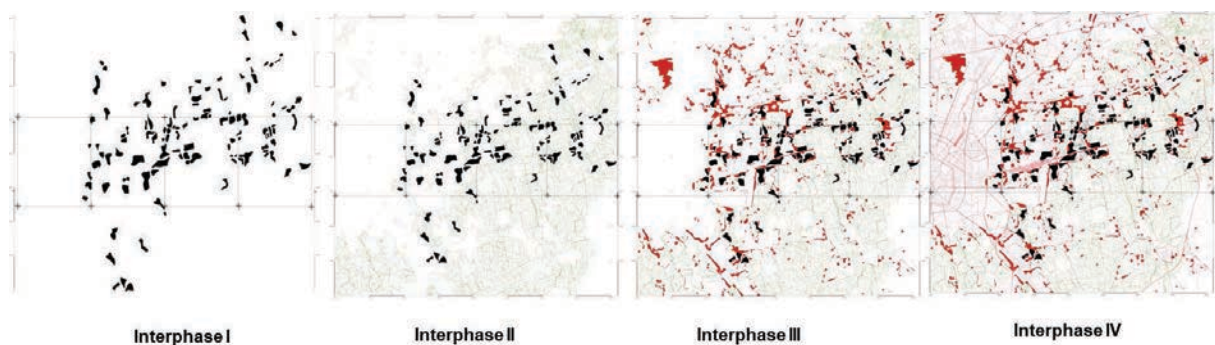
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## Illustration and tables



**Figure 1.** Metropolitan Landscapes of Exchanges Protocol Map. They are eligible landscapes for the re-articulation (Lyster, 2006) of the interstitial space between the infrastructure network and Ecosystem Services from the metropolitan, regional scale up to the landscape unit scale. These are the spaces where Nature and the city can co-exist again for a joint evolution. (Credits to V.Galiulo, 2022)



**Figure 2.** The urban-rural interphase, in the metropolitan city, is a morphological space, linked to the structural and formal conditions of the land. Nowadays, the attributes of environmental and social unsustainability are reproduced and transformed according to a close relationship between the city's acceleration, production, and consumption time. Therefore, urban-rural interface areas are Spatio-temporal expressions whose hybrid configuration admits different approaches of analysis and interpretation given their complexity in the physical, social, economic and land management dimensions. (Credits to V.Galiulo, 2022)

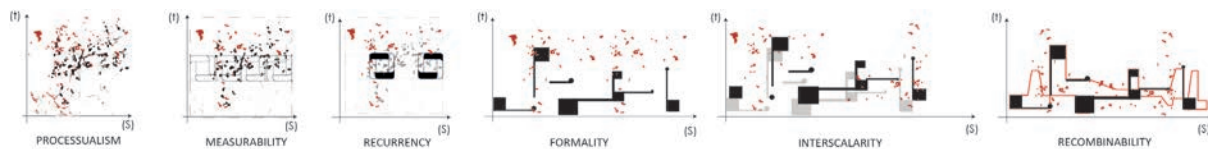
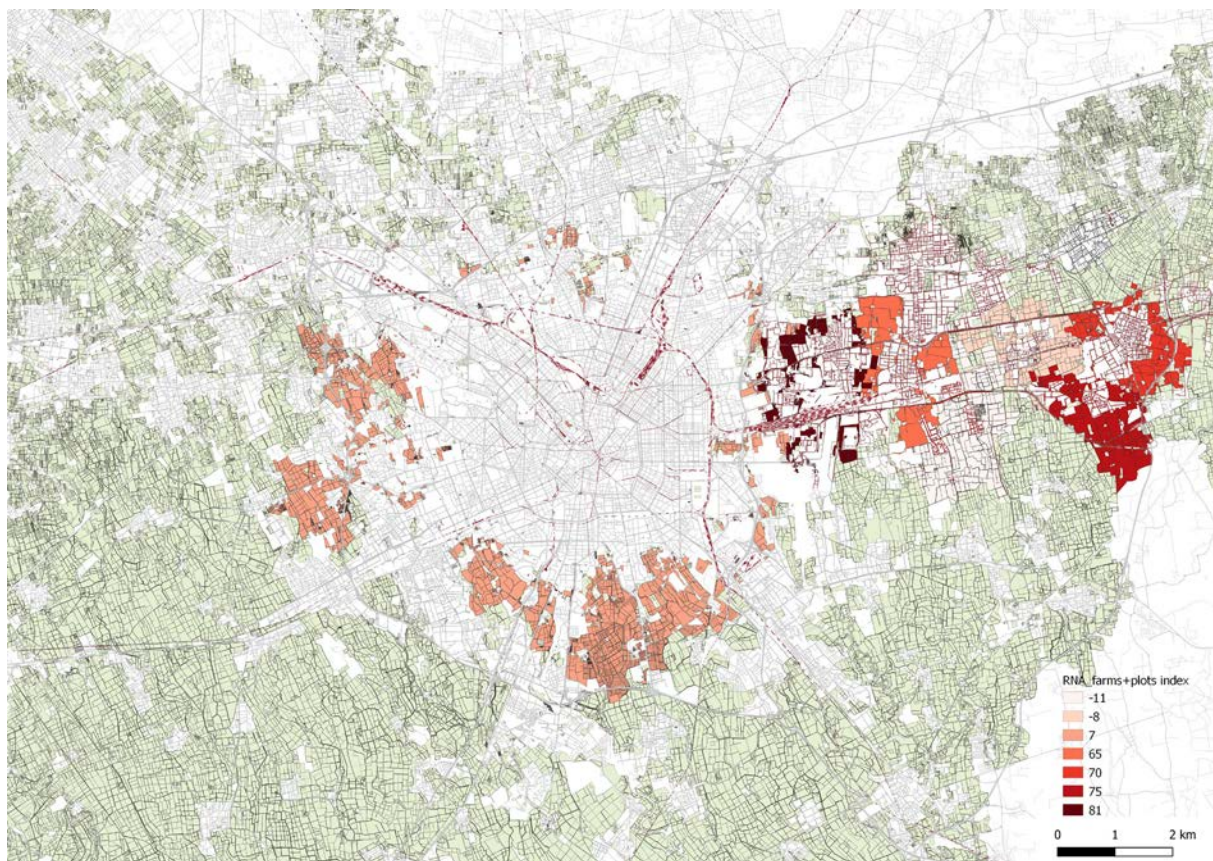


Figure 3. Rules of forms for shaping Urban-Rural Linkage quality indicators. (Credits to V.Galiulo, 2022)

<i>Spatial Index</i>	<i>Level of Spatial Index of RN</i>	<i>Related Concept from Metropolitan Discipline</i>	<i>Numbers of Elements (N<sub>i</sub>)</i>	<i>Forecast Degree of Rural Neglection</i> High: 5-4 M:3-2 L:1-0	<i>Pearson Correlation Index</i>	<b>Rural Neglection Degree</b> (, vvL: -70<x<-40; veryL: <-40;x<0;L:0<x<40; M:40<x<70; H:70<x<100)
<b>Spatial Productiveness</b>	<i>LSPI_Level of Spatial Productivity Index</i>	Agricultural Farm Agricultural Plot Industrial Areas Logistica Areas	N <sub>i</sub> Milan, Segrate, Pioltello, Vignate, Rodano, Liscate, Melzo	e.g: 3	$\rho_{XY} = \frac{\sigma_{XY}}{\sigma_X \sigma_Y}$	e.g: VVL
<b>Spatial Amenity</b>	<i>LSAI_Level of Spatial Amenity Index</i>	Park Zones Green spaces Architectural Heritage	N <sub>i</sub> Milan, Segrate, Pioltello, Vignate, Rodano, Liscate, Melzo	e.g: 4	$\rho_{XY} = \frac{\sigma_{XY}}{\sigma_X \sigma_Y}$	e.g: L
<b>Spatial Heterogeneity</b>	<i>LSHI_Level of Spatial Heterogeneity Index</i>	Common spaces_University Common spaces_School Common spaces_Museum  Health Facilities  EcosystemServices_Trees EcosystemServices_Biodiversity Areas EcosystemServices_Regulating Services Water EcosystemServices_Cultural Services Transport Services Fallow Areas	N <sub>i</sub> Milan, Segrate, Pioltello, Vignate, Rodano, Liscate, Melzo	e.g: 1	$\rho_{XY} = \frac{\sigma_{XY}}{\sigma_X \sigma_Y}$	e.g: M

Figure 4. Schedule of categories for assessing the Spatial Index in Rural Neglection Indicator. (Credits to V.Galiulo, 2022)





**Figure 5.** Cross-scale comparative image of Rural Neglection Indicator. Metropolitan Area of Milan. (Credits to V.Galiulo, 2022)

## Climatic performance of urban texture: public spaces in Venice fabric

Barbara Gherri<sup>1</sup>, Marco Maretto<sup>2</sup>, Daniela Maiullari<sup>3</sup>, Alice Monacelli<sup>4</sup>, Chiara Finizza<sup>5</sup>

<sup>1,2,5</sup>Dipartimento di Ingegneria e Architettura, Università di Parma, Parco Area delle Scienze 181, Parma 43123

<sup>3</sup>Chalmers University of Technology, Göteborg

<sup>4</sup>Dipartimento di Architettura e Progetto, Università La Sapienza, Piazzale Aldo Moro 5, Roma 00185

E-mail: <sup>1</sup>barbara.gherri@unipr.it, <sup>2</sup>marco.maretto@unipr.it, <sup>3</sup>d.maiullari@tudelft.com,

<sup>4</sup>alice.monacelli@gmail.com, <sup>5</sup>chiara.finizza@unipr.it

**Keywords:** Campo type; environmental analysis; morphological analysis, urban texture; climatic performance.

**Conference theme:** New methods and Technologies for the urban analysis

**Abstract.** The open spaces of Venice represent an emblematic excerpt of the social, environmental, and traditional identity of city life. One of the most disregarded aspects in Venice is the relationship between the natural and the built environment elements, such as building facades and the waterways. The paper thus focuses on assessing the fabric characteristics and their trade-offs in two of the largest public spaces in Venice. The first is Campo San Polo, a great quadrangular "Campo" of the Venetian urban structure dating back to the 10th-11th century known as the "Archipelago City". The second one is Campo Santa Maria Formosa, dated back to Gothic Venice, which features a bone structure and is characterized by the balance between water and land systems. The climatic performance of the two Campo Types is based on morphological and microclimatic analysis via ENVI-met, to identify the integrated performance of public spaces as the preferential place for reading, designing, and living in a city. The climatic behaviour of the Campo types was performed considering four key variables: urban morphology, anthropogenic heat from buildings facades and from street materials, albedo values, and the role of water. The results show that the variability of urban form has a major impact on urban temperature, urban livability, as well as on thermal resilience behaviour in future climatic conditions.

## Introduction

One of today's challenges in terms of managing, planning, and preserving existing cities is represented by reducing the effects of a changing climate. The increasing awareness of the issues deriving from frequent heat waves in cities (Powell, 2019) has stimulated a growing number of studies, dealing with Urban Morphology, Environmental Analysis, and the Urban Heat Island (UHI) effect (Eliasson, 2000; Nikolopoulou, 2003). UHI mitigation measures (Oke, 1982) are mostly needed in the historically dense urban fabrics where the temperature is the highest, and where city regulations, the form of the urban fabric, and the availability of open space constitute the main barriers to the implementation of the measures. Furthermore, literature has demonstrated that the UHI phenomenon is linked to many other aspects of urban climate and human activities. UHI has some influence on air pollution (Wang, 2021), can cause extensive health complications (Heaviside, 2017), and lastly, anthropogenic heat and urban pollution tend to worsen the overall air temperature inside the urban fabric, generating a series of negative effects that also encompass a social and economic dimension.

Dense and compact urban areas are deeply affected by the increased frequency of severe heat waves (Santamouris, 2014) as it was experienced in Europe and the Mediterranean area since 2000 (Barriopedro, 2010; Stefanon, 2012). Among Mediterranean cities, the case of Venice is peculiar due to some intrinsic features, historical configuration, scarce vegetation, high building density, and the dominant presence of impervious surfaces which further contribute to urban overheating phenomena. Additionally, being a car-free city, Venice forces residents and visitors to spend a long time in outdoor spaces. Accessible and thermally comfortable public spaces can actively support outdoor activities, reduce energy consumption, and have positive impacts on personal well-being and mental health. Under these conditions, the evaluation of the thermal resiliency of Venice outdoor spaces, through microclimate assessments, is particularly interesting to understand the actual climate performance and guide future climate-oriented design processes. The main aim of this study is to expand the knowledge on the thermal behaviour of Venice urban squares, called *Campi*, today and the projected future climate scenarios. This study tries to evaluate to what extent the microclimate of two exemplary open spaces in Venice is influenced by urban form, density, materials, and greenery and how these factors shape the future thermal comfort conditions.

## Methodology

Venice, due to the clarity of its transformation processes, its substantial pedestrianism, and the topicality of its urban structures in a sustainable city perspective (Pascolo, 2019), appeared a perfect opportunity to investigate outdoor thermal resilience of some urban areas. In particular, *Campi* are intended as part of the historical scenario of the traditional Venetian urban structure of the insula, along with other urban elements of *fondamenta/calle/canal* (Crowhurst Lennard, 2012).

Understanding the urban microclimate is vital for the deep understanding and future development of design solutions to improve local thermal comfort. Microclimate conditions in urban contexts have been demonstrated to have a significant impact on the perception of comfort and individuals' attendance in outdoor spaces (Nikolopoulou and Lykoudis, 2007). In the Mediterranean regions, the impact of microclimate factors on urban life is more noticeable, particularly during summer. Hot temperatures, prolonged sunshine hours, high relative humidity rates, and weak winds are the prevailing summer characteristics of urban environments that concur in enhancing the Heat Island Effect HUI (Oke, 1982). The understanding of the UHI is quite complex since microclimate data, buildings, and urban materials as well as local



morphology must be considered. All these gathered data are assessed through specific environmental analyses, via ENV-met, a three-dimensional prognostic microclimate model that has been used to simulate the interaction between surfaces, plants, and air in an urban environment (Bruse and Fler, 1998). ENVI-met 4 was used to simulate air temperature, mean radiant temperature MRT, wind velocity, and Relative Humidity for the two selected case studies, as well as The Universal Thermal Climate Index UTCI.

The UTCI is a bioclimatic index for describing the physiological comfort of the human body under specific meteorological conditions (Bröde, 2012).

Operationally the work is divided into four main stages:

1. Preparation of digital environmental models of the two selected Campi to be assessed in ENVI-met software.
2. Assessment of thermal comfort level through UTCI modelling in contemporary climate conditions (2020).
3. Assessment of thermal comfort level through UTCI modelling in the future climate conditions (2050).
4. Calculation of the absolute difference between UTCI values in points 2 and 3 and analysis of the urban features (building forms, building, and urban materials and greenery) responsible for the variations.

### **The selected Campi in Venice**

Campo San Polo e Campo Santa Maria Formosa have been selected for their urban features and their microclimatic performance is under investigation in this study.

The first area Campo San Polo (Fig.1, on the right) is characterized by a heterogeneous aggregation of building types (linear, courtyards) organized around the main open space, Campo San Polo. This Campo is the largest public space, after San Marco square, and is in the compact maze of the city core, shaped by a dense network of canals and streets, and the presence of Rio San Polo defines the west side of the Campo.

The space of the campo is defined by buildings with a height range of 10-20 meters and by the church of San Paolo Apostolo. The Campo's large proportions make it the perfect place for outdoor events. In the past, Campo San Polo was often used as a venue for traditional celebrations, and religious ceremonies as a market square.

The Campo of Santa Maria Formosa (Fig.1, on the left) is vast and irregular and can be identified as one of the largest in Venice, after Campo San Polo. It is also enclosed by a sequence of palaces from different eras and of architectural interest. The space of the Campo is defined by buildings with a height range of 15-22 meters and the urban fabric develops a radial pattern with 9 Calli and 11 bridges. Other architectural elements are the two "Vere da Pozzo", typical wells formed by the accumulation of rainwater and then filtered by layers of sand. The Santa Maria Formosa Church, erected in the 17th century, represents the largest building in this Campo and presents two main facades, one facing the Campo, and one facing the canal.

### **Microclimatic assessment and thermal comfort analysis**

The research focuses on the relationship between urban texture and perceived thermal comfort, based on a simplified description of urban structures and simplified individuals' thermal preferences. According to ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, 1997), thermal comfort is defined as the condition of mind that expresses satisfaction with the thermal environment and is assessed by subjective evaluation controlled by physiological, psychological, and behavioural factors (Nikolopoulou & Steemers,

2003). Among several thermal indices, based on the energy balance of the human body and specifically developed for outdoor conditions, the Universal Thermal Climate Index UTCI (Bröde, 2012) has been selected to assess Campi's outdoor comfort as it is regarded as one of the most comprehensive indices to calculate human heat stress in outdoor spaces (Blazejczyk, 1994). UTCI considers air temperature, relative humidity, solar radiation, and wind speed and is regarded as the reference environmental temperature causing strain. In this specific study, the environmental parameters including air temperature (°C), wind speed (m/s) at the elevation of 10 m, and relative humidity (%) were collected from the Venice EPW file. UTCI is divided into 10 groups, ranging from extreme cold stress to extreme heat stress (Young, 2017). The microclimatic evaluation has been performed using ENVI-met digital models for both Campi. Digital spatial models were built using a grid resolution of 2 m (x) by 2 m (y) by 3 m (z). The models also included different building materials (plaster, masonry, bricks, Trachite Euganea, and water) and their thermophysical features. The spatial models have been used to simulate microclimate and thermal comfort conditions. The simulations have been performed for the hottest summer day (19th August), for the present (the year 2020) and for the projected 2050. The MeteorNorm Climate Generator (Remund, 2010) was employed to project the 2050 climate scenario, using the Intergovernmental Panel on Climate Change (IPCC) scenario SSP2 - 4.5 (IPCC, 2022). ENVI-Met simulation performs UTCI assessments, considering all the above-mentioned data. The last stage of the research aims at defining the thermal resilience of both Campi, considering the effects of climate change. Contemplating that outdoor space is thermally resilient if it can achieve desirable thermal levels despite the overarching event of climate change, the absolute difference between UTCI data in 2020 and 2050 will depict how much those areas can be thermally resilient.

## Results

Simulations are performed for both Campi in a range of 24 hours for the hottest day of a typical year. The data here presented refer to the warm hours, 1 p.m. and to 4 p.m. In Figure 3, The UTCI values for Campo San Polo show moderate heat stress near the building façades, where the shaded area lowers air temperature values. In the center of the Campo, severe heat stress is due to the absence of shading, and the presence of impermeable surfaces that hamper the thermal discomfort. The only acceptable area, where UTCI values are 33°-35°C, is registered under the canopy of the trees, where evapotranspiration and shading seem to be effective in cooling down air temperature. In projected 2050 (Figure 2, in the middle), the open area presents noticeable strong heat stress, and the effectiveness of the green masses seems reduced, compared to the current situation. In the 4 p.m. scenario (Figure 3), the role of evapotranspiration is crucial to the mitigation of overheating in the dense urban context. Wind speed patterns show that the Campo, as well as any outdoor and dense areas, present very low flow values, and this leads to very low heat dissipation, throughout the day, especially in the late afternoon, when the solar heat accumulation is extremely high. Nonetheless, the shaded areas perform quite comfortably, especially thanks to the shaded areas. The projection for 2050 confirms that the open paved areas will be strongly affected by high air temperature, and the vegetation will be not sufficiently effective in mitigating the outdoor thermal stress. The thermal comfort in Campo Santa Maria Formosa is deeply affected by its geometrical configuration and its elongated form, compared to that of San Polo. Here the building's façades offer more shaded areas from 1 p.m. (Figure 4), also thanks to the apsidal part of the church. Compared to the nearby dense urban texture, where narrow streets and courtyards offer more shaded zones, the centre of Campo Santa Maria Formosa shows moderate stress

levels, which however will grow in the 2050 scenario. Here the presence of the canal on the left has a negligible cooling effect. In the late afternoon, thanks to the orientation of the Campo, no thermal stress is detectable and UTCI is around 26°C. The greater benefit is mainly offered by the elevations of buildings' fronts. The expected rise in temperatures in 2050 (Figure 5), on the other hand, made the square less comfortable resulting in strong heat stress all over the area. The absence of green mass makes evapotranspiration (a combination of evaporation and transpiration) less effective due to waterproof surfaces. Lastly, the Delta UTCI values, calculated as the absolute difference in UTCI 2020-2050 for both 1 p.m. and 4 p.m. thresholds (as in Figure 6), show that UTCI follows the growth curve of air temperature values. Consequently, its value also increases. From the maps in Figure 6 it is evident that, in the short term, the shaded areas are the most affected ones. Campo San Polo, due to its size, is likely to be less resilient to 2050 temperature increase in the centre of the open square. Campo Santa Maria Formosa, due to its narrowness and elongated form seems to be more shaded in both scenarios but, according to the 2050 projected scenario, the temperature is likely to increase due to predominantly impervious soil and due to the absence of any breezes. The wind is almost stagnant inside the open areas. The simulation shows that the wind velocity remains constant, even though overheating is expected to become stronger.

## Conclusion

The study carries out a first investigation of the influence of urban fabric on the outdoor thermal comfort of two Venetian Campi, conducted through microclimate digital simulation. In brief, despite the lack of greenery and extensive waterproof surfaces, the large open spaces in Campo San Polo and Santa Maria Formosa result to be protected by the uneven building heights that variably offer extensive shadows.

The historical fabric of Venice demonstrates that despite impervious surfaces and the absence of vegetation, evaporative cooling, the dense and compact fabric play an effective role in mitigating thermal stress, both in 2020 and 2050 projections.

Campi as other open spaces among the dense urban fabric can be considered a reference of resiliency for modern climate-adaptive urban developments.

The results of this study are a first attempt at detecting urban thermal patterns for supporting the future design of urban open spaces and improving outdoor thermal comfort in historical cities. This initial study needs to be improved to better understand the changes in human thermal sensation more accurately, also encompassing the role of water in Venice scenarios.

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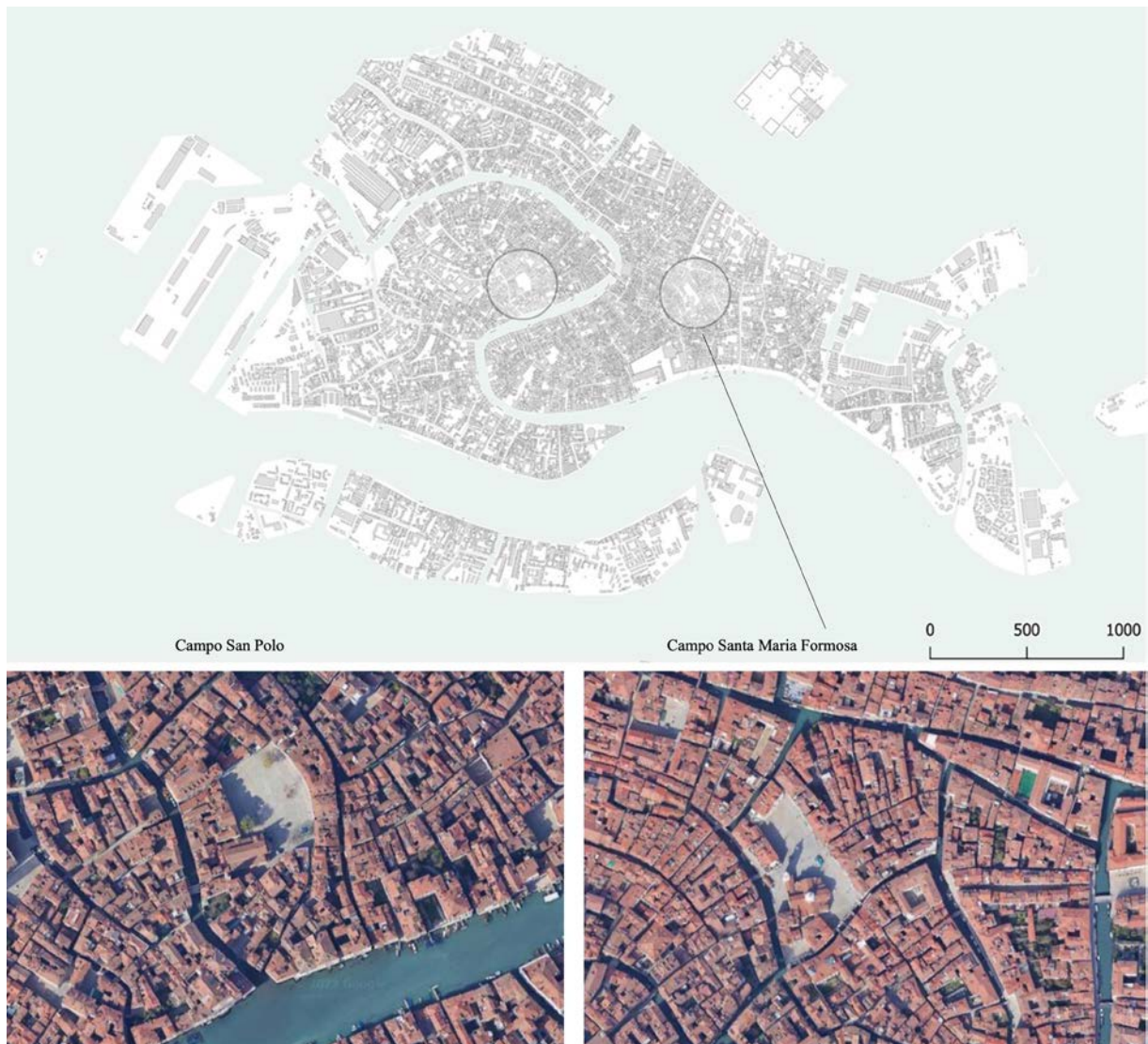


Figure 1. Venice aerial map with campo San Polo and Campo Santa Maria Formosa.

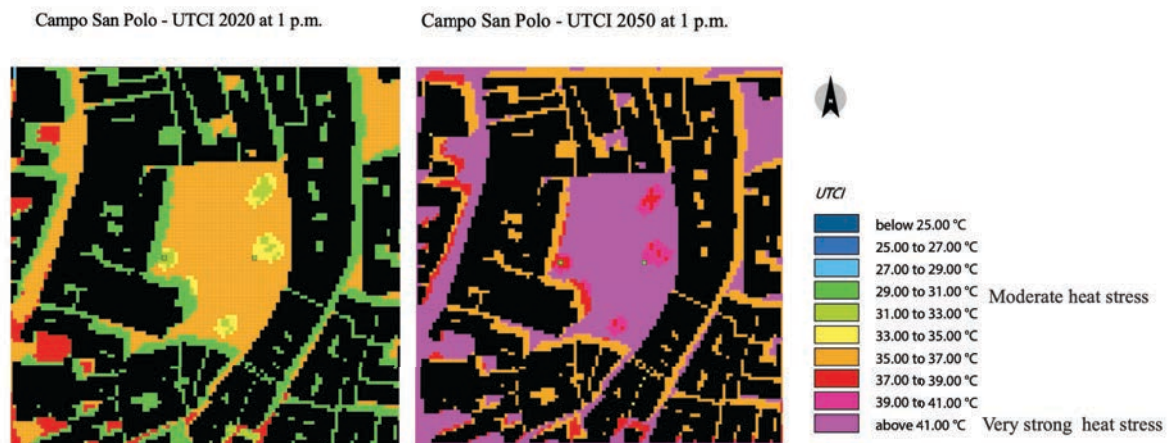


Figure 2. UTCI values map at 1 pm on 19th August for Campo San Polo in 2020 and 2050.



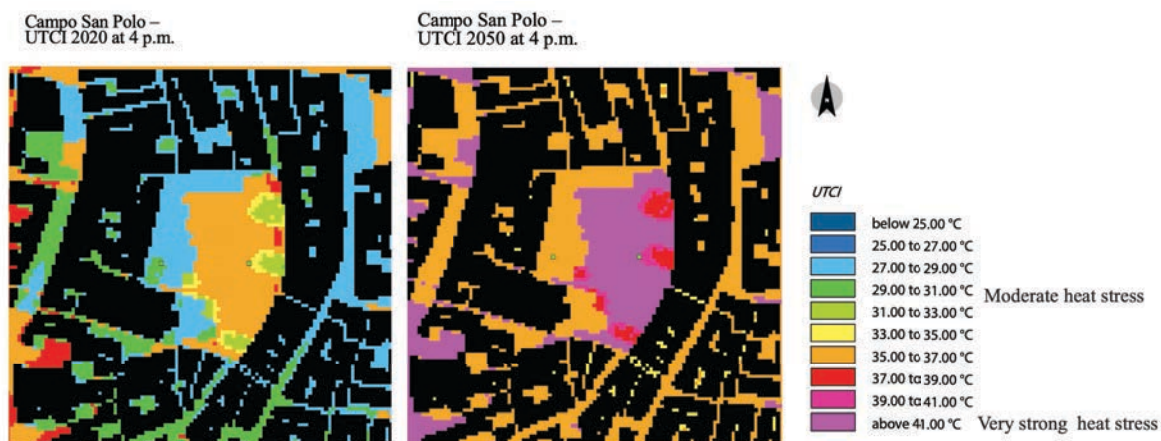


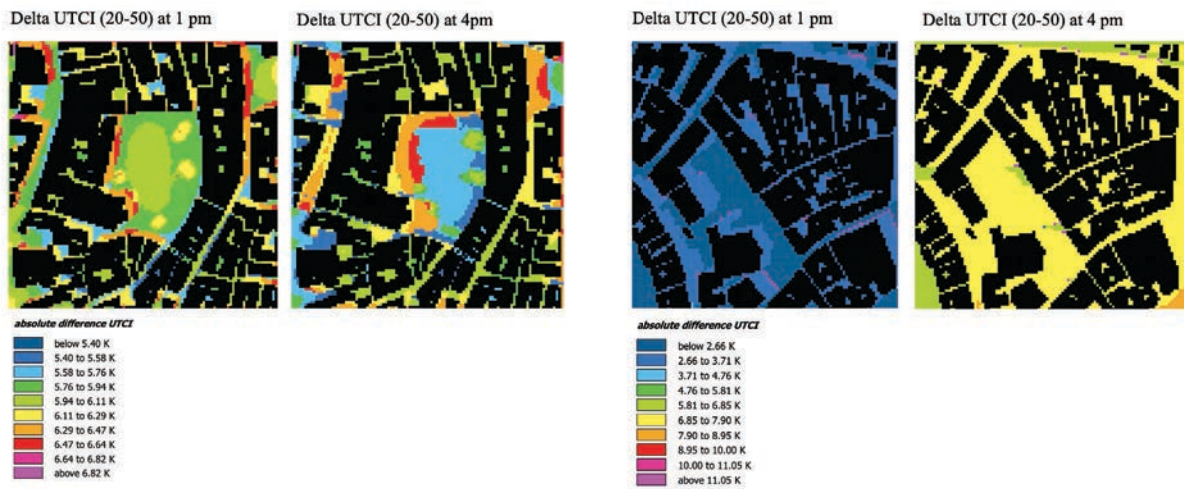
Figure 3. UTCI values map at 4 pm on 19th August for Campo San Polo in 2020 and 2050.



Figure 4. UTCI values map at 1 pm on 19th August for Campo Santa Maria Formosa in 2020 and 2050.



Figure 5. UTCI values map at 4 pm on 19th August for Campo Santa Maria Formosa in 2020 and 2050.



**Figure 6.** UTCI maps comparison for Delta value 2020-2050 for Campo San Polo and Campo Santa Maria Formosa.



## Reading morphology through diagrams. Exploring methodology

Rossella Gugliotta

Politecnico di Torino, DAD (Dipartimento di Architettura e Design), Viale Mattioli 39, 10125

E-mail: [rossella.gugliotta@polito.it](mailto:rossella.gugliotta@polito.it)

Keywords: *reading, diagram, transition, maps, methodology*

Conference theme: *New methods and Technologies for the urban analysis*

**Abstract.** *The relationship between reading and designing can be found in Saverio Muratori's theory. At the same time reading, as a means to understand the contemporary city, meets urban morphology analysis in 1979 in Gianfranco Caniggia e Gian Luigi Maffei "Lettura dell'edilizia di base" in the chapter "Lettura delle strutture edilizie". In this context, reading means understanding urban structures using analytical tools like maps and types to produce different outputs. However, the contemporary city is framed by a co-existence of variable times where past, present and future are linked and overlapped. To explore the complexity of reality it is necessary to define new analytical tools capable of keeping dynamicity. Grounded on the instrument used by the Italian School of Muratori and Caniggia, the following research questions the feasibility of the mapping method as a tool to understand complexity produced by transitional events in contemporary scenarios. Studying the diagrammatic component of the maps reveals its role in understanding urban transition. The diagram as a medium (Gleiter and Gasperoni, 2019) to understand and generate processes can be a functional experimental machine that defines relations between cities' patterns (hidden and formal) and their transformation. Through diagramming the maps of San Bartolomio (Muratori, 1959) and Via Rovelli (Caniggia, 1963), the research explores new methodologies helpful in the transition between the analogical study of urban morphology and data-driven design. The outcome is a method that merges maps and types (diachronic and synchronic) with the help of diagrams, opening the possibilities of multiple representations of urban transition.*

## Introduction

The introduction of the time variable in reading the city leads to the interpretation of the continuous evolution of urban elements as a constant relationship between fixity and mutation. In such a way, it offers a specific facet to research in the discipline of architectural and urban design, which must encounter and measure itself with the becoming of the contemporary city (Mei, 2014). The shape of contemporary cities can be described as a changing dynamic system subjected to continuous stresses over time. From this perspective, architecture enters the paradigm of complexity (Obon, 2022), and consequently, cities are associated with the concept of complex systems.

Complexity theory occurred with the revolution of the XX century with the introduction of three theories: cybernetics (Norman Wiener), informational theory (Claude Shannon And Warren Weaver), and system theory (Ludwing von Bertalanffy) (Obon, 2022), and it became relevant with the study of Edgard Morin.

It is possible to describe the attributes of complexity rather than give a definition. In system evolution, complexity is configured as the intermediate situation between equilibrium and chaos. It is a dynamic condition that tends neither towards immutability nor chaos. In this particular condition, a system manifests intelligent behaviour of adaptation to environmental stresses and exhibits specific properties (Padoa Schioppa, 2015). Complexity theory thus deals with systems whose structure is emergent. This property is a hallmark of the city, the economy, and the ecology within which new elements evolve (Batty, 2018). Meanwhile, the city as a complex system is an entity in continuous change in which the transition process from one state to another is the present reality. The city takes place in a time in which past, present and future are overlapped (Mei, 2014). Its transformation deals with an external and internal system of forces through a non-linear dynamic transition (Easterling, 2019). From this assumption, the study's focal point of this research became the transition process between two states, A and B, that are not necessarily in equilibrium. Moreover, the balance between A and B is not defined as an exact moment (Neyant, 2019). Therefore, there can be categories such as instability, contingency, unpredictability and lack of control, which express the indeterminacy of the complex system of predicting changes (Padoa Schioppa, 2015) and can be useful in considering the contemporary city and interpreting its change. Reading the transition process in this never-ending transformation gives the perception of opening up new possibilities to the project in architecture. The term transition within the city study highlights how dynamism and complexity are two fundamental characteristics in the contemporary environment (Wowo, 2015). The following contribution thus emphasises two main points: transition as a phenomenon to be studied and transition as a matter of representation through the map.

The image-based thinking characteristic of architectural practice reasons profoundly through the use of a specific convention: the map. From its historical origin to its current use, the map intertwines the reading of the territory with that of the inscription (Leader, 2011). The mapping systems as a tool for analysis and visualisation are upstream of many urban studies (Muminovic, 2019). The map does not have the only feature of a descriptive tool, moreover is a theoretical model (Palma, 2000) capable of representing reality by defining a specific orientation of space (Muminovic, 2019) both in terms of time and interpretation. The abstraction process characteristic of the map thus provides a possible trajectory for reading space (Leader, 2011). However, the map is an articulated tool that, although it presents characteristics similar to those of a diagram and makes the shape of the built environment explicit, leaves latent the relational information typical of a dynamic system. At the same time, maps show permeances very well but need help to perform for the permutation. Reading as a keyword to understand the structure of the



urban environment is formalised by using the map as a reading tool to unravel urban transformation by looking towards the city's project. From this point of view, the maps can be considered as a diagram that is forgetting to do its job (Hall, 1992).

### **Transition connecting reading and design activities**

The word "reading" is often related to "the project". This relationship is already found in Muratori's method, which considers the city an aesthetic synthesis defined by the formation process (Muratori, 1959). However, reading as a verb to understand the city concretely encountered urban morphological analysis in 1979 when the term appeared in Gianfranco Caniggia and Gian Luigi Maffei's book "Lettura dell'edilizia di base" in the chapter "Reading Building Structures". Both the code and the instrumentation used to read it allow us to understand what the object is made of, but also to understand where it comes from and how it came to be. The highest performance in reading is achieved when the most effective representation of how a building object is made with its stratifications and transformations (Caniggia, 1979). Reading is understood as a compendium to the project. Above all, reading is a fundamental principle to developing a tool in a methodological framework.

The Italian morphological school, in this sense with its studies on Venice (Saverio Muratori) and Como (Gianfranco Caniggia), defines tools and methods, such as typological maps and types variations, capable of showing the invariants of transformation (i.e. its structure) through a synchronic and diachronic process of decomposition. The structure of the present city explains the past and vice versa, within which the project fits as an outcome of the reading process. From both Muratori and Caniggia, the importance of studying the city is not just about trying to understand how the city changed over time but also how to develop a method to show this transition using the maps. Some characteristics of the morphological map give different interpretations of the transition process in terms of time, scale, deviation, structure and point of view. Each map of Muratori and Caniggia highlights the difference in the mapping system in showing a dynamic process. Muratori maps are made from surveys and cadastral documents, it shows the ground floor of the building identifying doors and stairs but without information on windows. With his students' help, he reconstructs the different phases in which the development of the neighbourhood, St. Bartolomeo, can be described. Each map is made separately with the same level of information but without a clear link or willingness to the overlapping phases. Caniggia, instead, is working differently to show the transition between the roman settlement of Como and the city as it is in the nineteenth century. The maps overlap the nineteenth-century street pattern with the roman transformation over a different time. Each map compares the survey with the conjectural reconstruction of Roman Castrum. It is clear the intersection between the elements of the maps because of the static element of the Roman Castrum repeated in each comparison.

Comparing the characteristic of the maps that show the transition (time, scale, deviation, structure and point of view) with the diagram logic, it is possible to define the diagrammatic components of the maps: abstraction, relation and reaction, sign and symbol, synchronicity, diachronicity, subjectivity, multiscalarity and multimediality. In this sense, the map is similar to a diagram. This vision leads the map as an analogical static tool to a diagram as a form of technology that can keep the city's dynamicity alive.

### **Methodology**

From focusing on definitions of methods, analysis and project tend to be separate practices; instead, links need to be defined. The perspective of the project changes: analysis does not

aim to establish what already exists, and the project does not express itself as a desire for invention. Between the two, a mechanism of mutual exchange is established within which there is the recognition of pre-existing models that are not taken as prior judgement but are re-formed (Rispoli, 2016). For this reason, in developing a new tool able to keep the complexity of the dynamicity alive, it is necessary to consider the need to question the tool continuously while designing (Fig. 1).

The research experiment focuses on transforming Muratori and Caniggia's map into a diagram that can stress the critical component of the representation. Therefore, the objective is not a graphical rework of maps but defines a critical view of a tool that can read the city and simultaneously provide a lens for the development of multiple future scenarios. It transforms an analytical tool into a generative one capable of unveiling processes, relationships, actions and reactions. Its generative feature is the peculiarity of the diagram as a medium (Gleiter & Gasperoni, 2019) helpful in representing transition. The transformation of drawing as a representative medium into a generative one marks its use in the generative design process. Drawings can be diagrammatic if used diagrammatically (Gasperoni, 2022), and maps can be if the diagrammatical component is stressed out in the formation process.

The research method is identified in the diagrammatic experiment in which the dynamic components in the map are stressed. The process of transforming the map into a diagram is divided into two parts. The first is to comprehend the representation of the transition event on the map, and the second developing the critical instrument of the diagram.

The case study used comes from two methodological books on the analysis of the form of the city. The maps of St. Bartolomeo (from the book "Studi per una storia operante di Venezia" by Saverio Muratori) and the maps of Como and Rovelli street (from the book "Studi per una città. Como" by Gianfranco Caniggia) are the two emblematic example of the Italian morphological study. The method developed by the two scholars represented transition and urban change in time, comparing different layers of the evolution of the urban pattern. The emphasis on the map is instrumental for studying the city from a perspective of understanding and acting on urban environments.

The first part of this analysis focuses on redrawing and understanding the map of St. Bartolomeo (Saverio Muratori) and Rovelli Street (Gianfranco Caniggia) as a starting point for the analysis. For each case are defined the macro-phases of the area of transformation (Fig. 2). For St. Bartolomeo, Saverio Muratori defined four phases of transformation from the 11th century to the 19th century. In the same way, Canniggia conducted the study on Como on five phases of expansion of the roman settlement compared with the city of the 19th century and a specific analysis on the case of Rovelli street. The maps are read and ultimately interpreted to understand the tool's logic and the information carried out by Muratori and Caniggia. Within the individual phases, several expansions are therefore identified in extended timeframes. The macro phases of transformation are understood by fragmenting into areas of interest in which variations and changes in the shape of the built environment can be recognised (Fig. 3). The zones of interest have been identified in the map and the written text that recounts the transformation phases of the St. Bartolomeo district and Rovelli street. Therefore, some direct information can be deduced by interpretation and further identified in the construction of the diagram. The macro-phases are subdivided into micro-phases of transformation analysis, in detail, the transition from one state to another of the single area. In the representation, each of the microphases is divided by its time phase decomposing the maps in a different part of scale and entity of the transformation (Fig. 4). Each piece builds the gussets to be introduced into the diagram. Therefore, the map's transformation is assembled, defining relationships of scale, time,

perspectives and dynamics and identifying signs and symbols.

The second part of the reading highlights the generative rather than the descriptive character of the method, seeing the diagram and its functioning as the protagonist. Reading, in this case, means defining a critical instrument that has as its basis the functioning of the transition maps analysed by stressing the diagrammatic components of the map itself composed of temporal, spatial and dynamic variables. Place and time are discriminating factors in reading the urban fabric through the map. Above all, time is the structure of the dynamic component that has the task of showing the transitions of urban form. In morphological studies, the mutations that occur within the city can be broken down through cultural and temporal lenses. The variable "time" in the reading of the city leads to interpreting the continuous evolution of "urban facts" and the continuous relationship between permanence and permutations (Caniggia, 1973). In such a way offers a new research tool to the discipline of architectural and urban design, which must confront and measure itself with the becoming of the contemporary city and its transition. The time variable is used to relate the plurality of times of the contemporary city that moves between past, present and future to define a new character. The mutations that can be found can therefore be defined as diachronic if they occur in the same cultural area in the same period (Caniggia, 1973); if, on the other hand, the mutations occur in a specific and instant time, taken as an abstraction, they are identified as synchronic (Caniggia, 1973). Time and scale built the principal axes of the diagrammatic tool (Fig. 5). The x-axis contains the diachronic variation and, therefore, the succession by phases of changes within the city (diachrony represented by the invariants). The y-axis contains the scale of the urban tissue from the territorial level to the building. Another axes, the z-axis, contains synchronic variations shown in the diagram as a section in a specific time of interest; it shows the typological variation and the permutation of the transition process. The reconstruction of the diachronic variations takes place in successive changes of scale, identifying the phases of the transitional map as the first component, represented by icons in the first row at the territorial scale (the scale in which the two cases of St. Bartolomeo and Rovelli street are less represented but described in the specific methodological text by Muratori and Caniggia). The second part of the analysis is on the city scale, going into detail with the urban tissue analysis. So for each micro-phase previously defined, there is a subdivision in different scales of analysis constructing the tool's transcalarity. As described in the premises, to define the city as a complex system is necessary to reconnect the different scales of transition of the urban environment (Padoa Schioppa, 2015). Finally, at the architectural level, the relationship between buildings can be defined, and it is possible to understand the typological change within the city. Once the transformations are defined on each scale, relationships can link the micro-phases. The links are defined through a relationship of strength between them, identifying strong relationships between areas of homogeneous fabric and weak relationships in the case of neighbouring fabrics where there are indirect influences between transformations. Moreover, the relationships connect all the time into the diachronic period.

Synchronic variations are identified differently from diachronic ones. These define a mutation concerning a primary element, which is the type. For this reason, representing diachronic variations identifies the process, while synchronic variations represent the exceptions and are easily identifiable through a section. The change of a basic form is identified by cultural, historical, social, territorial and morphological variables (Caniggia, 1979).

The final output relates the diagram's components to each other to identify the permanences and permutations. The outcome, therefore, concerns the identification of permanences that are directly legible on the map and permutations that are difficult to interpret from the map

are instead identifiable from the synchronic sections. Within diachronic development, it is possible to define fixed elements that constitute the structure of the transformations, which cannot be replicated because it is composed of unique and specific rules. Meanwhile, from the synchronic section, the permutation can be defined, although invisible on the map (Fig. 6).

### **The diagram of transition**

The experiment has been conducted on both St. Bartolomeo and Rovelli Street, and the result is transforming the typological map into a diagram of transition.

From the two elaborations of the map of Venice and Como, it is possible to draw considerations on the concept of permanence, which is the core of urban morphological analysis, and permutation that is a brand new direction in the dynamic study (Trisciuglio et al., 2021). The ultimate aim of the analysis of method and instrument is to subvert the duality between permanence and permutation. As mentioned before, the typological map aimed to recognise the permanence inside the city. Starting from their epistemological frame, the maps of Venice and Como, are aimed at the study of transition, a phenomenon that is based on behalf of the methodology within which the maps are inserted, on the static concept of permanence. Both the Venice and Como maps suggest, through the use of layers of succession and overlapping creating dynamicity, the use of the transitional paradigm as an unveiler of changing urban elements.

In the case of Como and Venice, the map as abstraction takes on a precise role. The maps do not serve to represent a state of affairs but highlights how behind a permanent sign within the urban fabric, it is possible to reconstruct a diachronic and synchronic evolution (even conjectural) that explains the transformation phenomenon. The maps should, therefore, not merely overlap but be interpreted to illustrate, even schematically, possible correlations between different periods of expansion. Therefore, understanding permanence correctly is a process based on the construction of the map and its informative character by choosing to represent successions. At the same time, reading the permutation with maps is not immediate, but it comes from external consideration not directly readable on the map.

Permutations, unlike permanence, can be represented by symbols. This is because the concept of permanence and its narration within the map and transition narrative is not fixed but depends on several variables. The significant output from the analysis of these two case studies is not so much the definition of the specific permanence occurring in Venice or Como as it is to identify what kind of changes and how they are regulated, but above all, how they can be understood within the urban fabric. Thus understood as an exception within a presumed rule, the permutation is composed of the event that generates it and the combinatorial variables that influence its formal definition. Permutations like permanences are the result of comparing different scales in different city times. This leads to the reasoning that the whole idea of permanence is an illusion. However, the term architecture is often associated with the belief of a profound structure not prone to change, every object and every architecture when it enters into relation with time changes. Instead, the possibility of variation opens up precisely because the replication mechanisms are imperfect (Ingold, 2019).

Similarly, considering permutations for the construction of a new tool capable of reading the transition allows the dynamic component of the design to be included already within the analysis. The dynamic concept linked to the permutation thus makes it possible to define an investigation tool that can be interrogated throughout the entire design process. Moreover, the final output is not predictive of the project but provides multiple scenarios that can expand the regenerative horizons of the city.

## Conclusion

According to Stewart Brand, architecture focuses on permanence (Brand, 1994). The term architecture is often associated with the belief in a profound structure that is not prone to change; however, every object and every piece of architecture, when it comes into contact with time, changes. Architecture, and with it, the city, modifies and adapts even without any particular predisposition to change. In fact, buildings are part of the world, a world that unfolds in its innumerable paths of growth, decomposition and regeneration, leading to ever and continual deviations. Completion is an idealisation (Ingold, 2019) and permanences is as well. Multiple visions of the map and diagram lead to different understandings of the urban fact. The research proposed here has no imposition methodological purpose. However, it aims to make a methodological critique of the morphological school by exploring new and multiple scenarios for representing, reading and visualising urban transitions. In this sense, the diagram can be understood as a critical instrument in urban morphology analysis, grounding a base for technological study on urban form and strongly linking the project with the city's reading.

Although the research results are still in development, some issues can be considered for future engagement of the tool in the design thought reading. The overexposed research aims to improve map components that can help visualise the qualitative method, working on the diagrammatic component of the tool. Maps are undoubtedly a good candidate to study the diagrammatic approach to the city's transition. Despite the risk in the transformation from maps to diagrams to become an exercise of style on drawing, some considerations corroborate the use of the diagram in method exploration. Furthermore, the diagrammatic process has entered architectural design as a moment of transformation and generation of new forms of the imaginary. For this reason, the diagram can be considered a medium that allows the translation of perfect shapes into thought and vice versa (Gasperoni & Gretschi, 2022).

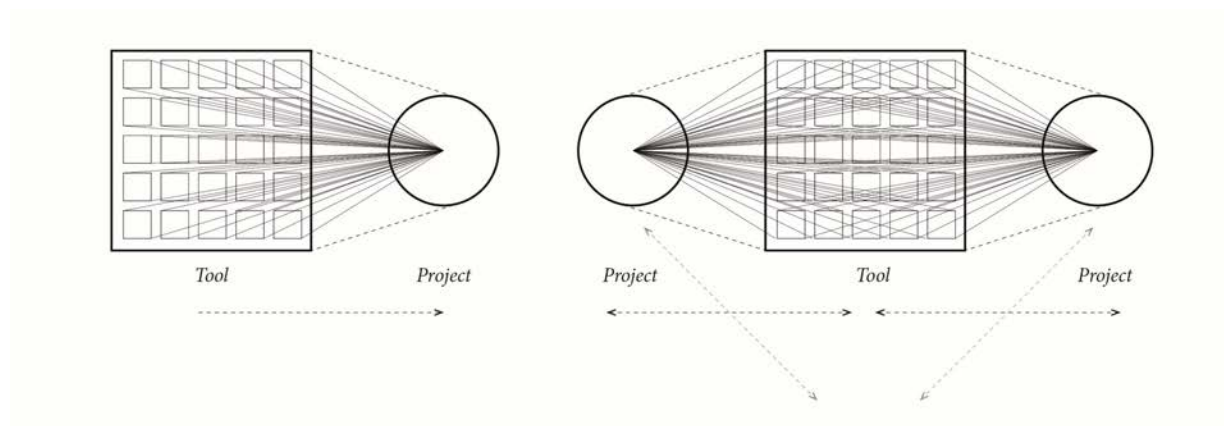
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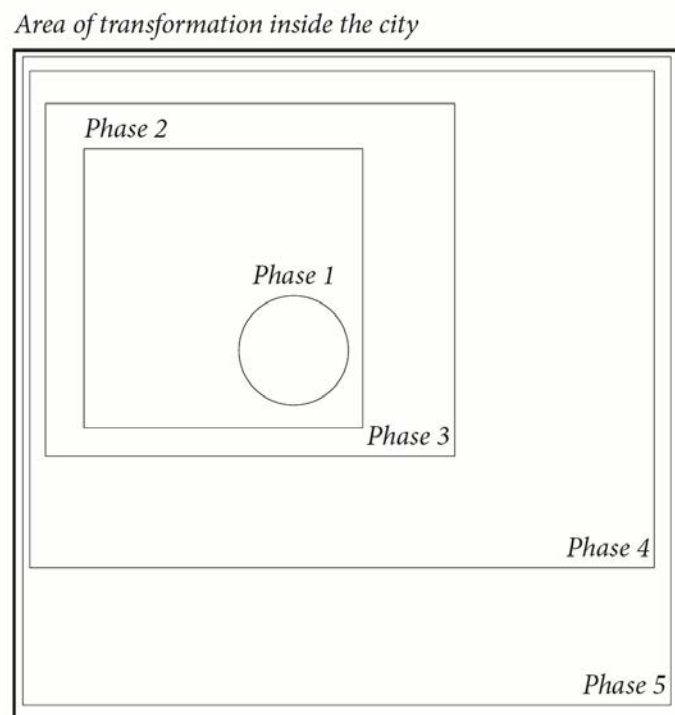


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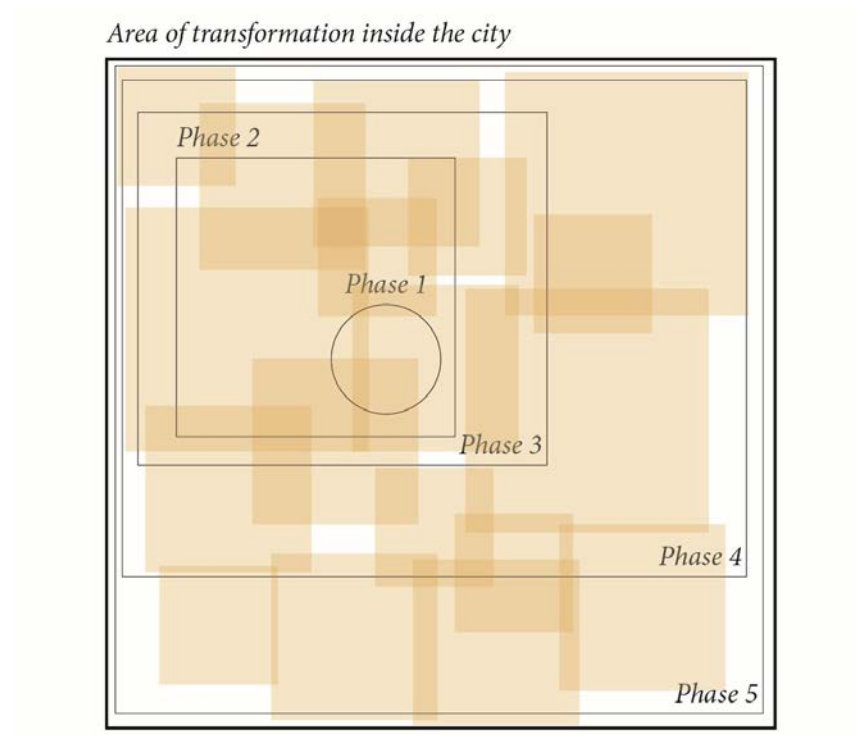
### Illustrations and tables



**Figure 1.** The information exchange process between tool and design.



**Figure 2.** Process of identification of the macro-phases of transformation.



**Figure 3.** Identification of micro-phases.



**Figure 4.** Decomposition of the macro-phases in micro-phases

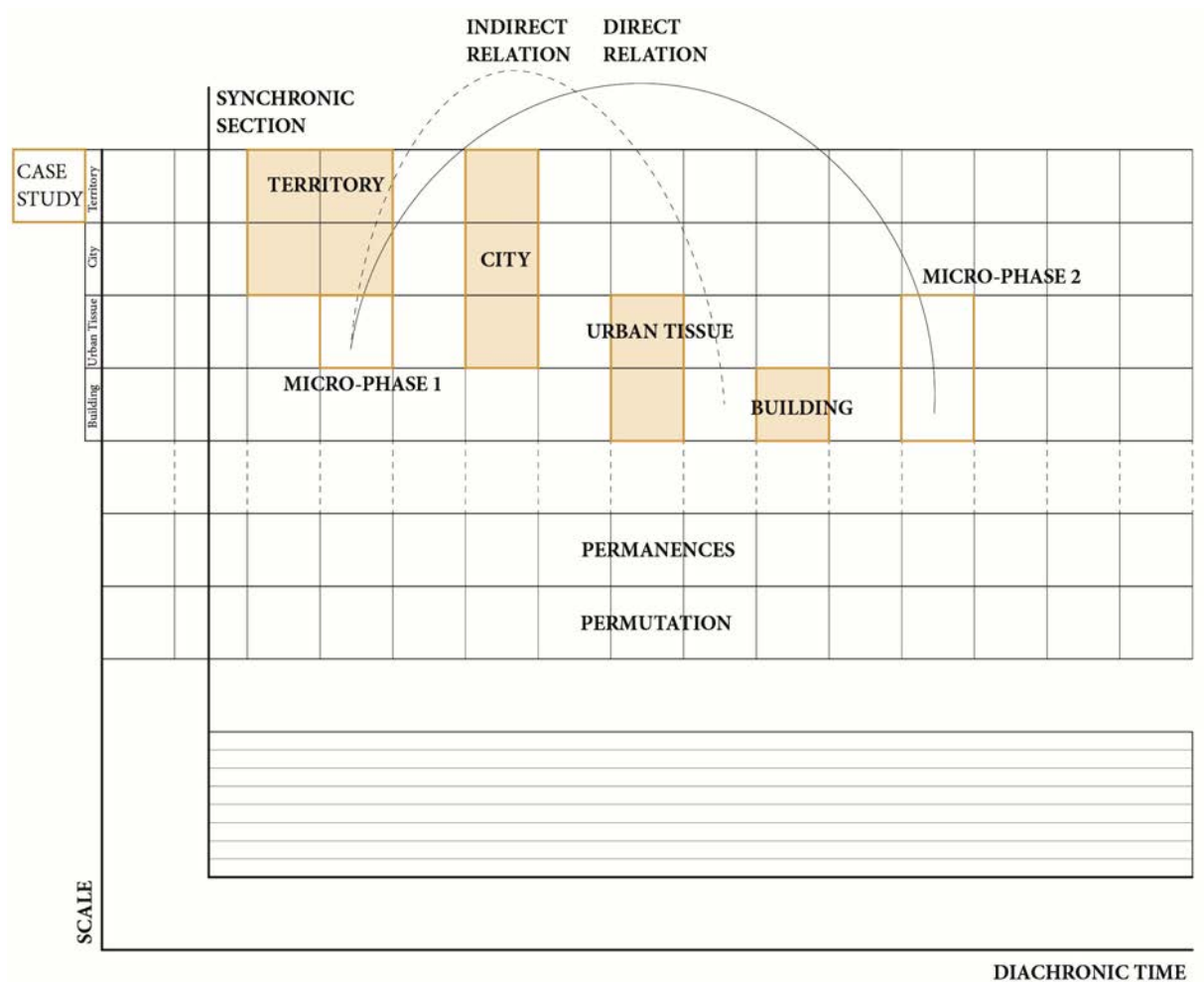


Figure 5. The diagrammatical space of transition. Constituent of the diagram.

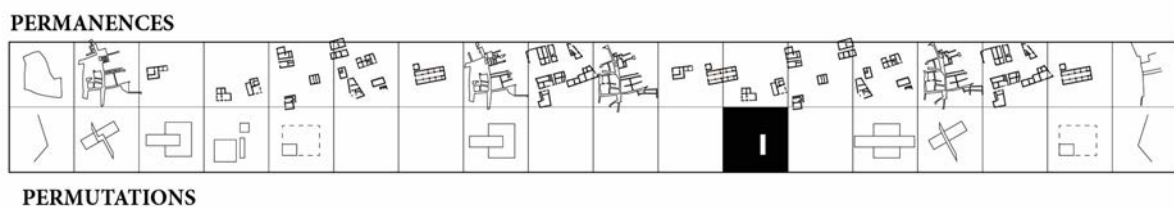


Figure 6. Permanences and permutation. St. Bartolomeo as paradigmatic example.

## Typological process of the historical courtyard houses in Yazd, Iran

Nahal Khorrami<sup>1</sup>, Alessandro Camiz<sup>2</sup>, Alessandra de Cesaris<sup>3</sup>

<sup>1,2</sup>Özyeğin University, Faculty of Architecture and Design, Department of Architecture, Istanbul, Turkey

<sup>3</sup>Sapienza Università di Roma, DPDTA Sapienza (Dipartimento di Pianificazione Design Tecnologia dell'Architettura), Via Flaminia 70, 00196, Roma, Italy

E-mail: <sup>1</sup>Nahal.khorrami@ozu.edu.tr, <sup>2</sup>Alessandro.camiz@ozyegin.edu.tr,

<sup>3</sup>Alessandra.decesaris@uniroma1.it

Keywords: Building typology, Urban morphology, Architecture, History

Conference theme: New methods and Technologies for the urban analysis

**Abstract.** The transition from the Sasanian Empire (224-651) to the Islamic era determined diachronic changes in the residential typology. The courtyard house was in use in this area from ancient times, but in the transition to Islam some variants developed hence a different social organisation. This research is based on the comparative analysis of the historical courtyard houses of Yazd and the pre-Islamic courtyard houses in Iran, in order to identify their typological process. Upon a selection of courtyard houses, from the same cultural area, the research outlines the analogies and differences. These courtyard houses represent their historical periods. This research examines 24 courtyard houses from four historical periods, pre-Islamic period (before 633), Islamic period (1158-1350), Qajar period (1785-1925), and Pahlavi period (1925-1979). After identifying courtyard houses and finding their basic information such as history, documents, photos. In the first phase, the research determines the location and the orientation of courtyard houses. In the second phase, the research places them in the matrix to examine and compare their characteristics. This research considers two scales, building scale and street scale, as a typological frame. The research compares courtyard houses with the courtyard houses of the same and different historical period, synchronic variant and diachronic variant. The main question of this paper is that, can we find and understand the origin of historical courtyard houses of Yazd using comparative analysis? The research method of the study is comparative and written sources are used to collect data.

## Introduction

This research is a building typological study. Its aim is to understand the courtyard houses of a historic city, Yazd, Iran, especially their formation process. Yazd province is in the central part of the Iranian plateau. Yazd province has 10 cities. City of Yazd is the capital of this province.

City of Yazd was one of the very ancient cities of Iran. Some attribute the Yazd foundation to Yazdegerd I and some to Alexander the Great, but historical evidence shows that the time of creating population centers in this area is very old, which estimates the Yazd foundation to be between 8 and 10 thousand years old.

## Methodology

The typological process expresses the progressive transformation of the concept of "house" into a specific place. If we examine several historical building types in the same cultural area, we perceive progressive differentiation among them, more marked in very old buildings and less so in more recent buildings. (Caniggia & Maffei, 2001)

This paper suggests that the typological process of historical courtyard houses of Yazd can be defined in three stages.

First, after a general study of the history of Yazd for identifying morphological periods. A series of types, courtyard houses, from same cultural area, Yazd, are chosen as case studies. These houses represent their morphological periods. In this research, 24 courtyard houses are chosen from four Historical periods, pre-Islamic, before 633, Islamic period, 1158-1350, Qajar period, 1785-1925, Pahlavi period, 1925-1979.

Second, for examine chosen case studies, scale is considered as typological frame. In this research, the types are identified at two scales: Building Scale, Street Scale.

Building Scale: Internal Access Pattern (Route Hierarchy), Internal Spaces Pattern, Internal Spaces Function, Visibility, Permeability.

Street Scale: Building Position Relative to the Street and other Buildings, Building Form, Building Orientation, Building Plan, Entrance, Building Dimensions.

Third, the types are compared in two scales with the types with same morphological period and types with different morphological period, synchronic variant and diachronic variant. (Gokce & Chen, 2018)

## Measurement and analysis

### Yazd architecture

In the historical context of Yazd, urban spaces are completely enclosed and they have a minimum of open spaces, because they are difficult to maintain due to unfavorable climate conditions. The design of the passages is narrow, sometimes enough for only two people to cross, irregular and generally covered with arches. The combination of these narrow passages and high walls of buildings is effective in creating shade against intense sunlight. As a result, as much shadow as possible is created. Irregularity and twisting of these passages also reduce the intensity of winds and desert winds.

Buildings in hot and dry climates, such as Yazd, are often constructed in such a way that they can be used in four seasons. To overcome the climate problems of the region, the residents of these areas considered the following items in the design and construction of their buildings for instance, residential houses.

### *Construction of introverted and enclosed buildings with courtyard*

Due to the extreme temperature fluctuations in this climate zone, lower humidity than human



comfort, sunlight and heat in the hot summer season and wind currents along with desert dust, by creating a courtyard in the middle of the residential houses and installing a water pond and garden in it, by increasing the humidity in the living space, comfortable conditions can be provided for the residents of the houses.

The rooms open only to the courtyard to be protected from wind and storms along with desert sand. Tempering their air against the cold of winter and moderating their humidity in summer with the help of the courtyard is well done.

#### *Construction of basement and Ayvan*

In most houses in this climate, there are large basements with cool and pleasant air. To prevent heat from penetrating the building, they built covered, one sided and back to the sun Ayvan. It is desirable to create universal canopies on the roofs and consoles on the outer walls.

#### *Construction of Badgir*

In hot and dry areas, efforts have been made to avoid creating air flow between the interior and exterior of houses, especially in high temperatures and hot weather, through openings. For this reason, Badgirs were created to cool the closed space naturally. Badgirs are built in the south or southeast of the houses to be located on the north or east direction, to bring cool air to the middle parts of the building. (Akhtar Kavan & Sedigh, 2013)

### **Historical courtyard houses in Yazd**

Historical courtyard houses of Yazd meet a wide range of human needs due to the central open space or courtyard that acts as the heart of these houses. The organization of spaces around the central open space of these houses has caused the connection of artificial and natural spaces and it has separated building from the outside world and made courtyard houses introverted. This introversion is consistent with the climate, beliefs, religion and lifestyle of the inhabitants. The courtyard is the private paradise of these houses. By continuing to be present in this paradise, a sense of place, a sense of belonging and attachment to the place is created in the residents. (Ahmadi, 2012)

### **Qajar, 1785-1925, and Pahlavi, 1925-1979, Period**

These courtyard houses are in the historical context of Yazd.

#### *Courtyard houses form, orientation and plan*

Historical courtyard houses of Yazd have a cube form because the cubic shape is the most suitable form for these houses, due to the hot and dry climate of this region.

Courtyard houses in this area are located between the south and 35 degrees southeast, they orient along the east-west axis, according to the angle of the sun's rays and the direction of the wind.

The plan of these houses is dense and compact and the external surface of these buildings are less than their internal volume. (Akhtar Kavan & Sedigh, 2013)

#### *Courtyard houses material*

The materials used in historical courtyard houses of Yazd are mainly mud, clay and brick. Due to the climatic conditions, these materials have good performance, because they heat up late during the day with direct and intense sunlight and they lose their heat gradually and slowly during the night. Therefore, the temperature fluctuation will decrease during the day

and night. On the other hand, these materials are native materials of Yazd and can be easily found in this area.

In these courtyard houses, the frame of the building, doors and windows are made of wood. (Akhtar Kavan & Sedigh, 2013)

### *Courtyard*

In historical courtyard houses of Yazd, the courtyards are the central elements, introverted, independent and they are spaces with a geometric order that are open and facing the sky. The size of courtyard houses and the number of courtyards depend on the financial capacity and social status of the house owner. The house of the poor people had several rooms and a courtyard, while the house of the rich people often had two courtyards: 1. Exterior Courtyard, for men, men who are not intimate enough to have access to the women's space and for the house owner's job. 2. Interior Courtyard, for women and men who are intimate enough to have access to the women's space for instance, father, brother, uncle and husband. The house of the rich people sometimes even had more than two courtyards, and their number sometimes reached six courtyards, each of them had its own function. The other four courtyards are: 3. Stables Courtyard, 4. Crew Courtyard, 5. Khaajegan Courtyard, 6. Narenjestan. (Ahmadi, 2012) The main courtyards of these houses have a rectangular plan and they are located in the middle of the house, therefore, other spaces are built around these courtyards. In Yazd courtyard houses, the courtyards are located along the north-south to be in harmony with the climate of the region.

Historical courtyard houses of Yazd are not separate from nature, and the presence of representative of nature within the space organization of these houses is mandatory.

Water is closely related to the sky in the thinking of ancient people in Iran, and is one of the most important natural elements, which was of special importance among the people in many ancient lands of Iran, especially in hot and dry lands where people faced water shortages. Therefore, water was sacred to the people and they built places to worship it.

In the middle of the courtyards of Yazd historical courtyard houses, there is a pond that has rectangular shape and is located along the direction of the courtyard. The percentage of the ponds area compared to the total courtyards area is 10% to 20%. The water in these houses, in addition to lowering the air temperature and creating humidity that softens the air which is a climate advantage, it also induces a sense of calm by creating good visual vision and sometimes creating sound using fountains. The presence of water in the courtyards of residential houses is a symbol of Iranian paradise.

In the courtyards of these houses, there are gardens symmetrically on both sides of the pond. Flowers and trees in these courtyards cause shading and increase humidity and thus contribute to the comfort of the space. In addition to the importance of green space and plants in regulating the environmental conditions of hot and dry climates, they give a special beauty to the courtyards. (Afshari Basir & Nasiri & Mofidi Shemirani, 2017)

### *Courtyard axes*

The principle of unity is one of the most important principles in the architecture of historical courtyard houses of Yazd. This principle encompasses the axes, hierarchy, orientation and geometry of spaces. Principle of unity is seen in the space organization of these courtyard houses. In this regard, these houses have two axes perpendicular to each other in the courtyard, which are the factors that place the surrounding elements, due to their values, dimensions and depend on the life in which it occurs. The first axis or the main axis is in the north-south direction,

perpendicular to the main façade of the courtyard and it is longitudinal. Along this axis, the main axis, the spaces in which collective and family life takes place, are located, for instance, Ayvans. The second axis or the secondary axis is in the west-east direction, parallel to the main façade of the courtyard and it is transverse. Spaces that are located along this axis, secondary axis, are less important, for instance, rooms. The intersection of these axes is the center of the courtyard houses, a moving and dynamic point. (Taghizadeh & Taghvaei, 2020)

#### *Courtyard facades*

Each courtyard of historical courtyard houses of Yazd has four facades, these facades are facing and conversing with each other, two by two. The height of these facades is one or two floors.

Another highlight of these courtyard houses is the scale. In the courtyards, the scale is such that a person, according to his field of vision, when faced with a façade or set of facades, what he sees fits his height and he can see the members of the facades at the same time. Therefore, he can instantly feel the feeling of unity and oneness in the facades. This factor helps to perceive and understand the place, and through it, a completely human space is created in the courtyards, which is the center of gathering events and concentrating forces.

Ayvans are a semi-open space, inside or sitting back in the heart of the courtyard's facades with larger dimensions than the surrounding spaces and along the axis of the courtyards. They are limited by three load-bearing walls and a roof. The value and importance of Ayvans are not the same and they often differ in terms of dimensions, decorations, access, combination with the surrounding spaces and function. Ayvans are located between open and closed spaces. Belonging to the building on the one hand, and connection with the courtyard on the other hand, has created a common space at the intersection, which has made it possible to use the two spaces. Ayvan is a communication and transfer space with a distinct combination, but at the same time, it is an independent space with a special function. This duality shapes the existence of the Ayvan. The location of the Ayvans in the middle of the courtyard's facades and the main axis of the courtyard houses, i.e. the axis of the courtyards, where the most important spaces are organized, affects the observer both aesthetically and psychologically. In other words, the Ayvans attract the attention of observers at the first encounter. (Rezaeinia, 2017)

#### *Courtyard houses entrance*

In historical courtyard houses of Yazd, due to the way that courtyards, open and closed spaces are organized, entering the houses as privacy is always associated with hierarchy, creating a turn in the entrance path and filters such as porches and corridors. This creates a sense of security and respect. To enter these courtyard houses, you must go through three parts, porch, narrow corridor and courtyard area, each of these three spaces is both a physical experience and a spiritual experience in the process of entering the house.

The number of entrances depends on the area of the courtyard houses, smaller houses have one entrance and larger houses have two entrances. In courtyard houses with two entrances, one is the main and luxurious entrance and is for the use of guests and house members, while the other one is a secondary entrance and is for the use of employees and servants.

Having two entrances, main and secondary, with different uses in some courtyard houses caused the house to be divided into two parts. Each part has specific spaces with different uses, for instance, in one part guest room and the owner's office are located and in the other part, there are service spaces.

The entrances of historical courtyard houses of Yazd are in the corner of these houses and are not in the middle, along the axis of the courtyard. (Fig. 1) - (Fig. 4)

### **Atabakan Period, 1158-1350**

#### *Tagh boland-ha (Hosseinian) House*

This house is one of the oldest houses in Yazd. The time of construction of this building is attributed to the reign of Atabakan 1158-1350 in Yazd. This house is in a series of brick buildings, next to Gonbad and Hosseinieh. There are four courtyards with a rectangular plan in this house and one of them is the largest and it is the main courtyard. The main courtyard is located along north-south. Each courtyard has four facades that include Ayvan and other spaces. The entrance to the house located in the corner, now consists of a short, narrow and winding corridor, which is well known for its adjoining entrance. Before today's entrance, it was symmetrical in the middle of the house, in the direction of the axis of the courtyard. (Einifar & Khademzade, 2011)

### **Pre-Islamic, before 633**

The residential areas of the pre-Islamic period, i.e., the middle of the Sassanid period, 223-652, have been less explored. For this reason, we do not have a clear picture of how the living spaces of different classes of society are, and this ambiguity is more about the lower classes and ordinary people. An important point to be note is that at that time a significant part of Iranian population was nomadic. Therefore, in Sassanid period, 223-652, society includes the resident population and the nomadic population. Most of the resident population lived in villages and their minority lived in newly built cities. Ordinary people's houses had a less durable construction method and materials than palaces, therefore, due to war and natural disasters, they underwent transformation and destruction, which reduces the information from that period. But it can be said that residential houses are a simplified design of palaces of this period.

Sassanid courtyard houses had one or two floors. The second floor had a residential function and the first floor had a service function. These courtyard houses, consist of a courtyard and one Ayvan on one façade of the courtyard or two opposite Ayvans. The covered spaces were built almost symmetrically around the courtyard and Ayvans. The courtyard houses of richer people had more space. In these houses, Ayvan is in the middle of one, two or three facades of the courtyard, and in more complete plans, there are four Ayvans in courtyard. Not all Ayvans are equally important, and the largest Ayvan is the most important. (Tahmasbi, 2013)

#### *Haji-abad house*

This house is in the south of Darabgerd, Fars province, Iran. Darabgerd region dates to the early Achaemenid period, 330-559 B.C.E. there are several parts in this complex. The first part is the outer part or the common court, which has a courtyard and Ayvan facing it. It leads from the end of the Ayvan to the special court. The second part is the residential area, located in the west of the complex and the other part is the religious area. located in the northwest of the complex. (Yuosef Jamali & Salimi, 2008)

#### *Almaarid house*

This house is in Ctesiphon, Today's Iraq. Ctesiphon was founded by the Parthians, 250 B.C.E-226, about 30 kilometres from Baghdad. This city was the political capital of the Sassanids. In this house, the outer part has a T-shaped Ayvan with columns. The inner part has a large courtyard

with four Ayvans, and other closed spaces are surrounding the courtyard. The third part is the residential area, located in the southwest of the inner part. The other part is the religious area, located in the south of the complex, while it has access to both the inner and outer parts. (Tahmasbi, 2013) (Fig. 5)

### Typological process

Based on the remains of ancient pre-Islamic houses that exist in many central parts of Iran. It can be said that normally every house consists of two parts, one is closed and built space and the other is open and unbuilt space (courtyard). In these areas, the weather is cold for half of the year and warm and temperate for half of the year. Therefore, part of the activities of the residents was done outdoor when the weather is suitable. Although the role of geographical and environmental phenomena in the formation of open spaces or courtyards is obvious, but culture, tradition, beliefs, philosophy, identity and human values can be named as the main factors in the formation of courtyards.

Various buildings, especially houses, have taken a very long time to reach the full form of the courtyard, a form that can be seen in the courtyard houses of the Qajar 1785-1925 and Pahlavi 1925-1979 period.

One of the oldest surviving houses from the pre-Islamic period in Iran is Tagh boland-ha (Hosseinian) house in Yazd. By examining this house, we can understand the antiquity of the courtyard pattern in this city. Unfortunately, due to the lack of attention to this historical pattern in the formation of contemporary houses in Yazd, the structure of the courtyard has been completely removed and no effect of the values of this structure can be seen in the contemporary residential houses. (Mohamadi & Neyestani & Mousavi Koohpar & Hojabri Nobari, 2011)

Ayvan is one of the lasting elements of Iranian architecture that has found various forms and composition from the first millennium B.C.E to the present day. Evidence shows that Ayvans were used in government, religious and aristocratic houses in pre-Islamic period. In the Islamic era, Ayvans were used in various types of architecture such as palaces, mosques, tombs, schools, Carvansaras and houses. There was a significant relationship between the dimensions of the Ayvans and the position of the governments. In other words, the more powerful rulers built high Ayvans with many ornaments. Ayvans are divided into three types according to their shape, depending on the type of roof covering. The first type are Ayvans with flat roofs and gabled roofs, which date back to the first millennium B.C.E in Hasanlu area. The second type are Ayvans with curved roofs and arched roofs, which date back to the Parthian period, 250 B.C.E- 226, in Seleucia area. The reason for the emergence of these two types of Ayvans is the change of materials and the development of construction techniques. The third type of Ayvans are a combination of columnar and arched type. So that in front of the arched space, there is a row of columns called Tarma or Tarmeh, which date back to the Sassanid period, 224-651. Ayvans with Tarma are popular in the Islamic era and especially in Qajar period, 1789-1925. The common feature of all three categories of Ayvans is position, function, dominance and nobility to the external environment.

Ayvan has been implemented in various designs and combinations in architecture. Before Islam, buildings were built with one Ayvan, Two Ayvans and four Ayvans. Finally, the design of four Ayvans became a standard and perfected Islamic architecture. (Rezaeinia, 2017)

When we look at pre-Islamic courtyard houses of central area of Iran, we find that the entry of Islam into Iranian architecture has changed the entrance of these houses. In pre-Islamic courtyard houses the entrances were in the middle of the house and they were symmetrical.



On the other hand, in Islamic courtyard houses, especially in Qajar, 1789-1925, and Pahlavi, 1925-1979, period, the entrances are in the corners, due to two reasons. First, the changes that took place with the arrival of Islam in Iran, and its impact on architecture. Second, architects did not want to mark the entrances in the courtyards facades by placing them along the two axes of the houses. In other words, at the intersection of the axes with courtyards facades, are closed and semi-open spaces such as Sedari, Panjdari, Ayvan. For the architects of that time, these spaces were more valuable than the entrances.

Another change that came with advent of Islam, was changing the path from entrance to the courtyard in these courtyard houses. Before Islamic courtyard houses, these paths were straight and people reached the courtyard through a direct corridor from the entrance. But in Islamic courtyard houses, the paths are not straight and they are winding and they have a hierarchy. It can be said that the reason is the religious beliefs of the residents of these houses, they wanted the courtyard space, which is the private part of the house, to be separate from the outside space and not to be seen from outside.

Some of courtyard houses from Qajar, 1789-1925, and Pahlavi, 1925-1979, period in Yazd, consist of two houses, or with two entrances they are divided into two houses. It can be said that this feature is taken from pre-Islamic courtyard houses. In those houses, there were different halls with different uses, for instance, different halls for women, men and for different occasions. (Fig. 6)

## Conclusion

Courtyard houses not only consider the physical needs and comfort of the body, but also care about the peace of mind of the residents. These houses are an example of human-oriented architecture, and they improve the quality of life and housing of the people who lived in it. They also improve the level of physical and mental well-being in the environment.

This research examined and compared 21 courtyard houses from Qajar period, 1789-1925, and Pahlavi period, 1925-1979, one courtyard house from Atabakan period, 1158-1350, and two houses from pre-Islamic period, before 633. This paper contains the typological process of historical courtyard houses of Yazd, their similarities and differences.

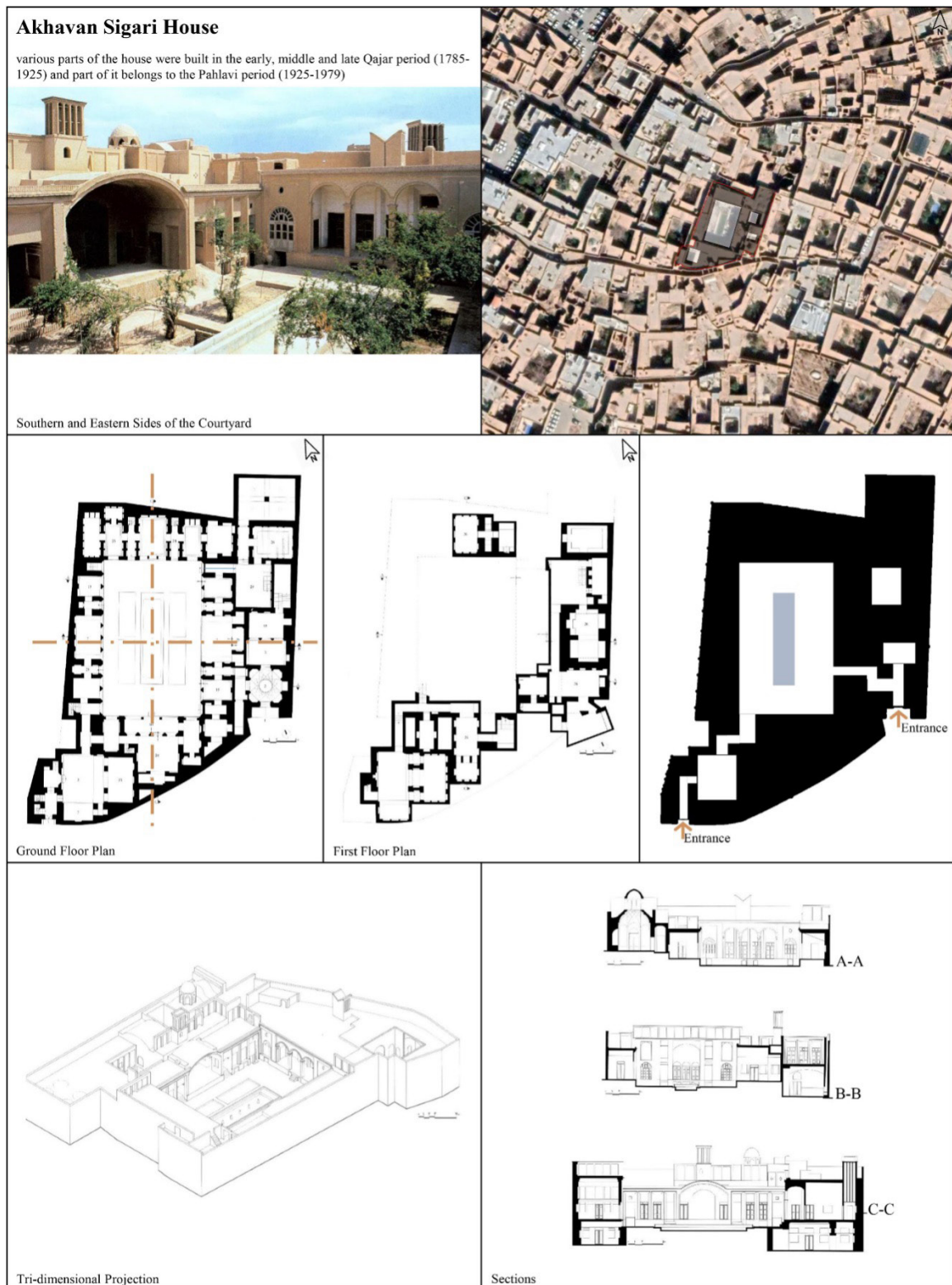
Introversion, separation of the private spaces from public space, privacy, observance of the hierarchy of access, provision of comfort, dynamism and vitality, connection with nature, adaptation to the culture and religion of the inhabitants and psychological security. It can be said that these are common features of historical courtyard houses of Yazd. Some of them are like pre-Islamic houses but some of them have changed throughout history.

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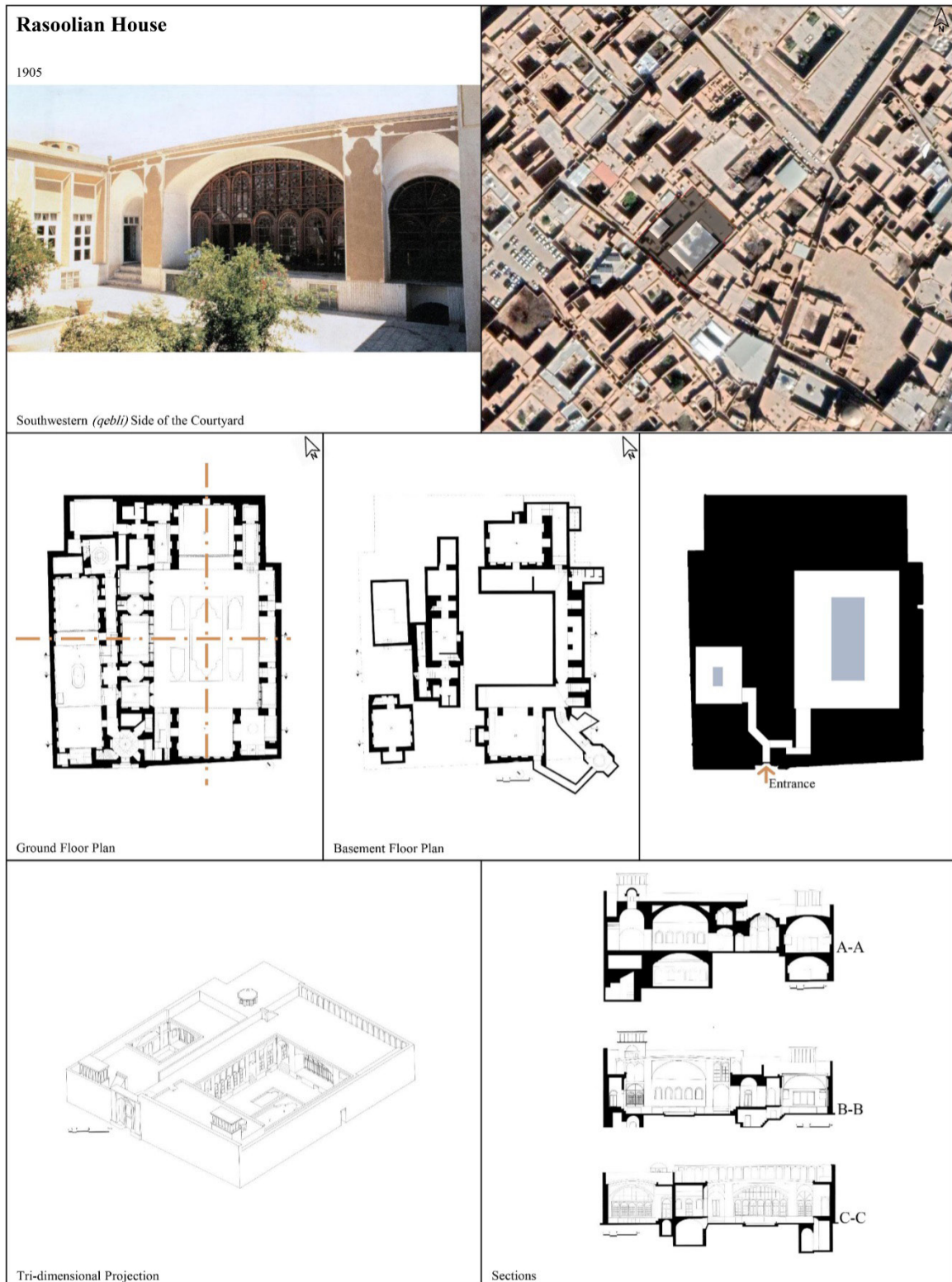
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## Illustrations and tables

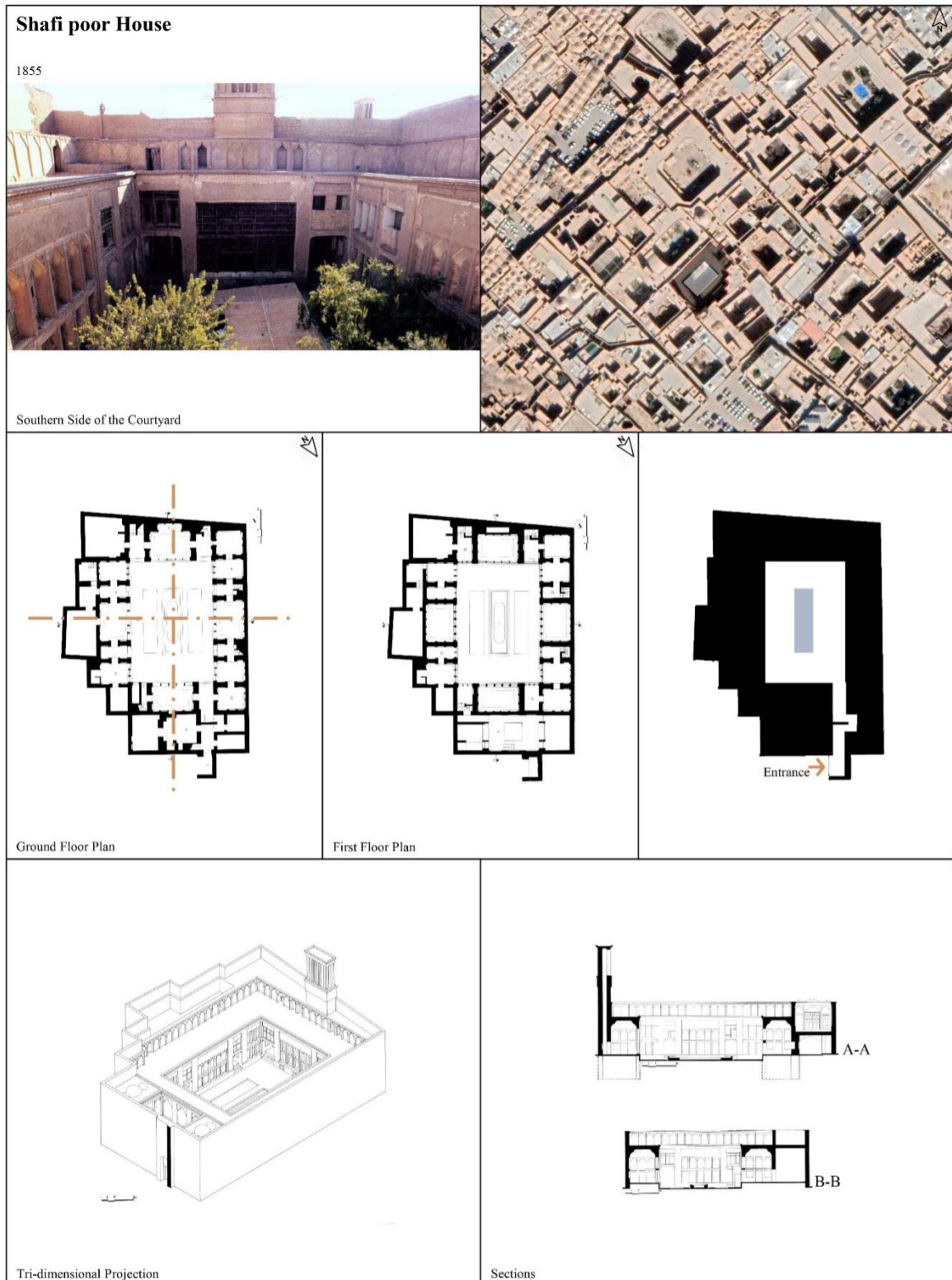


**Figure 1.** Distribution of Akhavan Sigari House drawings. Author's elaboration using drawings from (Haji Ghasemi, 2004)



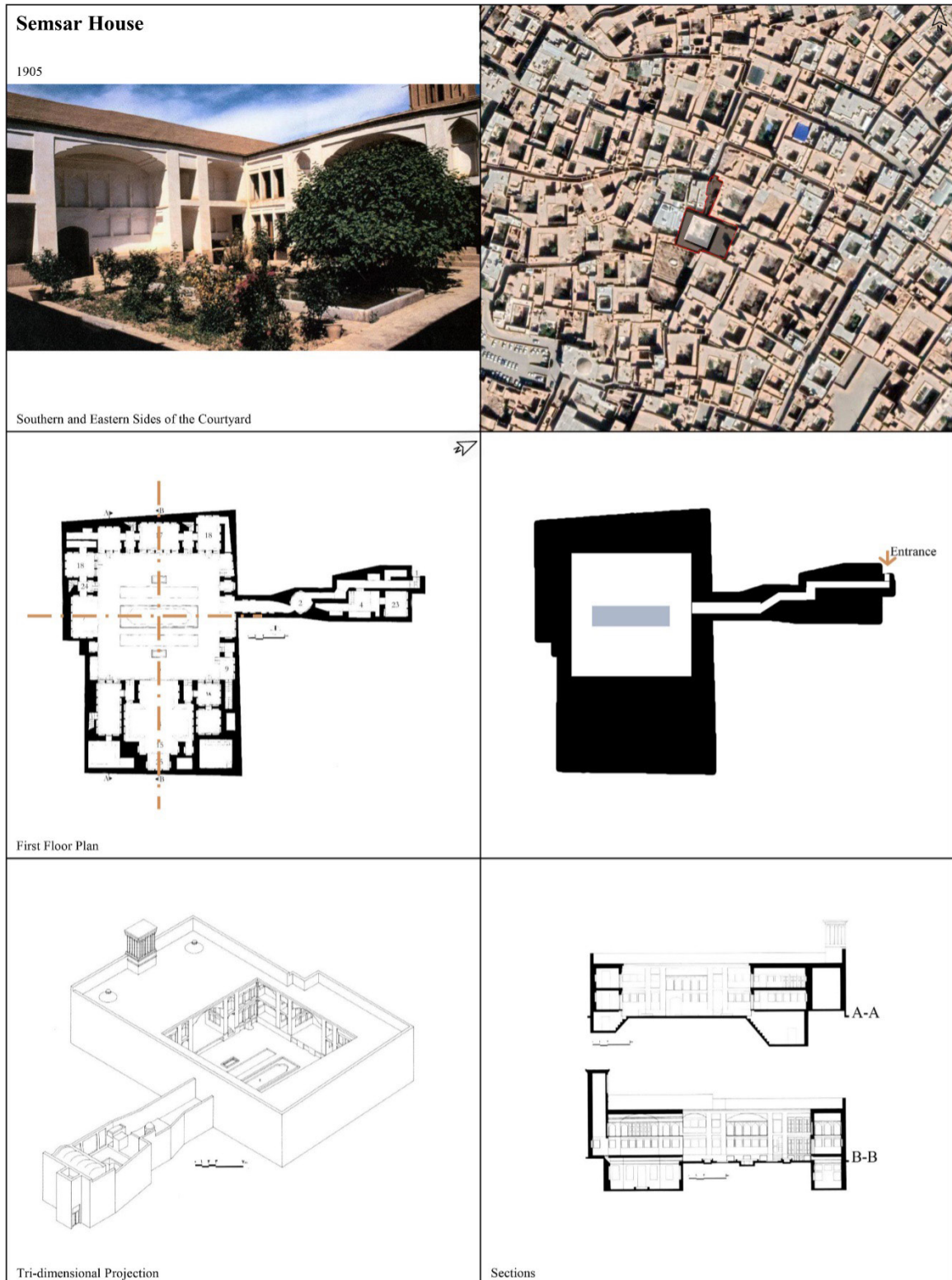
**Figure 2.** Distribution of Rasoolian House drawings. Author's elaboration using drawings from (Haji Ghasemi, 2004)



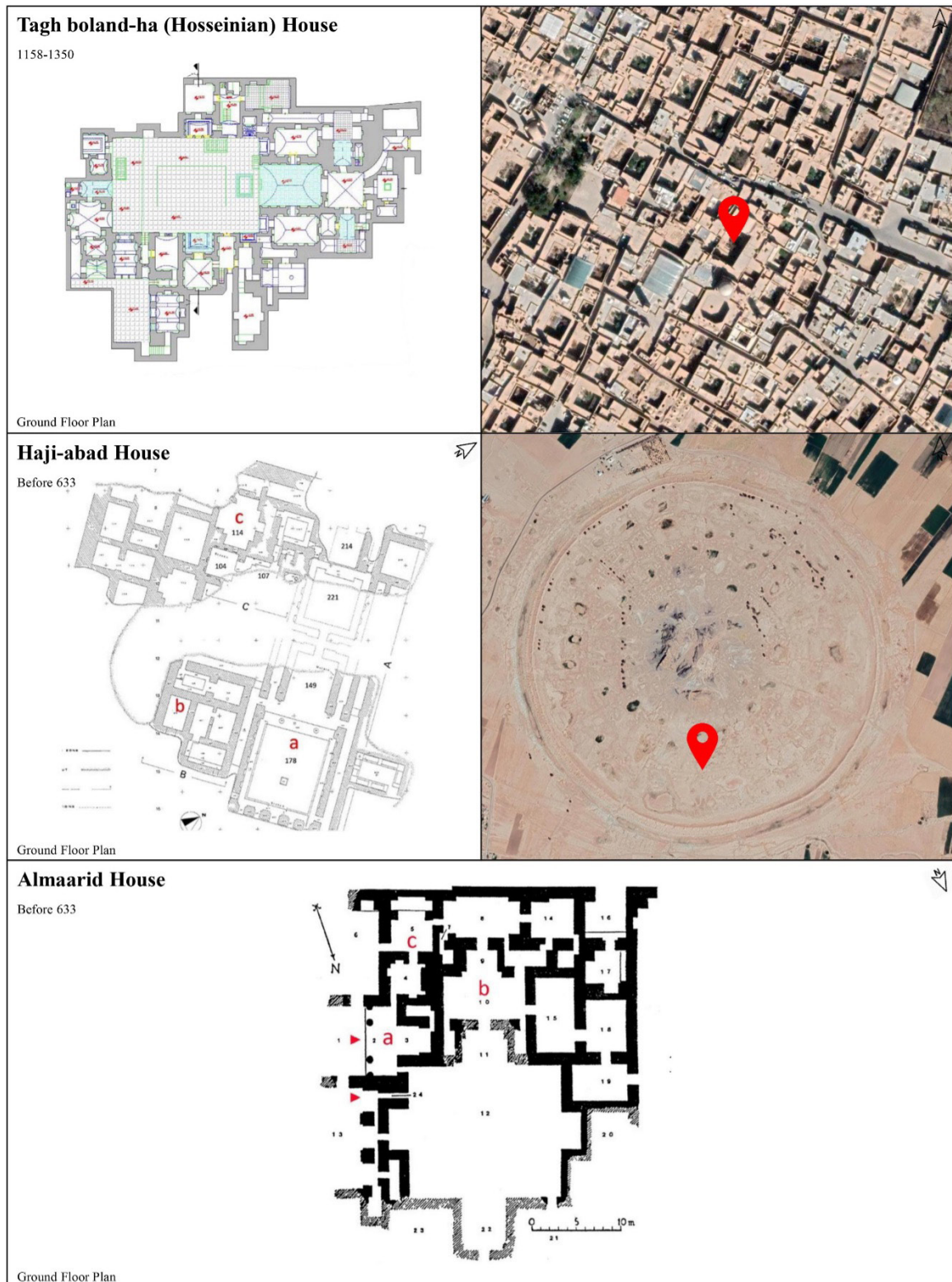


**Figure 3.** Distribution of Shafi poor House drawings. Author's elaboration using drawings from (Haji Ghasemi, 2004)

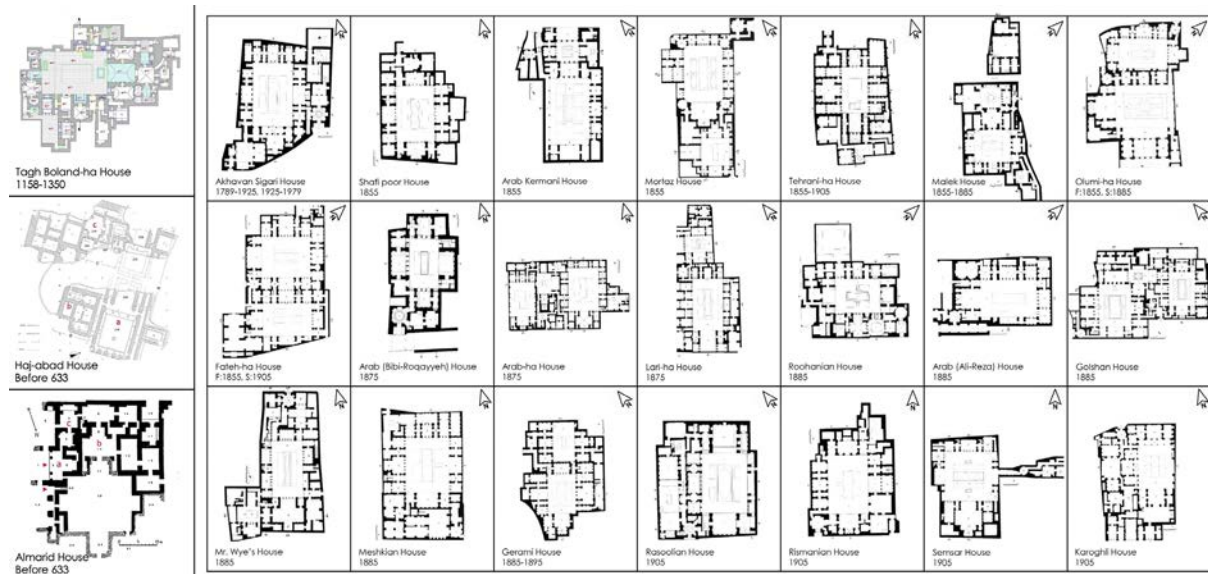




**Figure 4.** Distribution of Semsar House drawings. Author's elaboration using drawings from (Haji Ghasemi, 2004)



**Figure 5.** Distribution of Tagh boland-ha (Hosseinian) House, Haji-abad House and Almaarid House drawings. Author's elaboration using first house drawings from (Einifar & Khademzade, 2011), using second and third house drawings from (Tahmasbi, 2013).



**Figure 6.** Distribution of historical courtyard house in Yazd drawings. Author's elaboration using drawings from (Haji Ghasemi, 2004), (Einifar & Khademzade, 2011), (Tahmasbi, 2013).





## Morphogenetics of small size towns. The analysis of urban fringe belt in western Ligurian centers

Giampiero Lombardini

Dipartimento Architettura e Design. Università degli Studi. Genova. Stradone Sant'Agostino, 37. 16123

E-mail: giampiero.lombardini@unige.it

Keywords: Urban morphology, fringe belts, urban growth, compactness

Conference theme: New methods and Technologies for the urban analysis

**Abstract.** *The morphological theory of the urban fringe can be adopted for a reading of the morphogenetic processes of the settlement under different aspects:*

- a) To analyze how the transitions from rural to urban space took place;*
- b) To interpret and measure the phenomena of land consumption and urban sprawl;*
- c) To measure the different degrees of morphological evolution of the settlements.*

*The long-period morphological characters constituted by the road network, the structures and uses of the land plots, the building typologies that have characterized the different urban cycles, play a crucial role in the constitution of different urban belts. This paper aims to reconstruct the morphogenetic dynamics of the formation of urban belts through the analysis of a series of smaller urban centers in the inland areas of western Liguria. The study starts from the diachronic reading of the territorial development cycles that have progressively formed the current settlements, focusing in particular on the urban expansions that took place from 1950 to today. The study is conducted through the measurement of urban density and compactness indices which are measured with spatial analysis tools and with the processing of a specific fractal measurement indicator.*

*The study highlights, through the comparative comparison of cases: a) the dynamics of land use and erosion of agricultural space; b) the evolution of the average density of settlements; the different degrees of loss of compactness that characterize the different locations analyzed.*



## Introduction

The urban models that describe urban growth through the concept of urban fringe belt are based on some phenomena inherent in the capitalist urbanization process of the city. The origins of research on urban fringe belts can be found in the Berlin study by Louis (1936) who had used the term "Stadtrandzone" to explain the morphological structure of that city. Building to some extent on Louis's ideas, M. R. G. Conzen had successively studied the town plans of Alnwick and Newcastle upon Tyne. Conzen had defined the urban fringe belt in his seminal study of the town of Alnwick as "a belt-like area originating from the periphery of a temporarily stationary or slowly advancing town and composed of a characteristic mixture of land use units which initially they were looking for a peripheral position" (Conzen, 1969). The somehow recognizable unity in the different fringe belts of a city derives from the morphological elements that characterize them and which refer both to the uses of the land (and to particular combinations of land use) and to the morpho-typological characteristics of the buildings. (Whitehand, 1967). Barke (1982) defines fringe belts as zones "composed of land uses that are produced by the city but need not be located within it". In terms of land use, they present a distinctive group, which includes some industries, institutions, community services, small houses and more on the outside larger isolated houses, as well as open spaces (Conzen, 1969). However, urban fringe belts are more than just ways of describing land use associations: they provide ways of explaining the historical-geographical development of urban areas in terms of distinctive phases of growth and disruption (Whitehand, 1994).

In his further studies, Whitehand (1972a, 1972b, 1988) opened a new research frontier for fringe research by developing an economic perspective. He has explored the interrelationship between the formation and modification of urban fringe belts and urban rent theory, building cycles and innovation. This shifted the focus to more explicitly economic reasoning than before but retained a greater emphasis on changing relationships over time. He recognized the major differences between homebuilders and urban fringe belt uses in their supply power for sites, differences that involved either the accessibility of sites following periods of building booms or busts. During the building boom, cities were characterized by rapid residential growth on their margins, while during building collapses, institutional uses (even large sports facilities, urban parks, school and university complexes, hospitals, etc.) tend to acquire sites within the urban fringe belts. However, once these uses begin to be incorporated into their sites and invest more and more in them, they become more resistant to bids for their land by home builders. Thus, far from being ephemeral and thus replaced by residential uses in the subsequent building boom, they tend to become long-lasting features within built-up areas as the city progressively grows outward. The same author (Whitehand, 2003) recognized the role of land use planning and regulation in the formation of urban fringe belts. In fact, planning plays a fundamental role in regulating building activity, determining building densities through zoning regulations, and locating land use categories in the various areas of the city (Ducom, 2003). It can reasonably be argued that the regulations deriving from planning tools are in turn influenced, in their regulatory content, both by the socio-economic growth forecasts of the city and by the interests of landowners who exert forms of pressure and lobbying on public decision-makers. In this way, the form and functions of urban belts are determined not only by the interests of owners and builders, but also by the forms of regulation of urban planning.

## Methodology

As part of an approach to the study of economic and spatial fringe belts, it is analyzed, first of all, the whole process as an economic fact linked to urban income and in particular to the

curve of bid-rent values of an urban center (and its surrounding belts) which, based on the fundamental studies of Von Thunen and Alonso, assume a trend, on average, decreasing from the central areas towards the external areas (Batty, 2012). The real estate value of the land, in this spatial economic model, is linked to the cost of transport that investors must bear, which obviously grows with the distance of each single parcel of land from the center, which is considered the place of market and exchange. The other fundamental component of the model is made up of economic operators (households, businesses, and institutions) that compete for land use. The transport cost therefore assumes a fundamental importance since those who are willing to “pay” more will position themselves far from the urban center. In this way, the city is structured in a way that sees the different operators choose different locations based on how much the cost of transport affects their budget. The price of land (expressed through the land rent curve), in turn, will depend on the urban land market, adapting to the general economic conditions that the city finds itself experiencing in different historical periods. In the phases of growth (economic and demographic) the general prices of land will tend to grow and grow in different ways (the central ones will be worth more) as the two components of absolute rent and differential rent add up.

Conversely, during the periods of urban crisis, prices will tend to decrease (supply crisis) because there will be fewer subjects willing to pay the cost of the land (which incorporates the cost of transport depending on the location with respect to the center). And even this decline in land costs will not be homogeneous, as the values of central lands show greater inertia in maintaining their values, while in peripheral areas the average values could drop very rapidly. If these fundamental modes of functioning of urban land rent are linked to building cycles (as done by various authors, such as for example Barke, 1990; Whitehand, 2003 and Conzen, 2009) then the model of the urban fringe takes on precise connotations which tend to be valid for cities characterized by political, cultural and different economics. The building cycles are linked to the general real estate market, which in turn is part of the economy of a region or a state. Multiple macro-economic variables can lead to what most scholars of urban economics (Fujita et al., 1999) recognize as the cyclical trend of the housing market. General demographic factors (including migratory flows), technological, institutional and political factors contribute to making the real estate component of the economy variable over time. Normally, we tend to consider the real estate market as a factor with great inertia, since it is less linked than others to factors determining growth (or the crisis) such as technological change (which is very limited in the building sector) or the labor market (due to the low rate of specialization required). The real estate market is, from another point of view, influenced by the general economic cycles of nations, regions, and cities, as it is the market in which the capital generated by other sectors is very often reinvested (Harvey, 2011). If on the one hand, in fact, it is heavily dependent on external capital flows (which must be largely advanced before the start of urban growth or transformation operations), on the other hand it is characterized by a strong multiplication and increase factor worth. This dynamic of “materialization” of financial capital in real estate and urban structures has for centuries first crossed European cities and then obviously also American ones and finally those of other capitalist economies.

The fringe belt theory (see for example: Whitehand, 2009) is based on the hypothesis that in periods of growth in property prices and therefore in those phases in which the building cycle is positive, land outside the central urban pole will to be purchased and built by private real estate entities. The process of building for the expansion of the city will proceed outward and will be economically sustainable as the high value of the buildings will exceed the costs to be incurred for new construction. Conversely, in negative cyclical phases, the lowering of average

prices will lead to a halt in peripheral urban growth by means of private real estate operators. In these periods, land prices will tend to drop and thus the location of institutional functions in areas outside the central city will become more convenient. When the building market recovers, these urban fringes rich in institutional locations will either be replaced/integrated by private and residential functions, or, even more probable, "overtaken" towards the outermost areas by the construction of a further built-up strip which will still have the characteristics of a predominantly residential urban area. The alternation of these urban belts from land uses and from the differentiated typological-morphological characteristics of the buildings, characterizes the urban landscape of a city subject to growth linked to the progress of the building cycle. Given that housing construction normally proceeds in cycles of alternating boom and bust, the postulated relationships of different fringe belt constructions have significant implications for the land use composition of the urban area (Hopkins, 2012). Periods of housing boom will be characterized by the acquisition of sites adjacent to the central areas of the town for the construction of new homes. Few institutions will be able to compete for these near-central sites, and any new institutional development will likely occupy more distant sites, representing sub-marginal utility to the homebuilder. Downturns in homebuilding, by contrast, will be characterized by a contraction in demand from homebuilders for core sites and there will be a much greater likelihood of these being developed by institutions that are now able to offer higher prices than home builders. Repeated phases of building boom and property bust cycles would result in a series of alternating zones characterized by different proportions of institutions and housing.

### **Measurement and analysis**

The process of forming a fringe belt is activated when the economic and demographic conditions orient the development of the urban rings towards a modification of the land uses. Activities and uses previously present there either disappear or migrate to locations even more external than the urban center.

Can we apply the urban fringe belt model even for very small settlements?

Normally, the urban fringe belt theory is accepted (and demonstrated) for urban centers of a certain size, with a certain variety of land uses and changes that occurred between the pre-industrial and industrial (and post-industrial) phases.

In small towns this complexity of uses, functions and economic changes is more reduced.

Our hypothesis is that, although simplified, the urban fringe belt model can also be applied to small settlements.

In our study we consider the western area of Liguria. It is a geographical area of very ancient settlement (ruins of villages from over 10,000 years ago have been found) and which has had a long history of building the territory. The orography and natural morphology have historically been constraints that have determined settlement forms organized in compact isolated nuclei (mainly located on the hillsides and mountains, in a mid-coast position) and then, in more recent times, in long strands tending to follow the shapes of the watercourses and located in the valley bottoms. Thus, a settlement structure was established in which the coastal centers progressively grew (both in demographic and physical terms) to the detriment of the centers of the inland areas, which remained hamlets and villages perched on the hills increasingly dependent on the cities along the coast.

If we observe the urbanization processes of western Liguria starting from the end of the Second World War, we see how the region first underwent a strong phase of demographic growth (until the 1970s) and then a marked process of general depopulation. But both the initial population increase, and the subsequent depopulation were spatially differentiated. In the demographic

growth phase, the contribution of immigrants from other regions was fundamental, but it was directed exclusively towards the coastal centers, mainly the industrial centers (Genoa, La Spezia, Savona) and then, in a second phase, the other coastal towns that have become important tourist and service locations over time. These centers have been from the beginning, important centers of attraction with respect to the inner areas, leading to a depopulation of the mountains and valleys. In the second period, that of degrowth, a spatial difference in population dynamics can be noted in the same way. In fact, while losing population (but not all of them in the same way) the coastal centers have continued to attract population from inner areas, which have been affected by a serious process of depopulation and abandonment. This demographic dynamic then further differentiated, showing a certain level of growth of the crown centers of the coastal localities (which therefore represent the first hinterland) and a prevalence in the abandonment of the settlements located in the higher altitude bands compared to the valley floor areas.

The double demographic dynamic was in any case, in both phases, the main cause that determined the fundamental characteristic of the settlement in this region of Liguria: the linear form of the urban structures (starting from the very long linear coastal conurbation) which contrasts with a weak structure of small urban poles with a weak network.

From the point of view of land use, it should be noted that agricultural areas have progressively reduced over time. Until the second half of the twentieth century, the link between residential areas and agricultural lots was very strong, but with industrialization and the advent of the service economy, agricultural production was greatly reduced, and this also had direct consequences on agricultural spaces, which have declined sharply. Some agricultural activities, such as breeding for example, have almost completely disappeared and this has led to a drastic reduction of pasture areas in the mountains. At the same time many traditional crops have been lost and today agriculture is a marginal sector in the regional economy. The only exceptions, partially, are the coastal plains and the valley floors, where agriculture somehow survives. Another important aspect that has conditioned the general settlement structure in recent decades is the forest which, in the absence of real management of this resource, has spread greatly, occupying wide areas once used for agricultural activities.

In this general framework, we can however observe phenomena of formation and consolidation of urban fringes (Kropf, 2017). This certainly applies to major urban centers, which have seen intense urbanization and de-urbanization phenomena in the period considered (1950-2020), but even in small centers it is possible to detect processes of urban fringe formation outside the original historic settlements. The trend generally observable by mapping buildings by construction period is that of the formation of three main types of fringe belts (Fig.1). An inner fringe belt on the margins or inside the historical nucleus, a middle fringe belt immediately outside it (which is the result of a growth process that has led the population to move from the historical nucleus to the more external areas) and (only in some cases) an outer fringe belt, which arose outside the original small hamlets and was sometimes very extensive. The prevailing characteristic of this third belt (outer fringe belt) is that of being the result of an "urbanization of the rural territory", which took place through the progressive densification of the areas once destined solely for agricultural activities and characterized by a very rare presence of connected buildings to agricultural production. The succession of the three fringe belts, although spatially recognizable, is not necessarily differentiated also from the temporal point of view. In fact, the outer fringe belt and the middle fringe belt in some cases are the result of settlement processes that took place in times that were either close to each other or even coincident.

A first territorial classification can be based on accessibility levels, type of economy, morphological conditions, altitude range. The Western Ligurian territory can be thus divided into three large urban areas (fringe belts at a territorial scale?):

- the territory of coastal settlement
- the retro-coastal territory
- the internal (inner) territory

We can identify a first kind of behavior regularity at the regional macro scale: the different levels of coast-inland accessibility have in fact determined a sort of “regional fringe belt”, where the crown territories of the coastal conurbation represent a first fringe belt and the territories of the internal areas a second fringe (Fig.2).

What has happened in these three territorial areas in the last 50 years from the point of view of population (demographic change)? Different morphogenetic dynamics correspond to each of these territorial belts, which can be compared with the trend of the demographic and building cycles. The regional territory was, in fact, characterized by a double transition: in a first phase the coastal areas grew enormously, while the crown and internal territories experienced a real collapse. In the second transition (which began in the 1980s) the coastal and inland areas stabilized (both in terms of population and built-up area), while the crown centers contiguous to the coastal ones recorded a significant increase (Fig.3).

While the long-term trend shows the clear prevalence of urbanization in the coastal area, if we analyze the last 50 years (1971-2020) we can see how the population situation is much more dynamic and diversified. Some coastal cities have stopped growing, while the areas immediately close to the coast are experiencing a season of intense repopulation. The innermost areas are instead dominated by abandonment and depopulation (but not in all cases). The building cycles follow this trend and are clearly out of phase if we consider all the coastal centers and then those of the inner centers (Fig.4).

The combination of demographic dynamics with building cycles has given rise to four fundamental models of settlement growth in the nucleuses of western Liguria. A first pattern of demographic growth can be defined as closed development and concerns the formation of a fringe belt contiguous to the original nucleus. This growth model represents a typical phenomenon of this region linked to a sort of “proximity modernization”: since the 1960s many households have begun to prefer housing equipped with more modern technologies and have started an external urbanization process to the historic town center, occupying strips of land once destined for agricultural activity (in the meantime abandoned) and therefore in some way already prepared to be occupied by new buildings.

A second settlement model is instead represented by the formation of both a middle fringe belt and an outer fringe belt. A third case is represented by the formation of three urban belts, where one acquires the role of areas with a commercial and productive function (function absent in the first two cases). Finally, there is a fourth case, consisting of a series of urban fringes which, over time, gradually merge due to the homogeneity of the morphological and soil type characteristics and predominately prevailing over the original nucleus (Fig.5).

With respect to what could be defined as a morphogenetic process of formation of the urban belts of Ligurian settlements, four fundamental settlement principles can be recognized (Fig.6).

Types of urban fringe belts: Case A

In the first case, the urban fringe belt is the result of a simple expansion of the built-up area with absolute and relative access to the (larger) area which continues to have the role of the main center (often a structure of the urban fabric is lacking urban). Most of the original settlements expand and join together to form a single built-up area. The demographic dynamic has also



been growing in recent years, even if the construction cycle has had the highest rate in the 70s and 80s.

#### *Types of urban fringe belts: Case B*

The expansion by 'nuclei' (fragmented fringe belt) may be typical of some recent urbanization processes, but more often not that the result of the crystallization of the settlement structure of historical formation.

#### *Types of urban fringe belts: Case C*

The formation of linear fringe belts is the most frequent case in the territory of western Liguria. It is one, two or more fringe belts that take the shape of the filament. The original centre tends to lose importance (and often the centre of gravity shifts). The original center is no longer the dominant one.

#### *Types of urban fringe belts: Case D*

Another frequent case is that of growth in radial or polyform urban areas, without an urban structure. They are disorganised growth processes driven only by individual interests and are the result of the sum of an urban growth plot by plot.

### **Micro-urban fringe belts drivers: land use**

In a territory that has had a very long construction process such as the Ligurian one, the agricultural system plays a fundamental role in orienting the shape and dynamics of formation of the fringe belts. Soils that are already structured and accessible are the first to be affected by land use modification processes. Especially along the valley floors, the availability of space and a strong structuring of the spaces that were once agricultural, often generate the conditions for the formation of urban fringe-belts (linear type, with different land uses and cycles of land-uses).

The first driver of micro-urban fringe belts formation is the plot dimensions and form. The shape and size of the land plots depends on the historical land uses, on the morphology of the land, on the type of agricultural arrangements (irrigation canals, terracing, etc.), on the quality of soils. This land already "built" by agricultural use is the support on which the fringe belts are formed. The plots are mostly divided (or merged) but do not change shape and alignments (they have a great persistence) and this creates evident conditioning in the formation of subsequent fringe-belts.

The second driver of micro-urban fringe belts is accessibility. The formation of fringe-belts is also conditioned by accessibility, which in turn is directly connected with the shape of the road network and its hierarchical structure. In a context dominated by a tree model of the road pattern, accessibility tends to determine conditioning of a linear type.

### **Conclusion**

The formation of urban fringe belts is a complex process connected both to morphological aspects (shape of the territory) and to economic dynamics.

It is not possible to fully recognize and understand the fringe belts formation process if economic, demographic and social variables are not considered

The shape of the rural territory is the presupposition from which the different forms of fringe belt are generated: it is therefore necessary to understand first the shape of the rural territory to explain how the fringe belts have developed or could develop in the future.

The morphological variables that are most relevant are land uses (and its historical variations), the shape and size of the plots and accessibility (or the shape of the road network)

On the basis of these variables, the formation processes of micro fringe belts can also be

studied, involving small towns and villages (in different eras and with different forms)  
 Compactness and fractality indicators appear to be promising tools for measuring the morphological dimensions of fringe belts and then trying to relate these shape measures to economic variables (especially the urban rent).

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## Illustrations and tables

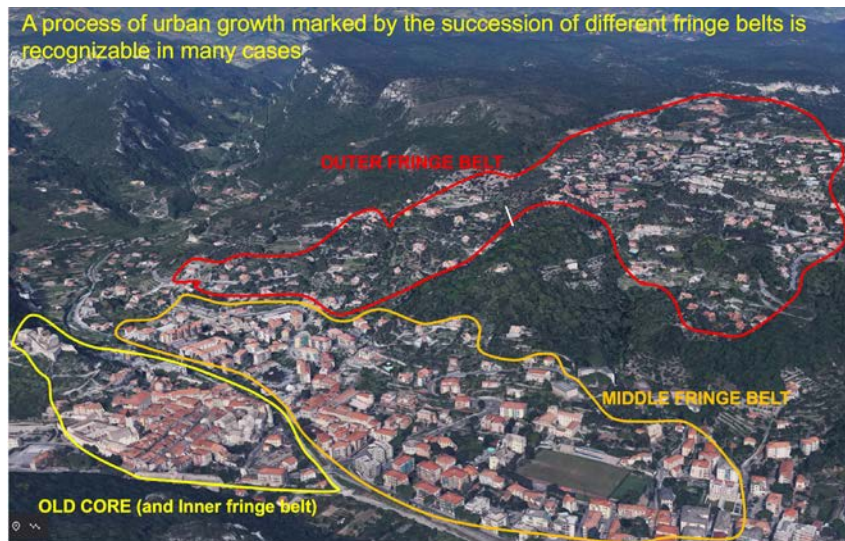


Figure 1. The three types of urban fringe belt in the Ligurian small centers

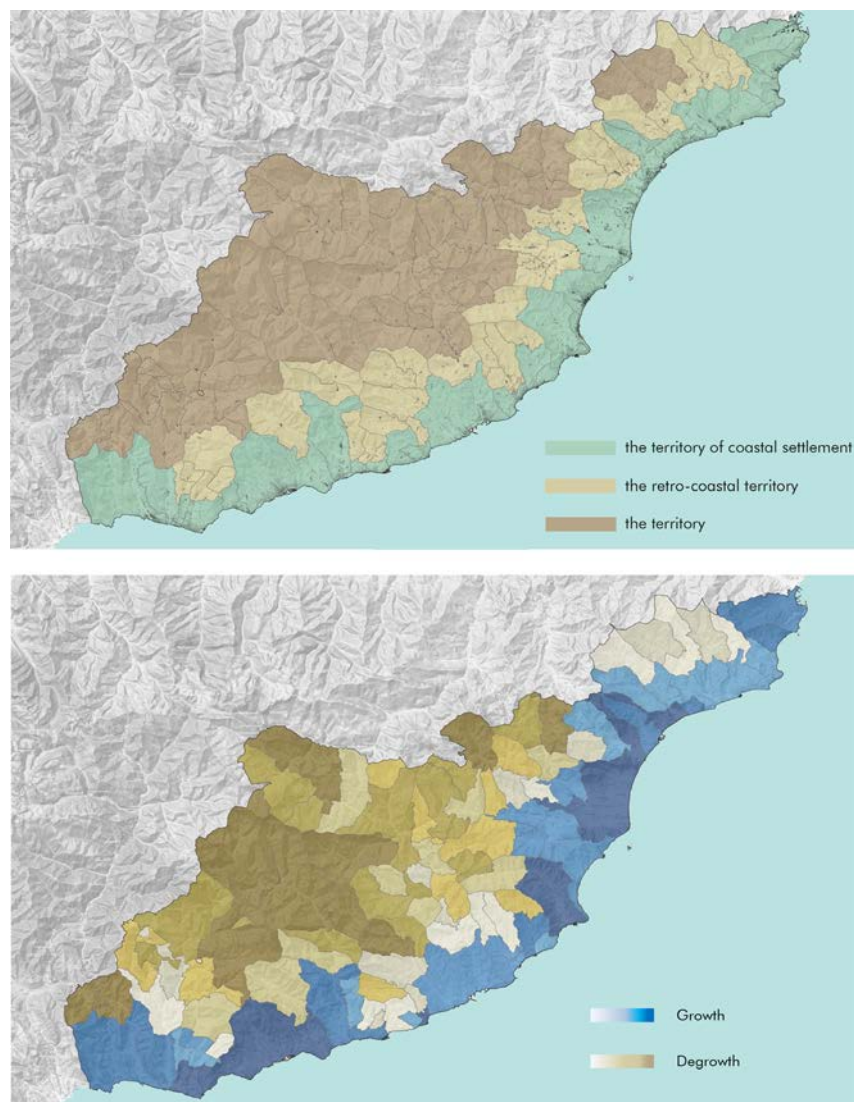


Figure 2. Growth dynamics in the western Liguria municipalities 1950-2020

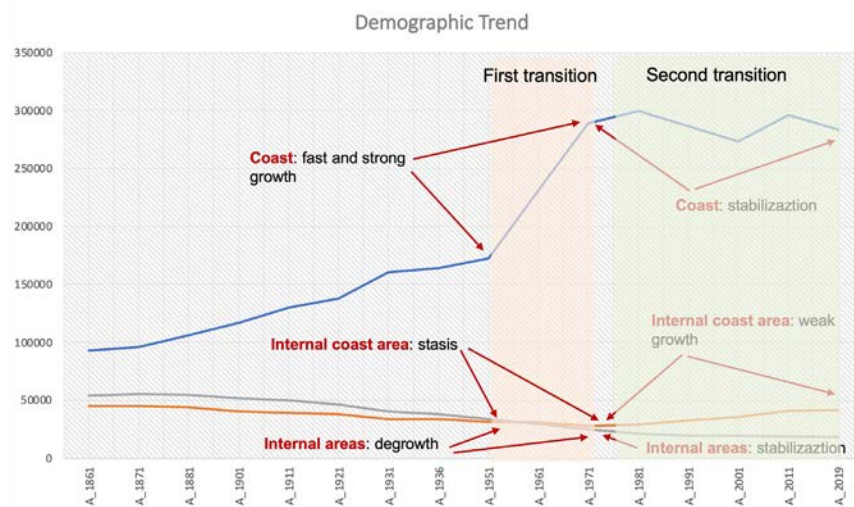


Figure 3. First and second demographic transition in the Liguria Region

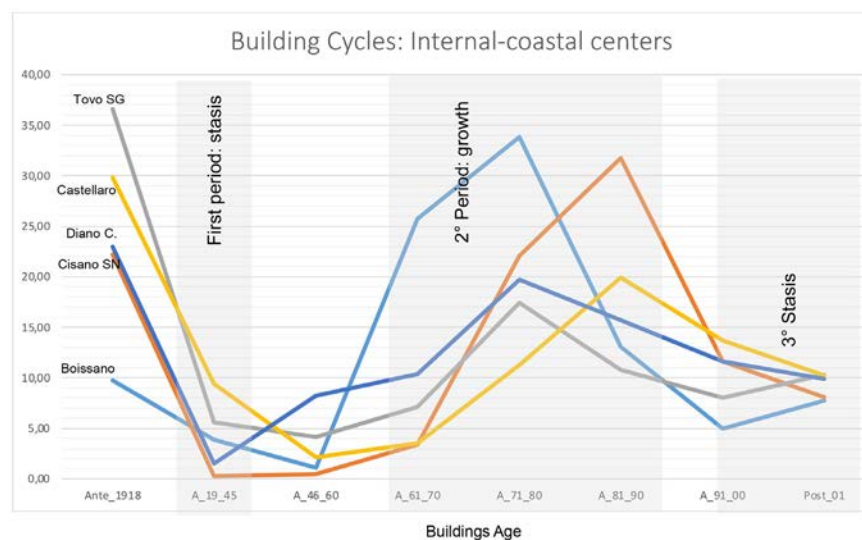
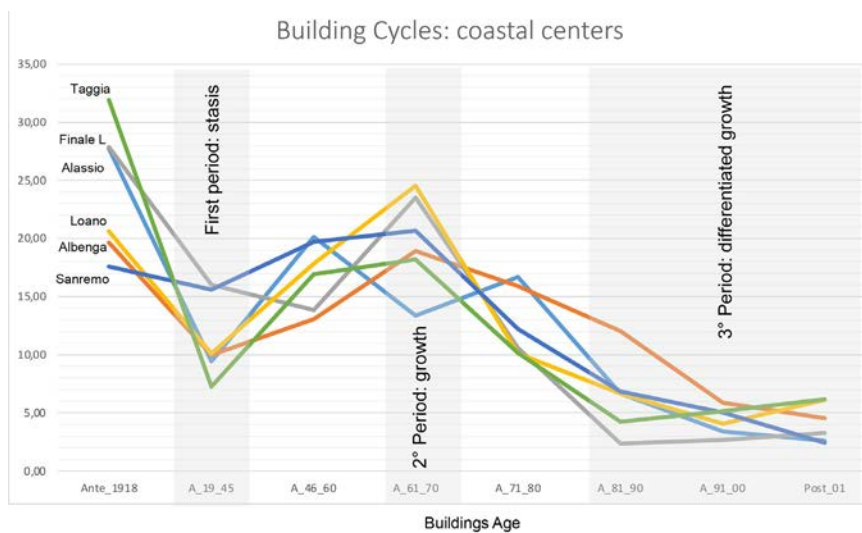


Figure 4. Building Cycles in coastal and internal-coastal centers – 10 Municipalities sample



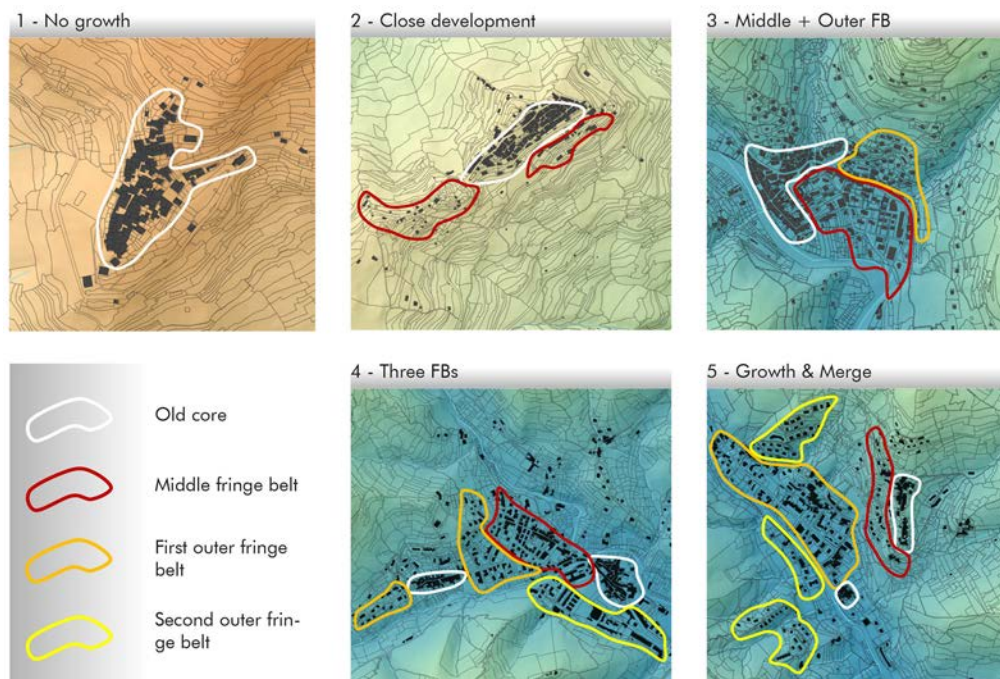


Figure 5. Morphogenetic types of urban fringe belt formation

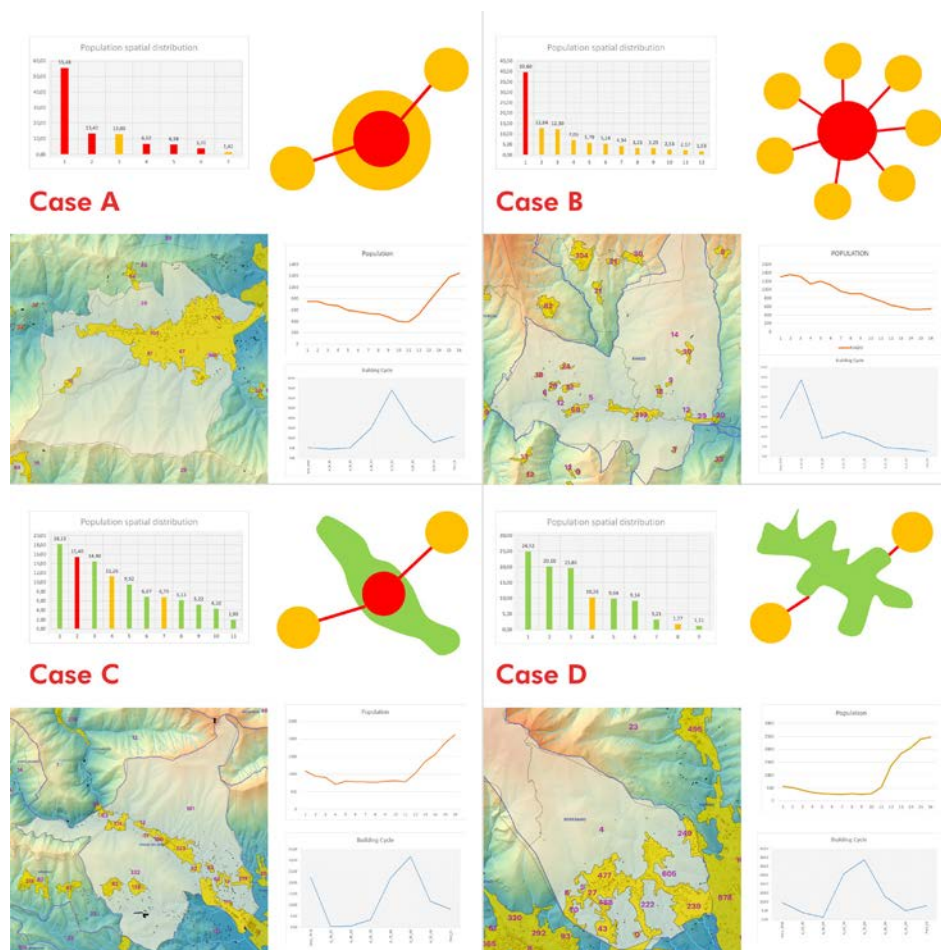


Figure 6. The four morpho-typologies of urban growth and fringe belt formation in Ligurian small centers





## Parametric analysis of urban form, from geometrical to topological

Luca Maricchiolo

Laboratoire d'Urbanisme « Lab'Urba », Université Paris-Est Créteil

14-20 Boulevard Newton, Cité Descartes, 77420 Champs-sur-Marne, France

E-mail: luca.maricchiolo@u-pec.fr

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Conference theme: New methods and Technologies for the urban analysis

**Abstract.** *This paper presents a methodology to read urban space and to display it through parametric representation. It is based on quantitative analysis of geometrical properties of different urban sequences, parameterized on a sample trajectory representing observer path. A labelled  $t(x)$  parameter allows to evaluate such path, systemizing on it visual, spatial, and morphological variations, through some indicators:*

a. *Dimensions  $D(t)$ : urban space large, measured orthogonally to the observer trajectory tangent at  $t(x)$ ;*

b. *Focal distance  $Fd(t)$ : visual depth tangent to observer trajectory at  $t(x)$ ;*

c. *Sequences variations: number of dimensions and focal distance deviations greater than respective average value, representing major changes in visual perception along the path, so that they produce the transition from one scene to another one in an urban sequence.*

*Quantitative data depending on a unique parameter  $t(x)$  lead to display graphical and statistical representation, as computing of average value, range, and standard deviation.*

*This methodology has been tested on few case studies in European cities: Rome, Palermo, Naples and Barcelona, comparing historical urban fabrics to XIX century planned ones, highlighting constants, differences and variations.*

*The parametrical analysis of sequences indicators allows to shift from geometrical information to a topological model, abstracting results from shape specificity. The configuration pattern linking metric and relational information is experimented as a design pattern. This puts urban analysis in the perspective of design practice, leading to the script of an input matrix for an informed parametric urban modelling.*

## Introduction

The research presented in this paper addresses the issues of data collection in urban morphology and their use into computational urban design. Particularly, it proposes a quantitative methodology to read urban space, with the aim of discussing links between urban morphology analysis and urban design.

Studies of urban morphology are traditionally aimed at understanding the generation of voids and masses – urban morphogenesis – relying on qualitative approaches to identify figures, elements and syntactic structures as well as their forming processes. The disciplinary evolution has proposed a great variety of approaches, mainly addressing two dimensions: the planimetric one, based on the building footprint and street network; the three-dimensional one, based on the articulation between spaces and buildings. Among these, different schools addressed specific mechanisms. Michael Conzen (Conzen, 1968), with the Anglo-Saxon one, identify three key elements and syntaxes: roads and their composition in road systems; plots and their aggregation in urban blocks; buildings and their arrangement in plots and blocks. Saverio Muratori (Muratori, 1960), Gianfranco Caniggia and Gian Luigi Maffei (Caniggia and Maffei, 1979) focused on local syntaxes, linking building typologies with the assembly rules along paths in the conformation of street and block shapes. The introduction of mathematical models, computer aided design tools for urban analysis (Martin et al, 1972), and graph theories in network analysis (Steadman, 1983), moves towards approaches based on measurable characters.

Within the framework of quantitative knowledge in the field, two main methods can be distinguished: configurational analysis and spatial analysis (Erin et al., 2017). Configurational analysis aims at quantifying the ability of street network to structure movements within the fabric, basing on the structural features of the network and of the relationships established with other elements in the urban space. The theoretical reference of Space Syntax (Hillier, 1996) addresses the network of public spaces modelling through graphs. Graphs can be built either as a system of axes intersected in nodes, or as a system of adjacent convex spaces (Fusco and Tirico, 2006). Configurational analysis introduced an innovation in the sense of a quantitative approach in urban morphology, based on the “network” component, leading to methods to address accessibility (Urban Network Analysis. Sevtsuk and Mekonnen, 2012), perspective continuity (Axial analysis. Figueiredo and Amorim, 2005) minimal paths (Angular analysis. Turner, 2000) and centrality analysis (Multiple Centrality Assessment. Porta et al., 2006).

Spatial analysis, based on Geographic Information Systems (GIS), concerns all the elements present in the urban fabric and focuses on the spatial relationships and configurations between them. It addresses categorization of elements and relations, as building types, neighbourhoods typologies, land use, mobility, density, building-plot relationship, referring to different models to analyse their arrangement in the urban form. Despite most of GIS based analyses rely on « point and click » method, whose reproducibility is affected by the sequence of operations, some computational tools have been recently implemented, in both Python and R, as well as plug-ins in GIS software, to systematize spatial analysis (Fleischmann, 2021). Morphological tessellation using Thiessen polygons on building footprints is a reproducible method to identify an analytical spatial unit for individual buildings surroundings (Fleischmann, 2020). Furthermore, tessellation using Thiessen polygons around a path identifies a new analytic urban unit, the proximity band around a street segment, that is particularly interesting as it adopts a perceptive point of view, different from traditional planimetric spatial analysis. (Araldi and Fusco, 2019)

The development of Geographic Data Sciences is still primarily linked to functional and mobility issues. The issues related to shape, geometry and proportions of space seem to be of less

interest, although these represent a major success factor of an urban form. Analysis scale matters. GIS is oriented to territorial development and urban planning, while the scale of urban design is often underrepresented due to lack of detail and loss of three-dimensional approach and internal focus.

Urban design measures address urban form at the highest scale of definition, and they request internal observation, as external data (e.g. satellite observation) can hardly be exploited, due to lack of definition. Basic units are urban frontage, streets or squares, whose measurement can be used as a support to explain or govern a whole range of urban phenomena, as vitality, safety, accessibility. In this perspective, quantitative approach provides objective measures to be compared with urban performances (Lynch, 1981) to empower multidisciplinary analysis (Clifton et al. 2008) and modelling (e.g. City Information Modelling. Gil, 2020).

The analysis methodology hereby presented addresses a quantitative measurement of urban space adopting internal focalization, basing on pedestrian's point of view to question perceptive experience. If perception is subjective, however some physical features of space are objectively measurable, as dimensions, spacing, proportions (Ewing et al. 2006). The investigative categories adopted in the present research to collect countable data from several urban sequences in a comparative approach follows the theoretical approach proposed by Kevin Lynch (Lynch, 1961). This will be discussed to better understand the combinatorial criterion of few urban sequences in Mediterranean historic cities, whose common features can be explained by the limitation of combinatorial possibilities – as grammar and syntax limit to a finite number the possible combinations of letters in language (Hillier, 1996). Thus, analysis aims at recognizing recurring geometrical and topological features as to produce similar perceptive situations.

#### **Methodology. A parametric approach for the pedestrian point of view.**

This paper presents the indicators, the methodology and the collected data of the analysis of six urban sequences of historic cities in Mediterranean Europe, followed by the results discussion oriented towards design. The general objective is to develop a methodology to read urban space, to highlight recurring characters and to explore results potential in a design algorithm. This is based on consecutive steps, whose results are presented during the discussion:

- the parametric measurement of six sequences of public space in six historical fabrics;
- the evaluation of the results on the basis of some indicators aimed at identifying the sequences;
- the construction of a topological model based on the identified sequences;
- the testing of the topological model in a design algorithm.

Measurement adopts an internal focus and is returned in parametric representation along a sample path through urban fabric. The transition from Cartesian to parametric representation aims at abstracting analytic metric data from local shape specificities: the unique and reproducible independent variable is the walking time along an urban path, which is adopted as a fundamental parameter. Metric data are, thus, represented as function of t parameter on a sample trajectory. This allows getting away from geometric features, ensuring a stronger results comparability and absolute values fit for design algorithm. Dependent variables and indicators are based on the normative theory of Kevin Lynch (Lynch, 1962), which offers a reference benchmark.

The analysis is carried on in a CAD environment (Rhinoceros3D) through a visual programming tool (Grasshopper), based on building footprint from GIS information. On the basis of qualitative results, identification of local topologies and sequences configuration on a graph shapes a design pattern.

### **Measurement. Quantitative analysis of urban sequences.**

#### *On local indicators framework.*

Several approaches to urban studies based on human perception suggest the transition to a representation of urban space from an external focus (plan) to an internal focus, based on inner perception or cognitive spaces. Perceptive role of space in shaping historical memory and assuming adequate performances has widely been raised in literature (from Sitte, 1889, to Jacobs, 1961) but it is Kevin Lynch, in *Site Planning* (Lynch, 1962), who operates an analytical, dimensional and normative description of the space of the city, which he will subsequently relate to a performance and multidimensional approach (Lynch, 1981).

In *Site Planning*, Lynch focuses on sensorial function of space, often ignored in site arrangement plans in favour of functional or technical needs. As argued by Lynch, urban space is, the most if not all, experienced through a sequence of views, driven by site directions and rhythms, whose element parallax movement can affect global perception. Thus, proportioning and articulation are not necessarily conceived in absolute terms, but relating to the perception and the movement of people in space. Basing on sequences structure, inner focalisation and parallax, Lynch addresses a few tentative quantities that can be assigned to the size and the proportion of external spaces:

(a) Space dimensions. Basing on human view capacity, urban space can be dimensioned moving from its perception. Humans can detect a man about 1,2 km away, recognize him at 25 m, see his face as a clear portrait at 15 m, feel him to be in direct relation to us, whether pleasant or intrusive, from 1 to 3 m. Consequently, about 15 m large space appear intimate, until 25 m it is human scaled; smaller, it appears too small and oppressive; for instance, most of the successful enclosed squares of the past not exceeded 130 m in the smaller dimension.

(b) Parallax. Urban perception is shaped by the limits to the angle of clear vision and to the rapidity of scanning. Thus, focal distance from the observer to the object affects urban perception: an element whose height equals distance is seen in detail but not as a whole; while distance is two times height, it would be seen clearly and entirely; from three times and more, visual field becomes predominant on the element, till this disappear to be part of the scene.

(c) Proportions. Most comfortable spaces are height a third of large; below, space ceases to be enclosed; over, it seems a pit.

(d) Sequences. Made of both spaces and paths, they should be measured by successive balances at each point of view. Evaluation results from cumulative effect, as a lack of formal balance at a moment can be less important than a qualitative connected chain of spaces. Sequences size on congenial physical characteristics: continuity and closure of form; differentiation, dominance or contrast of a figure on a ground; symmetry, order, repetition or simplicity of forms. Movement is as much important: the road suggests direction, eyes follow it as a thread that ties the whole together.

(e) Rhythmical continuity. Sequences should be linked harmoniously to create consistent variations alternating open to close, simple to intricate, brilliant to subdued. "The space should be considered as a total pattern – not seen flatwise from the air, but as a progression through which one moves" (Lynch, 1962, p. 81)

Although empirically thought, "these statements seem to derive from the optical characteristics of the human eye, and from the size of the objects which are generally of greatest interest to it, i.e., other human being" (Lynch, 1962, p. 60).

#### *Urban sequence specimens.*

The analysis methodology was tested on different urban fabrics. The demonstrative purpose of



the methodology is independent of local quality of urban specimens, aiming at highlighting some tools to link spatial quantitative analysis to design.

Four sequences in the historical urban fabrics of Rome, Naples, Palermo and Barcelona, have been compared with two paradigmatic XIX century urban plans: the first extension of Rome as the post-unification capital, Rione Prati, consisting of regular orthogonal grid of approximately 100 x 70 meters, and Barcelona example planned by Ildefons Cerdà, based on 110 meters squared blocks. For each, the analysis focuses on an arbitrary path along a quasi-linear trajectory, traced avoiding main axes to simulate a random walk experiencing the urban sequences. This, to grasp diffused urban features rather than extraordinary ones, as they appear to a greater number of observers.

(i) Rome, Centro Storico. The analysed path goes through the zona urbanistica Centro Storico, crossing the medieval and the Renaissance fabrics, and avoiding main straight axes resulting of later planification. It begins in Rione Ponte, crosses Parione, Sant'Eustachio and Pigna districts, touching nodal points such as Piazza Navona, Piazza della Rotonda, to reach Trevi district and end in Piazza del Quirinale.

(ii) Palermo, Albergheria and Kalsa. The analysed path runs through the two mandamenti on the south side of the Cassaro, presently via Vittorio Emanuele. It moves from Piazza della Vittoria in front of Normanni Palace toward the sea in north-east direction, crossing Ballarò marketplace, Piazza Bologni, Piazza Bellini, and reaching the waterfront through via Alloro.

(iii) Barcelona, Barrio Gotico. The path crosses medieval district parallel to the coastline, from the example on south-west to the example on north-east. It starts in Raval neighbourhood at Sant Antoni marketplace proceeding along Carrer de Sant Antoni Abat and Carrer del Carme, to cross La Rambla and enter Barrio Gotico in Carrer de la Portaferriça until the cathedral. It runs through plan Cerdà's demolitions in Plaça Nova and Avenida de Francesc Cambò, facing Santa Catarina market to finally reach the example on the north-east side of Bairro Gotico in Placeta del Comerç.

(iv) Naples, Centro Storico. The path crosses the still visible Roman structure of the historical fabric. Moving from piazza Carità along via Toledo, it reaches the castrum at piazza del Gesù Nuovo and runs along the decumano inferiore (via San Biagio dei Librai), crosses the cardus of via Duomo, and it ends in Piazza Garibaldi, a vast XIX century square that became bigger after modern central station relocation.

(v) Rome, Prati. On the orthogonal XIX century grid, the analysed path is one of the axes, namely Via Cola di Rienzo from Piazza Risorgimento to Piazza della Libertà.

(vi) Barcelona, Eixample. The analysis concerns a sample path within Cerdà's fabric, particularly Carrer del Conseil de Cent, from Carrer del Comte d'Urgell to Carrer de Bailèn.

#### *Analysis parameter and variables*

Sequences features are measured and represented as a function of an independent parameter, walking time  $t(x)$  along the path, ranging from  $t(0)$  at the start and  $t(1)$  at the end, equal to about 20 minutes walking on an approximate length of 2km (+/-100m) at 5km/h. Analysis variables depending on  $t$  are :

(a) Dimensions  $D(t)$ . The scale of space is mostly represented by large, measured orthogonally to the path, from a built front to the other on opposite sides. Intersections with transversal streets are assumed as gates, as they don't interrupt perceptive continuity of the fronts, while shaping convex urban voids. Parametric representation of  $D(t)$  shows the variation of urban space dimensions, highlighting discontinuities and rates of change. Lack of dependence from urban form geometry allows comparison.

(b) Focal distance  $F_d(t)$ . Urban form diversity is expressed by measuring the variation of axial viewpoints, on a direction tangent to the path. The more frequent are the viewpoints changes, and the shorter are their focal length, so space experience and perception are richest. Focal distance measures, hence, length from the observer to the first urban front or other perspective obstacle on an axial direction, namely tangent to the path at  $t(x)$ . Parametric restitution shows space depth: lower values express a tight succession of scenes, so a strong articulation of the path, while higher values express long perspectives and more linear paths.

(c) Sequences  $S(t)$ . The passage from a spatial sequence to the successive is identified by discontinuities in space dimensions and focal depths variations, or by the rate of change of such variables. A variation equal to or greater than, positive or negative, identifies the passage from one sequence to the next; in the same way, a variation (always positive) of the focal depth equal to the previous one identifies a sequence passage. The sequences are therefore described by both sudden variations of expansion or compression (e.g.: the way in or the way out of a square), and sudden variations of visual depth (e.g.: a turn along a path).

### **Results: scale, diversity, articulation, and rhythms**

Metric data collected are visualized through both graphical and statistical representation. Graphics in figure 3 present  $t(x)$  on the abscissa and  $f(t)$  values on the ordinate, displaying variations of the indicators for dimensions, focal depth and sequences. Statistical representation in figure 4 addresses frequency and distribution of the collected values.

Graphical comparison between cases study directly shows compressions, dilations, and focal progressions differences, as to explain how urban sequences and their ratio change in relation of urban space shape.

Some considerations can be drawn on four main topics:

1. Dimensions and scale. As expected, average dimensions are lower for historical fabrics rather than planned ones. In all Rome, Palermo, Barcelona, and Naples historical centres average values are around 10 m large, fitting with human scale and recognizability of boundaries. Furthermore, dimensions don't exceed 200 m, keeping space scale not too far from Lynch's reference for enclosed squares.
2. Diversity. The gaps between minimum, maximum and average values express the variation rate; therefore, the standard deviation of data qualifies space in its capacity to provide compression and release produced when the observer passes from a narrow to a broader space.
3. Articulation. Focal distances express axial variations along the path, as turns, curves, visual obstacles. Intensity of gaps shows less linearity in space, whose articulation provides a higher number of perspectives per path unity. In historical fabrics (i, ii, iii, iv) visual depth varies from about 3 to 950m, associated with the long straight of Naples decumano inferiore. In planned fabric (v, vi) infinite length refers to focal depth exceeding sample limits, not finding any visual obstacle within the path.
4. Rhythms. The number of sequences per length unity reveals sequence ratio, that is the frequency of variations along the path, thus urban space rhythm

The following tables (tab. 1) display key values of the collected data and their statistical comparison.

Dimensions and focal distances provide a measurement of urban space scale, diversification, articulation and rhythms: Analytic quantitative data allow a comparison and an objective evaluation of the case studies, on the basis of related indicators. Obviously, such evaluation is restricted to the analysed path, not giving any information about the identified fabric as a

whole. Moreover, it is arbitrary, due to its dependency from the chosen path and the travel direction. However, for demonstrative purpose, it shows a methodology fit to be reproduced in every possible path within a neighbourhood, to offer more significant statistical data about the whole urban fabric.

Evaluation data are not suitable for developing a design algorithm, due to strict compliance with the specific case-study: values strictly depend on shape, while a broad generalisation of the relational principle, fit for design, requires stronger abstraction. Hence, the elaboration of a topological model addresses the script of configurational rules to feed a morphogenetic algorithm.

### **Discussion. The topology of urban sequences.**

General topology of open spaces consists of a continuous surface space with as many holes as built elements (both isolated buildings and blocks). All squares and streets are a connected bi-dimensional surface, as any point can be reached by travelling on this surface. It is bi-dimensional and orientable, as it is easily recognizable an above and a below and there are not ambiguities between the two faces, although few overlaps are possible. It is bordered by all urban space internal boundaries, like urban frontages and enclosures, and by a hypothetical external city limit. Hence, as a general topology, urban space is a surface topologically equivalent to a disk with  $n$  perforations and an external boundary, which are independent of geometry (Brelsford et al. 2015).

Furthermore, accessible urban space is isomorphic to its access network, which can be described by graphs identifying nodes and connections (Agryzkov, 2017). Access network graph provides a configurational scheme, whose nodes are access points as well as intersections or aggregation spaces. Such urban representation is highly reproducible and generalizable, providing information about integration, connectivity and depth, as relational features, independent from element own qualities (Brelsford et al., 2015). As a development of network analysis, several criteria can identify nodes and connections, to make graphs more consistent to the real or to the perceived urban form: these could be based, for instance, on isovists, street names, or axial analysis including only the fewest and longest lines (Hillier, 1996). Such normalizations of graphs aim at linking continuous paths that are not, actually, a system of segments, to better clarify relations between the parts of access network (D'Autilia, 2015).

Despite their effectiveness about cities configuration understanding, graphs representations do not provide any information about real quality of nodes and connections. Furthermore, they lead to some inconsistencies and ambiguities, for instance in the representation of a square with a fountain, that could be seen as a node in itself, or as network of small segments with as any intersections as the streets going to the square (D'Autilia, 2015). Another weakness concerns the base support, focusing just on relations and removing metric or geometric features data. This leads to some ambiguities in integration computation, including loss of urban scale and over-reliance on connections axuality (Ratti, 2004).

Topology, as a non-metric science, could be very effective in the study of relations, especially at a global scale. However, at a local scale such representation suffers from a lack of information about spatial qualities; moreover, it is hard to dissociate pedestrian and human-scaled perceptions from metric information, as walkability relies more on distances and spatial comfort rather than on connections depth (Ratti, 2004).

Urban sequences, as defined in Site planning (Lynch, 1962), consist of a linear configuration (or chain) of urban voids, which quantitative description requires both metric and non-metric relational data. Abstraction from geometric information allows to focus on relational properties

and to highlight configuration. Nevertheless, within this research, some metric-derived data are supposed to be kept, as the position and the scale of each sequence.

The hypothesis hereby explored consists of introduce few nodes features within a topological representation of the analysed urban sequences. The topology of urban sequences is restricted to the analysed path, not including general city topology. This is made of a chain of cognitive spaces, topologically identified by surface, boundaries (e.g. urban frontages) and gates (Stojanovski, 2013). Identifying as gates the connections between each convex void space, it allows to define a local topology of public spaces as a bi-dimensional continuous surface bordered by both enclosures and gates. In an enclosed square, delimited by compact urban fronts, access streets do not break unity of perceptive – or cognitive – enclosure. This is consistent with the perception of urban sequences as a chain of different, unitary, spaces, interconnected one to each other, although the whole path is actually just one topological surface.

Local topologies lead to identify a range of urban objects enriching the basic urban form ontology made of streets, buildings, and blocks (Kropf, 2014). This concerns elementary syntactic units whose internal and external relational properties are recurrent in urban forms, as to be defined as building blocks for an informed and generalizable city modelling. Perceptive and relational features, defining basic spaces as frontages, streets, squares, are at the basis of urban performances and could be very useful if integrated in base grammar for urban models (Stojanovski, 2018). Finally, representation of urban sequences as a chain of local topologies, interconnected by gates, fulfils internal focalization of urban space.

Urban sequences configuration consists of two syntactic principles:

- a. The chain itself, as a configurational path referring to gates and interconnections
- b. Local topologies, referring to cognitive spaces and represented as nodes

The parametric analysis is used as a criterion to qualify both principles: the parameterization of the path identifies the position (and the depth) of every space on the chain; the quantitative data define scale of each space.

This leads to define three syntactic units, basing on the spread of analytic values highlighted by parametric analysis, represented through an informed dual graph of urban sequences (in which nodes refer to each convex space and connections refer to gates):

- a. Expanded units (e.g. squares), consisting of spaces whose dimensions exceed the average values of the whole sequence, represented as nodes;
- b. Compressed units (e.g. streets), consisting of spaces whose dimensions are less then average values, represented as nodes as well;
- c. Gates, referring to links between units, equivalent to discontinuities of both dimensions and focal distances indicators.

The identification of these three syntactic elements is essentially based on local spatial qualities, with the aim of including in city modelling qualitative features, as shape, human-scale, perceptive experience, through quantitative analysis and reproducible methods.

### **Conclusion. Towards urban modelling and design**

Urban morphology and urban design are theoretically linked, as morphology focuses on how and why urban elements are composed. Design takes advantage of morphology categories, both in terms of theoretical approaches (normative theories rooted in the results of morphology studies), and of operational tools (methods to analyse local contexts as basis for design). Nevertheless, a mainly qualitative approach in urban morphology makes it difficult to have a highly generalizable systematisation of results and a direct application in design guidelines.

Quantitative analysis in the field of urban morphology can fill this gap, providing precise and intelligible results to be used in the project. Parametric urbanism can offer a great support, relying on algorithms and rules on the basis of local parameters: “the challenge will be the capacity of quantitative urban morphology to serve as input and/or reference framework to parametric urbanism, in order to avoid the divergence between morphological studies and design proposals” (Erin et al. 2017).

With this regard, the development of a configurationally pattern, following quantitative analysis of an existing urban form, aims at exploring in parametric design a few principles recognized to be successful, namely human scale and articulation of public spaces sequences. This approach, whose experimentation is restricted to few indicators on sample case studies, leads to the definition of a simple algorithm to shape urban voids along a matrix path. Geometry of the path and the boundaries are independent variables, defined a priori in the parametric algorithm, while distances and dimensions of spatial units depend on path parameterisation. Hence, the algorithm defines occurrence and scale of space units, as to produce homeomorphic sequences reproducing similar space progressions.

This pattern outlines a way to link design with analysis, operating within evidence-based knowledge to feed a parametric algorithm. The definition of ontological categories from quantitative morphology can improve object-based urban modelling, offering a support for multidimensional data (Duarte et al., 2012); on the other hand, it suggests further research development to increase spatial and performance-based data usability in city information modelling.

Systematic analysis of urban space and sequences, thus, addresses multidimensional analysis by providing a data-driven semantic framework for city modelling, aiming at enhancing spatial and perceptive features in the whole process of analysing, designing and managing cities.

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## Illustrations and tables

indicator	u	(i) Rome Centro Storico	(ii) Palermo	(iii) Barcelona Bairro Gotico	(iv) Naples	(v) Rome Prati	(vi) Barcelona Eixample
path length	m	2042.0	1789.0	1972	2068	1127	1887
D(max)	m	175.0	186.5	146.0	163.6	116.5	60.5
D(average)	m	10.4	8.2	9.5	14.4	24.8	20.0
D(min)	m	2.6	1.9	4.2	4.2	22.3	16.8
Fd(max)	m	235.5	300.5	302.5	955.9	Inf	Inf
Fd(average)	m	50.6	59.5	99.4	242.6	n.d.	n.d.
Fd(min)	m	2.9	8.6	3.0	6.5	Inf	Inf
S	val	37	37	33	19	4	1
S(ratio)	val	1.8	2	1.7	0.9	0.3	0.05

Table 1. Key values of parametric analysis, per indicator, per case study (Author, 2022).

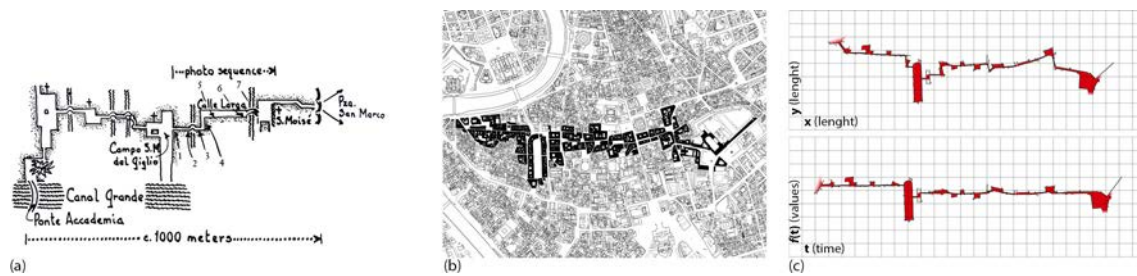


Figure 1. From cartesian to parametric representation: (a) Urban sequences in Venice (Lynch, 1962); (b) sample path in Rome case study (Author, 2022); (c) the sample path in cartesian representation (above) and unfolded along the parametrized trajectory (below) (Author, 2022);

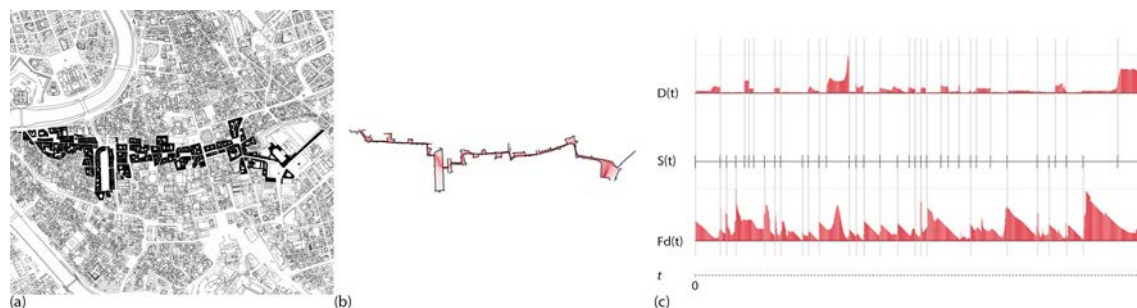
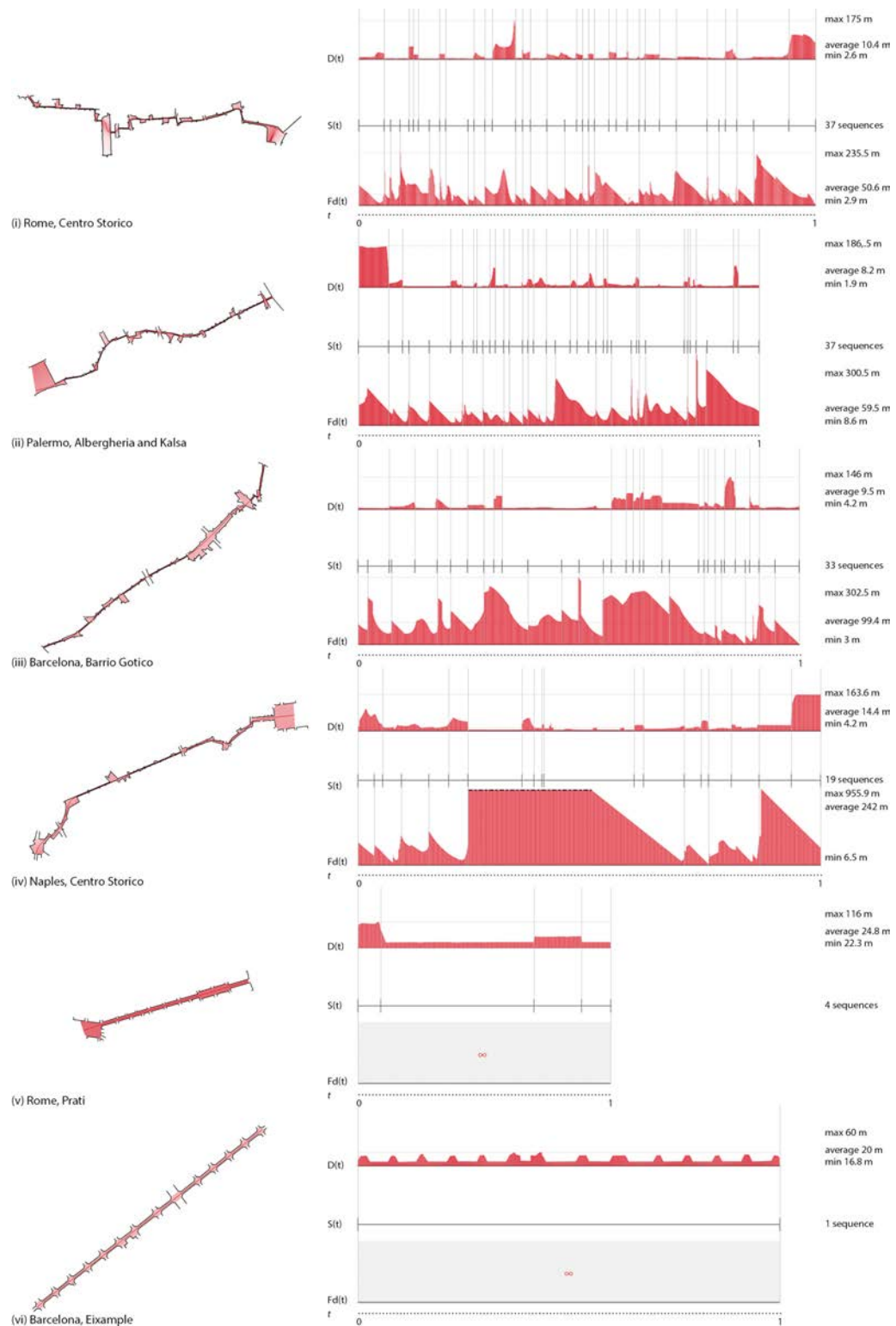
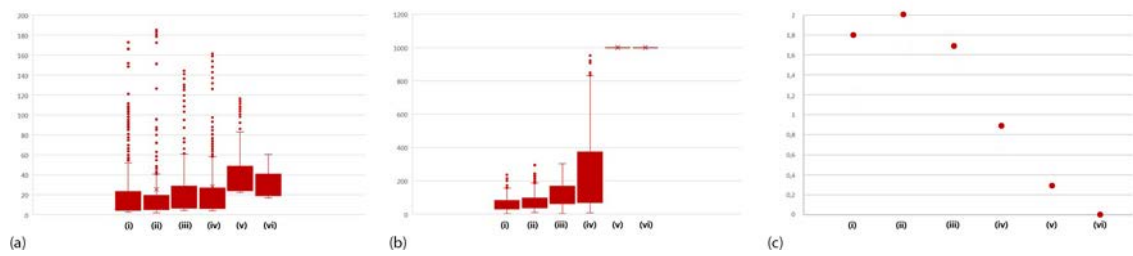


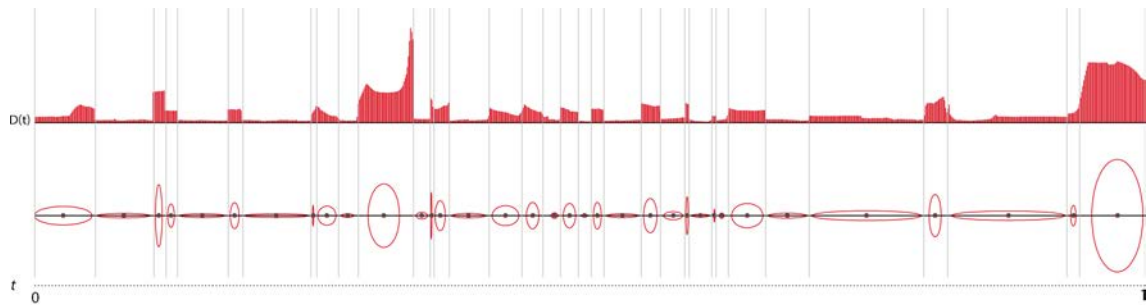
Figure 2. Analysis of a sample path in Rome, Centro Storico (a), along a parametric trajectory (b): (c) dimensions, sequences, and focal distances in parametric representation on basis  $t(0,1)$  (Author, 2022);



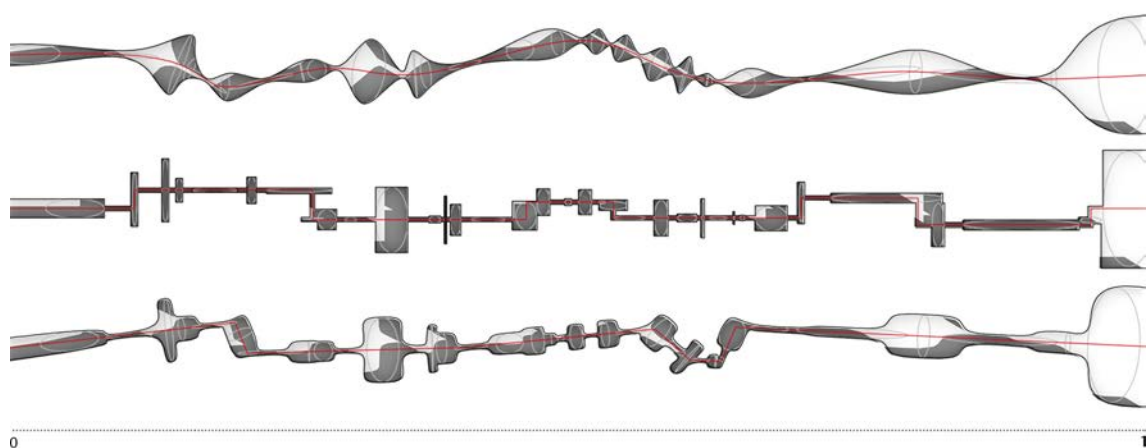
**Figure 3.** Graphical representation of the comparative analyses: (i) Rome, Centro Storico, (ii) Palermo, (iii) Barcelona, Barrio gotico, (iv) Naples, (v) Rome, Prati, (vi) Barcelona, Eixample (Author, 2022);



**Figure 4.** Data visualisation per type for every case study: (a) dimensions; (b) focal distances; (c) sequences per 100 m (Author, 2022);



**Figure 5.** Urban sequence (i) represented as a chain of local topologies with proportional data based on dimensions  $D(t)$  (Author, 2022);



**Figure 6.** Urban sequences design through a parametric algorithm based on urban sequence (i) configuration, adopting three different sample paths with the related geometric languages (Author, 2022);





## Luigi Moretti's Parametric Architecture: Deliberation on an Old New Method for the Urban Analysis

Martina Meulli

Dottorato in Architettura e Costruzione. Sapienza Università di Roma. Piazza Borghese, 9. 50125 Roma.

E-mail: martinameulli@gmail.com

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Conference theme: New methods and Technologies for the urban analysis

**Abstract.** *Since the early forties, the architect Luigi Moretti theorized the so-called 'Architettura Parametrica', according to which the parameters and their interrelationships become the expression or the code of a new architectural language. Moretti's first attempt to rethink urban morphologies through the application of the scientific method dates back to his project for the Foro Mussolini. However, it was not until 1956 that he put his theories into practice with the work of IRMOU (National Institute of Mathematical and Operational Research in Urban Planning), a research laboratory he had co-founded with Bruno De Finetti and other researchers from different fields. Since Moretti's idea was to combine the theory of Parametric Architecture with the methods of Operational Research, their work focused on the analysis of urban design and traffic flows. The translation of the mathematical modulations into reality took place in different projects, from the INCIS districts in Rome to the Watergate complex in Washington. Moretti's parametric intuition still amazes with its topicality, even if the general response was mostly of skepticism. Although today architecture is at the heart of its digital turn and the society of the 21st century – being data-driven – is highly technological, urban analysis seems not to be able to take advantage of it. On the contrary, the inevitable mathematical turn that took place in urbanism – and architecture – appears to have caused its declining.*

## Introduction

The deliberation on one of the proposed themes – ‘New Methods & Technology for the Urban Analysis’ – combined with the enduring study of my doctoral research – which analyzes the figure of Luigi Moretti in general, and his idea of the city in particular – led me to get deeper on an ‘old’ new method for the urban analysis, that is the Parametric Architecture proposed by Moretti in the early forties.

Ahead of his time, the Roman architect immediately seemed able to foresee the possibilities in architecture offered by new technologies. According to Patrik Schumacher (Magliozzi, 2021), this was possible because he was in touch with the most innovative intellectual and scientific trends of his time. But, unlike the drifts that ‘Parametricism’ – a term coined by Schumacher together with Zaha Hadid – has had since the early nineties, the substantial peculiarity of Moretti’s work lies precisely in its application to urban planning. Because, as Antonio Monestiroli eloquently suggested during a debate, “he was a great architect, also a great architect of the city”.

## Parametric Architecture and Operational Research

The first time Moretti mentions the ‘parameters’ is in the first issue of his magazine *Spazio*, in the essay entitled *Eclettismo e unità di linguaggio*, where he argues that “a unitary language is born [...] from an ordering and classification, in fundamental and secondary, of the infinite parameters of reality and their relationships” (Moretti, 1950). The influence of logical-mathematical thinking is immediately noticeable. Then, the term ‘Parametric Architecture’ is coined in the sixth issue of *Spazio*: the expression is only quoted in the essay entitled *Structure as form*, while Moretti demonstrates how his way of thinking is conditioned by the world of science, as he intends “the term ‘structure’ in the sense that is assumed in logic-mathematics that is of ‘complex of relationships’” (Moretti, 1951-52). However, it is in the French magazine *United States Lines Paris Review* that Moretti announces the advent of an architecture based on mathematical thought. In the introductory note of the essay *Structure comme forme*, the architect wants to show how the architecture of tomorrow should be based upon the parameters derived from the group theory of the mathematician Évariste Galois, arguing that “the enumeration of the ‘parameters’, scientific research, the quantitative mathematical analysis of these parameters, these form a task to be tackled ‘a priori’ by the new architecture in every case. There will thus be born that architecture I have long demanded, and to which I gave the name parametric” (Moretti, 1954).

The theoretical formulation and the parallel research carried out by Moretti are influenced by a new way of thinking, called ‘Operational Research’, which is a discipline developed since the Second World War whose intent is to develop and apply advanced analytical methods to improve decision-making. Moretti himself talks about it during a lecture entitled ‘Scientific instrumentation for urban planning’ held at the Aldo della Rocca Foundation in 1965, arguing that: “Operational Research in fact proposes, with the help of a staff of researchers belonging to the most diverse disciplines, to define exactly the themes of each research and enumerate and quantize the parameters that enter into the development of these themes, in order to define, with certain degrees of probability, the different solutions most suitable to immerse themselves in reality” (Moretti, 1965).

The combination of parametric architecture and operational research is the reason why Moretti founded an institute called IRMOU in 1957, meaning Institute of Mathematical and Operational Research for Urban Planning. He intended to apply operational research to architecture and urban planning, through the collaboration of researchers from different fields such as

mathematics, physics, sociology, economics, etc. It is important to remember that applied mathematics was still a novelty that was struggling to make its way, and in Italy, one of the few and best in the field was Professor Bruno De Finetti, who was entrusted with the role of vice-president of the Institute.

To draw attention to their work, IRMOU participated at the XII Triennale di Milano in 1960 with the Exhibition of Parametric Architecture and Mathematical and Operational Research in Urban Planning. On the first page of the catalogue, it is written: "Architecture and Urbanism are still expressed today following purely empirical structures of thought. They seem to ignore, and in fact ignore, the richness of modern scientific thought understood both in the extraordinary instrumental possibilities it offers (and of which the new materials and related technologies are only a fragment) and above all in its characteristic structure as a specific and very new logical, conceptual, spiritual rhythm" (Moretti, 1960). In addition to the evocative plaster models of some types of stadiums and cinemas, there were exhibited solutions for metro stations – a theme that Moretti had been studying since the thirties – together with typologies for schools and hospitals, or possible applications in human engineering (i.e., the definition of secondary elements, such as stair profiles, opening controls, traffic signals). The research group focused mainly on the application to urban planning since Moretti considered it a discipline that in many and fundamental fields could only be addressed by operational research (Moretti, 1960), in opposition to the approximation and uncertainty usually accepted. Other application examples proposed in the catalogue concern the division of a city into school zones, traffic, coordination of investments, and location of residential and production centers. Despite the great success at the international level (Moretti was invited to chair a seminar on the subject at the IBM center in the Netherlands), the Italian response was for the most of mistrust and skepticism.

### Operative Approaches

Focusing now on Moretti's role as architect of the city, the first germ of his interest in urban design is already in the project for the Foro Mussolini of 1936. The entire process of the design of the Foro is complicated – and we should not outline it here – but the intuition that Moretti had to make it the new northern gate of Rome turned out to be correct. The architect proved to be intuitive and far-sighted, having been the first to grasp the potential of a north-south axis, "both for its role in the Italian road communications system, and for its ability to innervate the main monuments of the city" (Rossi, 2021). In fact, the Foro Mussolini never really became the northern gate to access the capital, but that axis was progressively consolidated in the physical reality and urban imagination of the city. An interesting element concerns the fact that Moretti, rather than dealing with a purely urban plan and limiting himself to the design of sports facilities, intends to give shape to the landscape. In the essay by Tommaso Magnifico – heir of the architect – there are published important project drawings belonging to the archive, through which it is possible to understand the work intended by Moretti. In the table *Determinazione dei Raggi visuali corrispondenti a quadri panoramici modificabili per elementi estranei al Foro*, different fields of view – or, as Moretti called them, 'optical scopes' – are drawn, originating in the most significant points of the area. Moretti will use this particular tool several times and in different ways: first, in the studies of 'visual equiappetibility' for the models of the aforementioned exhibition at the XII Triennale, but also for the sequential visions of the project for Corso Italia in Milan, or in the tracing of the curved lines of the buildings of the Watergate complex in Washington. The idea behind the shapes of the stadiums, however, is already present in the colossal project of the Arengo della Nazione for the Foro Mussolini, that is, as Magnifico says,

“an architecture of the void, imprinted on the ground and guided by an anthropomorphic idea of space that already prefigures the forms for the large numbers of parametric architecture” (Magnifico, 2021).

However, it was from the second half of the fifties until his premature death in 1973 that Moretti dedicated himself to major urban projects, both in Rome and abroad. First, he deals with the field of urban design with the new INCIS (National Institute for the Homes of State Employees) districts: the Olympic Village (1957-60) and the Decima District (1960-65). The Olympic Village is realized with the collaboration of Vittorio Cafiero, Adalberto Libera, Amedeo Luccichenti, and Vincenzo Monaco. Leaving aside the details of the design events and purely architectural features, it is important to note that Moretti works on different variations to the proposed urban plan and “redesigns the rectilinear buildings in the middle of the neighborhood, bending them to form an elongated reservoir that narrows at the ends” (Talamona, 2010). Reflecting on the relationship between spaces and architecture, he gives life to an “exemplary new district of efficient urban functionality, wide-ranging, spatial and figurative coherence”, emphasizing, among other things, the importance of “very large uninterrupted green spaces” and “continuously varied perspectives”, as Moretti himself describes the district (Moretti, 1962). He applies the same aspects in the following project for INCIS, that is the Decima District, which is located further south, in line with the urban expansion to the EUR-Mare area that Moretti had already envisaged in the project for the Foro. In the district report published in *«La Casa»* in 1962, it is presented the analysis of the place, with the geological conditions and the hydrometric and fluviometric situation of the area. Based on an in-depth examination of the road connections with the city and the territory, Moretti proposes again a variation of the urban plan. His intention is to modify the roads plan, continuing the Via Olimpica in order to constitute a new axis for ‘inter-district’ traffic. He wanted to give the new district an approach that was at the same time the most convenient from an economic point of view and the most efficient from the point of view of urban life (Moretti, 1962). Therefore, he opted for a three-level circulation system – inter-district car traffic, neighborhood car traffic, and pedestrian traffic – at different heights, all connected but independent. By doing so, he generated a continuously free ground floor, accentuated by the decision – like at the Villaggio Olimpico – to lift all the buildings on pilotis.

During that period, between 1957 and 1960, Moretti was also appointed representative of the Ministry of Public Works in the commissions for the study of the Master Plan of Rome and was entrusted with the project of the Archaeological Park (1957-1961), the Intermunicipal Plan of Rome (1958-1960) and the Plan of Parks, urban, suburban and territorial (1959-1960). In general, Moretti aims at an economic and industrial strengthening of the entire territory surrounding the capital on a regional scale, committing himself to transform Rome into a modern metropolis. The drafting of the plan involves a massive application of the methods of operational research to urban planning. It is impossible to omit the heavy criticism to which Moretti was subjected, for obvious political reasons, and above all due to his relations with power groups in the field of real estate speculation. Because of that, the analyzes conducted by IRMOU are considered a way to “provide the new capitalism with the alibi of an alleged coldness derived from statistics and mathematical models under which to operate with quiet impudence and at the same time an efficient tool for the rational organization of exploitation and speculation” (Bracco & Ray, 1968). Moretti’s goal seems rather to safeguard the nature of Rome and at the same time demonstrate the need to give a violent turn to the classical concepts of urban planning (Rostagni, 2008). In order not to succumb to the limits imposed by the interests of politicians and private speculators, the urban planner must be able to accurately foresee all the implications

of a regulatory plan, at an economic, social and demographic level. Thus, during the sixties, Moretti elaborated a series of infrastructural projects for the Capitoline Administration. In particular, he was in charge of the new section of the Termini-Risorgimento subway, with the task of defining the new stations both on an urban and architectural scale. With the aim to create an underground network of roads and car parks connected to surface roads, the project is based on an accurate parametric analysis of flows and relationships with the city. Among the urban fundamental nodes projected by Moretti there are the Pietro Nenni bridge – which allows the crossing of the Tiber River to the section between Flaminio and Orsini Farnese stations – and the well-known underground car park at Villa Borghese – which, in addition to the architectural value itself, has allowed restoring value to the area in front of the Villa, freeing it from traffic.

We have said before that Moretti and his studio had a fervent period between the fifties and the seventies, not only in Rome but also abroad. Among the projects we could analyze, there is one that can't be excluded: the large area along the Potomac River in Washington D.C. famously known as Watergate (1960-63). Again, Moretti lets himself be guided by the analysis of the city, even more being the project on American soil and of dimension and complexity not yet addressed. Since the beginning, he designs the residential complex as an assembly of fluid forms freely inserted in the natural curves of the river. As in the projects for INCIS, all buildings are raised on 'pilotis' to allow a continuous view, through the park and towards the river. The ground is free from streets and cars since they are all tidily organized in the hypogea. It is a truly modern project, both on the urban and architectural scale. In fact, since the construction of the large and undulating elliptical shapes of the buildings in reinforced concrete required considerable engineering support, we can consider Watergate one of the earliest examples of computer-aided design.

## Conclusion

Having said that, we can also reflect on the fact that Watergate was one of the first among replicating projects conceived by architects since the nineties that – after the advent of Parametricism – were seduced by the possibility of complex forms over the complexity of function and meaning. Most of them forgot the identity, the utility, and the morality that an act of definition of any part of the city should have. It seems now that the distance between the world of ideas – that of urban culture – and the world of reality – on which this culture wants and must affect – has become too wide. Since urban planning is a discipline experimental, is it not worrying that there is no comparative examination between what the plans foresee and what the concreteness of reality highlights? Should not we citizens demand some sort of testing? If urbanism – as much as architecture – is to be considered a scientific discipline, it should be addressed as such. This is exactly what Moretti suggested sixty years ago. Consequently, the urban crisis started – among other things – also because of the difficulty of accepting the tools to quantify the parameters that define reality. The distrust towards the 'New Methods & Technology for the Urban Analysis' is well expressed in an essay written by Bruno Zevi about the IRMOU exhibition – which title translation is Electronic brains? No, calculating machines – where he argues: "If parametric architecture is not to remain a brilliant intellectual exercise, it is indispensable that research is sustained by a high moral inspiration. For now, the idea surprises and fascinates us; tomorrow, it may convince" (Zevi, 1960).

Halfway between then and now, Rem Koolhaas wrote an essay in his popular book *S, M, L, XL* where he wonders *Whatever Happened to Urbanism?* He argues that, despite the disappointing promise to transform quantity into quality through abstraction and repetition, urbanism has



been unable to invent and implement. Comparing the professionals of the city to chess players who lose to computers, he gives a powerful image of the incapacity of architects to manage the complexity of today's reality (Koolhaas, 1995). At the end of his career – and of his life – Moretti supposed that 'his' parametric architecture would probably lose the battle with quantity since it could respond with efficient precision only to issues with a limited number of parameters. (Moretti, 1971-72). The problem was – and is – in the difficult coexistence between quantized and un-quantized parameters, meaning scientific accuracy and architectural intuition. Because of that, even if the mathematical twist of urbanism was inevitable, it somehow led to its sabotaging.

The occasion of this paper has been the opportunity to reflect on a theory that was – and still is – valid. Luigi Moretti had the intuition to foresee the future of the architecture of the city and, even more incredibly, its limits and consequent difficulties. Today, the phenomenon of digital turning is still evolving, but its effects are already visible. What will happen? A consideration of the construction of the city seems to be missing. What is certain is that we need to redefine our relationship with urbanism, because, as Koolhaas declares, "more than ever, the city is all we have".

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## Learning from Monasteries. New Collective Spaces for Naples Ancient City

Salvatore Pesarino<sup>1</sup>, Ferruccio Izzo<sup>2</sup>, Luigiemanuele Amabile<sup>3</sup>, Lorenzo Giordano<sup>4</sup>

<sup>1,2,3,4</sup>Università degli studi di Napoli "Federico II", DIARC (Dipartimento di Architettura), Via Forno Vecchio 36, 80135, Napoli.

E-mail: <sup>1</sup>ferruccio.izzo@unina.it, <sup>2</sup>luigiemanuele.amabile@unina.it, <sup>3</sup>lorenzo.giordano@unina.it,

<sup>4</sup>salvatore.pesarino@unina.it

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**Abstract.** *This contribution presents a teaching and research experience on some monasteries within the ancient city of Naples. The interest for this architectural type lies both in its history and meaning inherent in the urban fabric of the city and its ability to be responsive to changing needs and challenges. We experimented a methodology of reading the historic city, based on the simultaneous utilization of the traditional tools of urban analysis – images, sketches, drawings, models – and an attitude sensitive to the evolving necessities of the contemporary in relation to the architecture of the city. The past is thus revealed as something alive that through built spaces offers experiences, knowledge and values to the contemporary city. In investigating the role of monastic buildings and the continuous process of stratification, merging and modification that has characterized them, we present an analytical review structured through a comparison of significant examples of the ancient city of Naples. Identifying differences and invariants in these buildings, we have tested the actuality of their architectural features on the monastery of Santa Chiara, reinterpreting its uses and roles in the contemporary. The sight, looking beyond the huge walls looming on the cardini and decumani, has captured the potential of those transitional spaces between the building and the fence as empty spaces available to the continuation of the ancient city both in terms of values and quality of spaces and uses for the community.*

### **Working with History within the Design Studio**

The work presented in this contribution emerges from an ongoing didactic and research experience on the Ancient City of Naples conducted within the Department of Architecture at the University of Naples "Federico II" in the Architectural Design Studio IV (4th year 5UE Architectural Degree Course). The methodological core of the course is founded on the possibility of learning from historic contexts in order to provide contemporary architecture in continuity with stratified urban tissues searching for a certain adequacy of the new to physical contexts. In order to reach this objective, the studio followed three main complementary didactic phases: a first moment of analyses, identified in the observation of different case studies; a second one based on the interpretation of data and their transformation into design actions and a third of recollection, where the results are re-evaluated, and their coherence tested within a specific context of reference. The studio is based on the assumption that architectural design projects should interpret reality and search for how – knowledge, craft, techniques – what – the place as the ultimate object of its projection – and why – its *raison d'être* and intentionality, both on a conceptual and perceptive level, through which it substantiates its physical presence. Working within historic cities implies a careful confrontation with the history and the specificities of the local construction process pertaining the existing built environment. The past is rediscovered as some alive force, which through the testimony of buildings and their spaces offers architectural experiences and spatial values that would turn into new lymph for the contemporary project. This research is encouraged and supported by architectural theory and the study of contemporary references as necessary supports for ideas to broaden the aspects that a project in an existing context affects. The tools used within the studio are those typical of the architect: onsite visits, surveys, sketches, drawings, models, images. Specifically for this contribution, redrawing as architectural practice had a fundamental role to understand both at the urban scale – for studying and verifying settlement strategies existing within the ancient city – and at a more detailed human-eye scale – for the investigation of the possible relationships and proportions – how to establish new dialogues between contemporary insertions and their historic surroundings. The search for architectural solutions started then from afar and went through all the different phases of the studio, to establish a dialectical relationship between intuition and rigorous verification, between precise analytical tools of representation and a certain sensitivity towards space, acquired with time and repeated exercises<sup>1</sup>, with the aim of guiding the design process learning from physical contexts, and transform those notions, with the help of memory and imagination, into an act of intellectual responsibility. Starting from these premises, in the Architectural Design Studio IV we experimented a methodology of reading and interpreting only some parts of the complex urban leviathan that is the ancient city of Naples, investigating the contemporary role of monastic architecture for today's evolving necessities, their continuous process of stratification, developing an analytical review of significant examples. Through the identification of differences and fixed characteristics in these buildings, we have composed a catalogue of physical actions that demonstrates the actuality and resilience of their architectural features. These were finally experimented on-site in different design projects on probably the most famous – and certainly the biggest – monastery of the ancient city, Santa Chiara, choosing as project sites some underused areas in between its still intact bordering wall and the monastery structure, characterized by the potential of function as transitional spaces between the monument, the

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<sup>1</sup>Cfr. J. Pallasmaa, *The Thinking Hand: Existential and Embodied Wisdom in Architecture*, John Wiley & Sons, Chichester 2009.

enclosure and the city, available to become new spaces for neglected communities in the city centre.

### Reading the Ancient City. Seeing, Drawing, Learning

Much has been already said on the manifold qualities of historic cities, and as much has been written on the city of Naples<sup>2</sup>, an extraordinary example of how different layers of history shifted in time can coexist together, defining a peculiar atmosphere suspended between a sense of domesticity – of alleyways, courtyards, staircases – and urbanity<sup>3</sup>. One of the fundamental properties emerging for these features is the ability to orient. Orientation is in fact one of the typical traits of historically stratified cities, between natural elements – like the topography, or emergencies such as the Vesuvius – and manmade architecture, places where to feel protected and safe, sheltered by the shadows of years of history that guide us naturally through public space, result of stratified collective action, in opposition to the increasing phenomena of homologation and gentrification. The few pockets of resistance are living in those architectures of the past that have resisted the passing of time through their own perceptual and physical qualities, still being recognized as shared heritage. “Not to find one’s way around a city does not mean much. But to lose one’s way in a city, as one loses one’s way in a forest, requires some schooling”<sup>4</sup>. In Benjamin’s words, the space of the city – by the beginning of the design studio still unknown in its various degrees of complexity for the students – should be considered as a rich field of exploration. The information we found in the exploration of its structure is then moulded and refined through personal experience. Observing reality and filtering its essential traits is a possible way to learn and understand how good architecture is made – and not necessarily why – in order to build a personal archive of images to apply in the design process. The possibility to investigate the rich stratification of the ancient city has opened to different fields of knowledge that have intertwined throughout centuries of history. Indeed, it is interesting to notice that this complexity of uses and spaces, how they have mixed up and overlapped, still bears values that adapt to the evolving needs of contemporary society, defining a close correlation between physical features and behaviours as well as between community and social, cultural, economic, political structures and building traditions, history and place.

To have a glimpse – a full comprehension would require years – of these issues, we invited the students to look at the city with their eyes, discover it, and bring back on shareable supports their impressions and reasonings. Monasteries in the ancient city – the topic of the design studio – have been for centuries one of the most important drivers for transformation of the city and its society<sup>5</sup>. Investigating these architectures means to inductively comprehend the development of the city. San Pietro a Majella, Sant’Antoniello a Portalba, Sant’Andrea delle Dame, San Gaudioso, San Domenico Maggiore, San Gregorio Armeno, San Marcellino e Festo, Santi Severino e Sossio, San Paolo Maggiore, the Complesso dei Girolamini, San Giuseppe dei Ruffi, Santa Maria della Pace; this list comprises only some case studies of the ones within the city that have been analysed by the students of the design studio, to provide a collection of examples demonstrating different evolutions of such a strict typology and how the apparently rigid structure of spaces has been from time to time adapted to the specificities of the historic

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<sup>2</sup>Cfr. R. Pane, *Napoli Imprevista*, Einaudi, Torino 1949; cfr. M. Ascolese, A. Calderoni, V. Cestarello, Anaciclosi. Sguardi sulla città storica, Quodlibet, Macerata 2017.

<sup>3</sup>Cfr W. Sonne, *Urbanity and density in 20th century urban design*, DOM Publishers, Berlin 2017.

<sup>4</sup>W. Benjamin, *Berlin Childhood Around 1900* (1938), Belknap Press, Cambridge 2006.

<sup>5</sup>Cfr. Hills, H. *Invisible City: The Architecture of Devotion in Seventeenth-Century Neapolitan Convents*, Oxford University Press, Oxford 2004.

cities. (Fig. 1). As introduced, working in the ancient city of Naples means to be in daily contact with the matter of history, which is treated and understood as alive and ready to be used and transformed in useful architectural knowledge to be carried on for life. To put this aspiration to practice, the exercise of redrawing has assumed a fundamental role in the design studio. The relevance of architectural drawing as one of the tools through which learn and teach architectural design is still subject to intense disciplinary debates among scholars and architects<sup>6</sup>. From its many different declinations, drawing can be considered a tool for architectural research and spatial understanding of the complexity of the historic city.

Through frequent surveys, students can grasp the sense of an urban space and its inherent haptic qualities. A slow process made of different actions that allows immaterial knowledge to slowly stratify in the eyes of the observer, training the senses to an augmented comprehension of the existing built environment. In this process, drawing acts as one possible way to understand reality. This approach is well synthesized by Florian Beigel and Philip Christou: "Initially we try to make a small number of what one could call portrait photos of a place that capture its nature and character on different scales. It is essential to visit the site as often as one can. After reflecting on the observations, one has gathered, return visits are necessary to verify, clarify and possibly review one's initial observations, again with the help of photographs and sketching"<sup>7</sup>. The manifold surveys by the students allowed to extract each time more precise information towards the understanding of how these extraordinary objects are made. Drawing and redrawing is a slow path of evaluations, errors, repetitions and doubts, adding a different depth of meaning to the contemporary inclination to stop at a retinal knowledge level. "Drawing is a process of observation and expression, receiving and giving, at the same time"<sup>8</sup>; in fact, sketches contain within them the mood and expectations of the person who draws, carrying with them always something more than what constitutes its actual material subject. Hand and eyes connect together while filtered by imagination, memory and personal consciousness, building on paper a reality made of ink. "The hand-eye-mind connection in drawing is natural and fluent, as if the pencil were a bridge that mediates between two realities [...] the physical drawing and the non-existent object in the mental space that the drawing depicts"<sup>9</sup>. Bringing sketches into plans, sections, façades, and details, means to absorb the internal logic of existing architecture to produce something anew, emerging from the site: "designing from the place requires cool observation and a careful reading of the place"<sup>10</sup>. The shaky and hesitant hand-drawings have then been transformed into computer drawings in 1:20 scale, composing a register of architectural solutions available for contemporary use. In this sense, investigating monasteries within their historical urban contexts has helped defining a path of research that aims at the transmission of a specific cultural message to be applied in the project: learning from past examples to produce contemporary, resilient, and resistant architecture for our cities and their inhabitants. (Fig. 2).

### **Settlement strategies. Approaching Historic Matter**

The phase of analysis of existing monasteries has been followed by a phase of experimentation. What has been extracted from the existing, should then lead to confront a practical issue, that is to insert a contemporary building into a stratified context: working within the bordering walls

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<sup>6</sup>Cfr. A. Calderoni, C. Gandolfi, J. Leveratto, J., Nitti, A. (eds.) *Stoà 2 [Disegni]*, Thymos Books, Napoli 2021.

<sup>7</sup>F. Beigel, P. Christou, *The Art of Living*, in «Domus», n. 973, 2013.

<sup>8</sup>Pallasmaa, op. cit.

<sup>9</sup>Pallasmaa, op. cit.

<sup>10</sup>Beigel, Christou, op. cit.



of the Monastery of Santa Chiara. Basically, a design problem. But how to intervene?

The complexity of defining a general methodological approach can be an intricate problem in the pedagogical path towards the architectural project. The wide range of variables, which combine many issues to build up an initial design strategy, imply a set of questions that cannot always be clearly resolved. The multiple preliminary analyses, however comprehensive – relating to the studied monasteries, to the construction of a functional program and to the collection of references – and representing an important starting point to identify a cultural iter within which to direct the design exploration, do not specifically consider, however, the unpredictability of what can be defined as intentionality. It is interesting, in fact, to notice how the design narrative is not always and only dependent on the starting assumptions. The preliminary analytical process turns out to gain then even more relevance in allowing to specify the issues to be addressed, a *conditio sine qua non* through which to acquire the appropriate tools for an initial design approach. The knowledge acquired in these early stages of cognitive reflection opens, in this sense, to broader and more personal interpretations where the individual design intentionality emerges. This need to identify a coherent reasoning is manifested in what we can call the settlement strategies. It is through intentional intuition, in fact, that the architectural actions develop anticipating the constitutive plausibility of architecture. A presumable cultural foundation, invisible to physical perception but perceptible in the sphere of the intellect, capable of supporting the construction, first, theoretical, then, physical of the architectural project. Just as the unveiling of Piranesian foundations, in their illusory tangibility, the identification of the settlement strategy makes itself available to a plausible design truth, again through an immaterial, yet concrete, determinacy.

The semester-long project theme was identified in the development of an architectural intervention strategy with a strong social value, which aimed to define new spaces for living and community within the walls of Santa Chiara. The construction of this monumental complex was ordered in the early fourteenth century, representing one of the first examples of “religious citadel” outside the oldest circle of walls of the Greco-Roman original core of the city. The shape of a large rectangle of about 270 x 130 m, Santa Chiara has two cloisters, the bigger twice the size of the smaller. The smaller is connected to the Piazza del Gesù, and faces the lower decumano; the bigger faces the dense fabric of the city. The transformations that took place over time generated underused spaces between the walls and the complex. There the students had to solve the design task, complicated by the presence of the archaeological remains of an old Roman spa, and the presence of a dilapidated building hosting the ex Istituto Pontificio. Other small preexistences, a football field, a few trees, and the former carpentry shop of the monastic complex, complete the picture of the place. The complex is surrounded by a 10 m high wall at the perimeter, and in different positions it defines diverse relationships with the city – many inhabitants of the area would be happy to demolish it so that the sun could easily get into their homes. To explore the first design intuitions, the studio encouraged the students to work with drawings at the big scale, diagrams, and models at the urban scale, that proved to be valuable tools to try out and verify strategies. To redefine possible relationships between the Santa Chiara complex and the historic city – and fulfil the program of inserting new spaces for the community – the strategies were discussed in a series of collective reviews and critiques that resulted in different ideas developing eventually into architectural projects. The outcome was a set of urban compositions that define new ideas for the city, while at the same time taking care of the existing. (Fig. 3). With the help of the solid analytical premises, the students confronted the design questions through the identification of a series of active actions, capable of defining a modifying hypothesis. The search for a compositional and volumetric

principle made it possible to lay the foundations toward an architectural narrative capable of establishing a reciprocal relationship between the project site and those ideas which question its nature, succeeding in highlighting the continuity of the proposed intervention in its most specific formal, typological and linguistic meanings. The importance of a cognitive process of this kind, that is, through the interpretive singularity of the settlement strategy, is found in the very nature of such an act that is both symbolic and original, capable of establishing not only the physical, but also the cultural modes of transformation of a place. It is an ascending path, where not all signs are tangible and concrete, such, however, that they can be perceived, in the same way that, for the French philosopher Gaston Bachelard, the house is perceived: a vision where "verticality is ensured by the polarity of the cellar and the attic: the signs of such a polarity are so profound as to open, in some way, two very different directions for a phenomenology of the imagination. Indeed, it is possible to oppose, almost without need for comment, the rationality of the roof to the irrationality of the cellar"<sup>11</sup>. Ultimately, an instinctual premise of irrationality turned toward a categorical search for method and rationality in architectural design.

#### **Actions of Adequacy. Projects for Santa Chiara**

If the settlement strategies were able to define the main framework around which manifold architectures could have been designed, during the third phase of the studio the projects were concretely developed and brought at a higher level of detail. Of more than twenty-five projects, what follows are three main approaches that guided the different solutions that emerged from the design studio.

Along the wall. (Fig. 4). The intervention is focused on the organization of a series of volumes that follows and reinforce the infrastructural meaning of the wall, that in this case becomes a "liveable" space, accommodating new uses. The definition of the resulting spaces between the city and the monastic complex tries to implement a certain recognizability to these areas, giving them a strong public vocation. The new buildings are works as architectural devices that allows a renewed interaction with the wall, enhancing its readability. The facades of the new insertions establish a relationship with the complex of Santa Chiara, constituting a new background for the activities of the users, while at the same time allowing the wall to fulfil its potential and work with its matter. Defining open space. (Fig. 5). This strategy consists of inserting a series of volumes of specific dimensions that could define the leftover open space, considered as an important element of the composition. The borders and accesses to the three areas are designed in such a way as to encourage new views and new perspectives on the complex of Santa Chiara. On the west side, a sequence of rooms placed on the perimeter of the archaeological ruins allows for seating while at the same time supporting structurally the new roofing consisting of a semi-transparent veil that allows light to illuminate the space. Thresholds and paths as spatial devices. (Fig. 6). Thresholds are typical of the architecture of historic cities and particularly evident in Naples. In this strategy they work as spatial devices to define the residual spaces between the monastery and the perimeter wall. These follow the structural rhythm of the Santa Chiara complex, seemingly coming out from it to define a new system of open-air rooms. These enclosures – of different heights, coated in local bricks – contain new natural and mineral spaces. The design of the flooring emphasizes the transition from one space to another, even puncturing the high border wall to open new pathways for the community to enter into and pass through the complex.

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<sup>11</sup>G. Bachelard, *La poetica dello spazio* (1957), Dedalo, Bari 1975.

Three different strategies with common goals, all with the same aspiration of providing the existing built environment with adequate examples for its continuation, to be available for future generations and open to transformations.

## Conclusions

The results of this research did not lead to projects that could provide a definitive ideological stance on how to make architecture, but rather to a series of open-ended reflections on possible methodologies of intervention in the historic city. The students were encouraged to root their actions in the discipline of Architectural Design, in contemporary social, political, economic and material realities, as well as to a specific place, city, tradition and to the broader history of the experience of architecture<sup>12</sup>. The recognition of this belonging allowed the students to understand architecture not as an isolated matter, but as a singular, inevitable moment of the entire history of urban construction and, therefore, to the history of society. "No man is an island entire of itself; every man / is a piece of the continent, a part of the main"<sup>13</sup> and so that is for architecture. Architecture, as a medium, could share past – but still valid – values through its inherent spatial and formal qualities. Reading these specific features means seeing how different spatial devices and specific material conditions of existing realities could trigger processes that give back to the project of architecture its capability to generate urbanity and achieve a certain atmosphere. Holding out against abstract and speculative contemporary design processes, detached from the natural evolution of built contexts, this research could prompt new reflections on the project for the historic city.

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<sup>12</sup>Cfr. E. N. Rogers, *Esperienza dell'architettura*, Einaudi, Torino 1958.

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#### Illustrations and tables

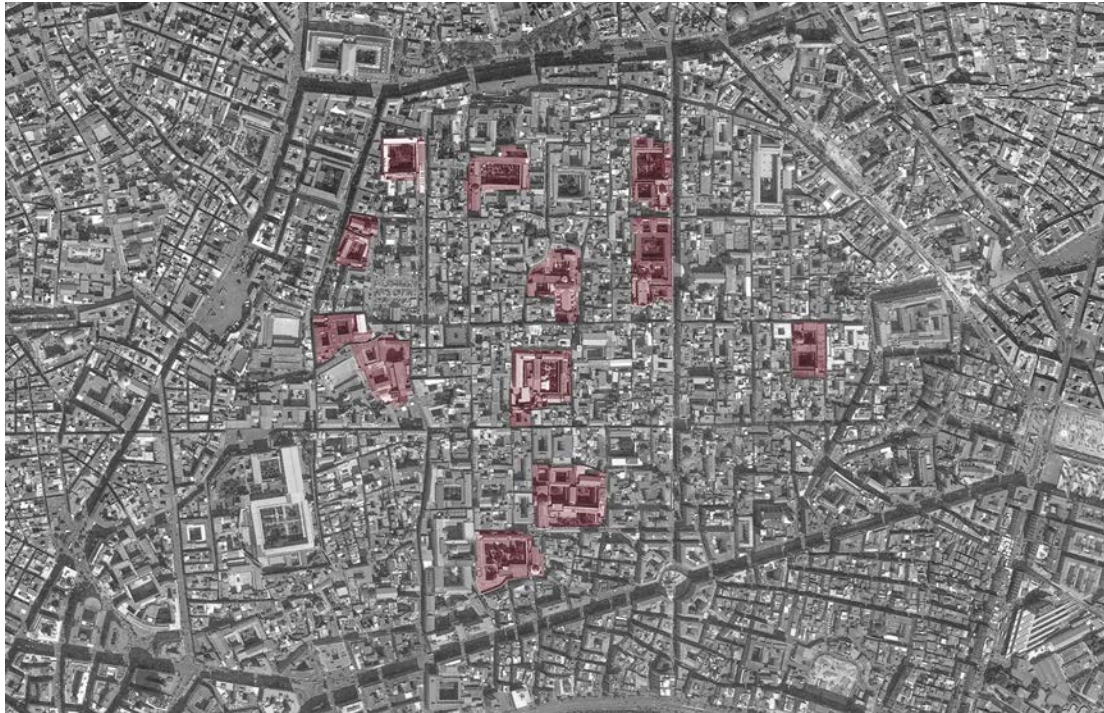


Figure 1. The monasteries of the Ancient City of Naples

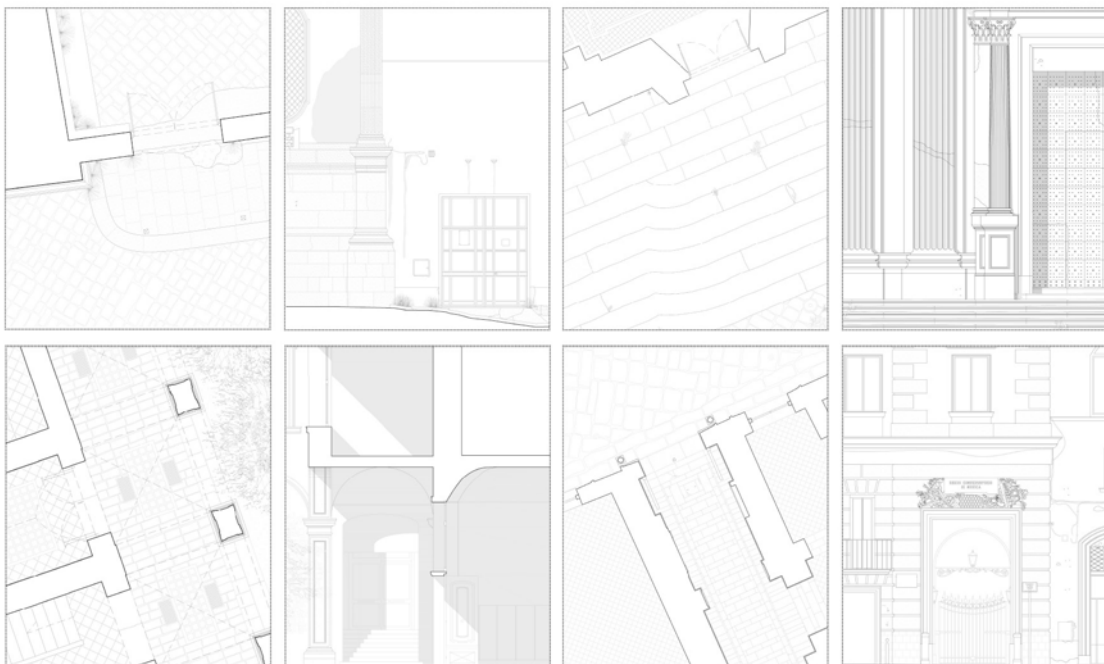
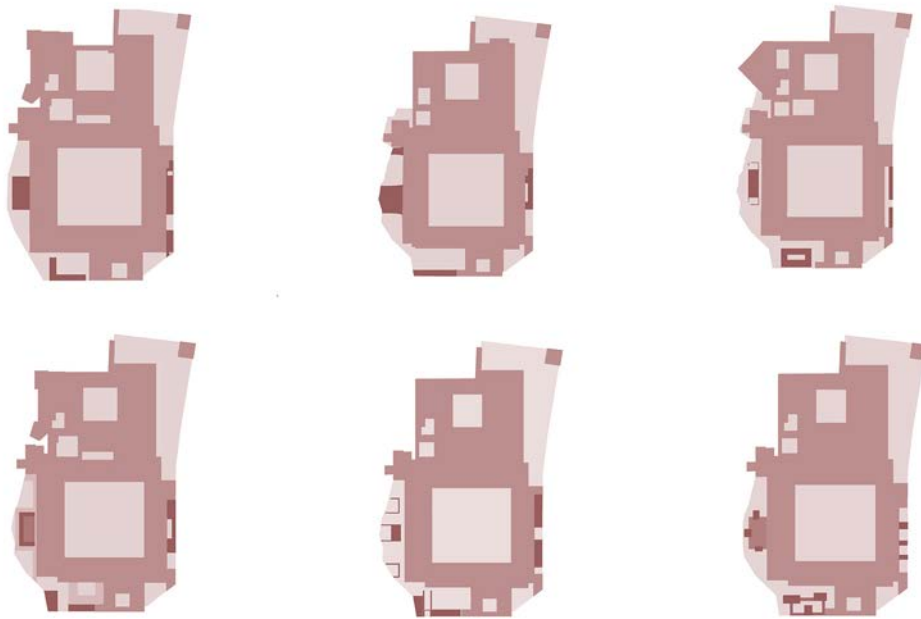
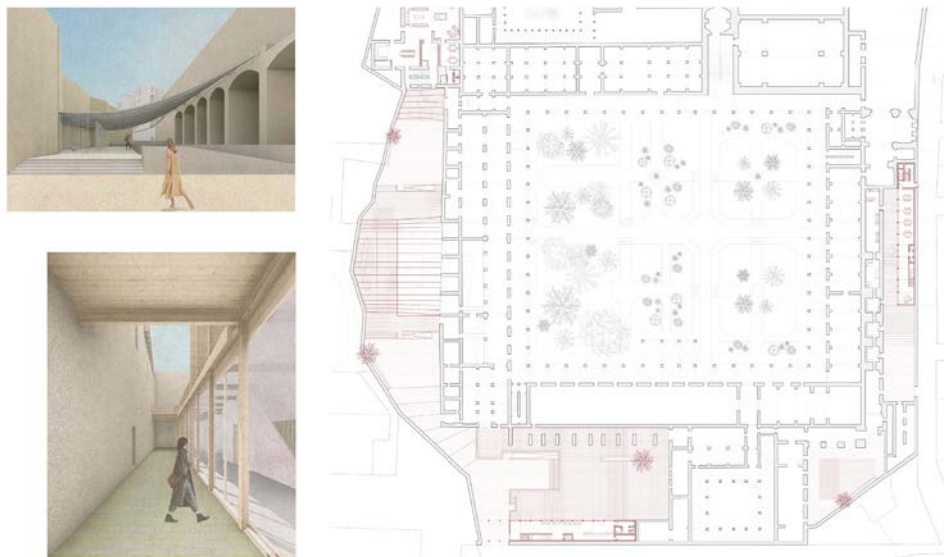


Figure 2. Redrawing monasteries, details, aa. 2020/2021



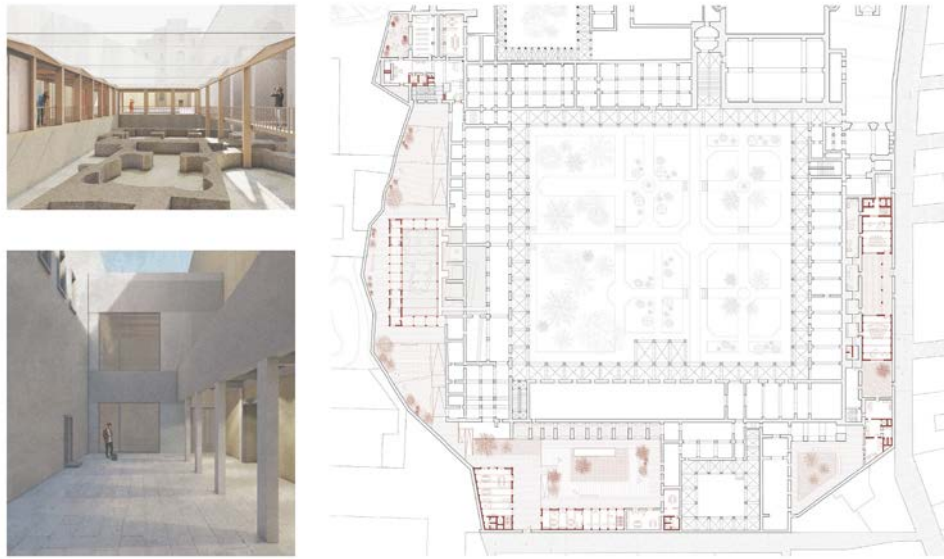


**Figure 3.** Settlement strategies for Santa Chiara, aa. 2020/2021

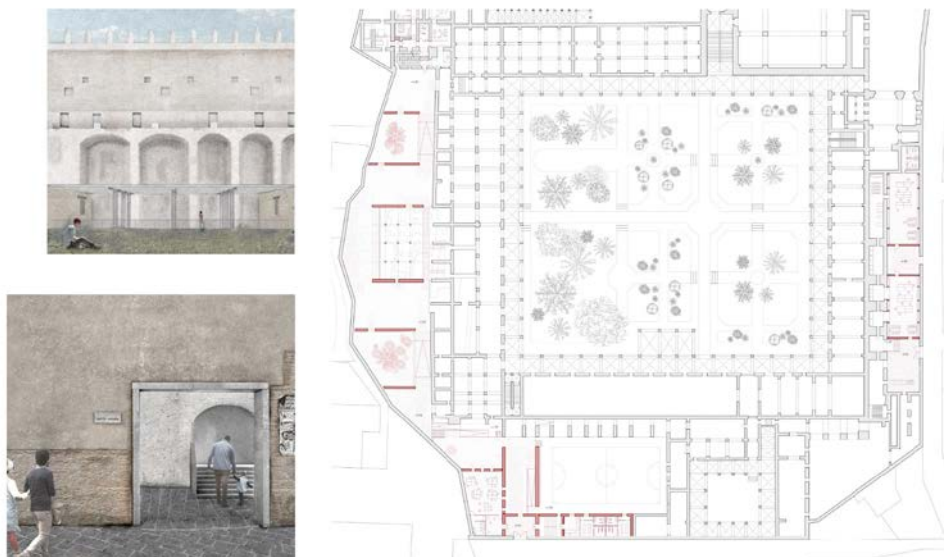


**Figure 4.** Along the wall. Project by Laura Pappalardo, Mariagrazia Pompeo, aa. 2020/2021





**Figure 5.** Defining open space. Project by Gianluca Barile, Leonardo Ossuto, aa. 2020/2021



**Figure 6.** Thresholds and paths as spatial devices. Project by Vincenzo Ceriello, Lucrezia Guadagno, aa. 2020/2021

# New methods and Technologies in Urban Analysis: How Dynamic Morphology influences the transformation of Public Space

Greta Pitanti<sup>1</sup>, Marco Maretto<sup>2</sup>

<sup>1</sup>"Sapienza" Università di Roma, DiAP (Dipartimento di Architettura e Progetto), Via Flaminia 359, 00196, Roma, Italy;

<sup>2</sup>Università di Parma, DIA (Dipartimento di Ingegneria e Architettura), Parco Area delle Scienze, 181/A, 43124, Parma, Italy

E-mail: <sup>1</sup>greta.pitanti@uniroma1.it, <sup>2</sup>marco.maretto@unipr.it; 1

Keywords: Dynamic Morphology, Public Space, Virtual Geographical Space, Digital Technologies

Conference theme: New methods and Technologies for the urban analysis

**Abstract.** *The paper discusses the relationship between urban morphology and the use of technologies in the investigation of public spaces in our cities. The regime towards which the architect's futurecraft has been oriented (Ratti, 2017) and the definition of an increasingly "concrete" virtual geographical space have changed the ways in which public space is conceived today, leading to the definition of a new dynamic morphology that feeds on the use of digital technologies, with "best practices" whose field of action is complementary and not secondary to the "traditional" design dimension. From the studies of spatialist sociology by Jacobs (1961) and White (1980) to the definition of the first operational approaches to reading for the design of the city by Gehl (1971), public space has been observed not only for its physical characteristics, but also for its immaterial ones, the expression of its social nature. This aspect has generated various operational approaches to the city, supported by the use of new technologies and new methods of urban analysis, from analytical-spatial ones (Space Syntax), to bottom-up collective-infrastructure ones (City-Wide Public Space Strategies) for the transformation of community spaces. The research therefore intends to investigate the various dynamic approaches to the reading and transformation of urban public spaces, demonstrating that technology, from a discipline of work performance only (Kahn, 1980) is now a tool that crosses and fills all the phases of the architectural process, as a fundamental means of project organisation and management.*

This paper aims to discuss the relationship between urban morphology and the use of technologies to investigate the public spaces of our cities, highlighting the various dynamic approaches to their reading and transformation to guide the evolutionary processes of the 21st century city.

Talking about the contemporary city today means talking about the "Melting of Disciplines," that is, the set of techniques and strategies belonging to different disciplines that are necessary to address the prospects for change in the city of the future.

In this sense, it is incumbent to reflect on the architect's concept of "futurecraft," so extensively described by Carlo Ratti about "Tomorrow by Design" in which the need to mutate design and observational approaches on the city is manifested in order to deal with the transformations imposed by its evolution.

The quote that opens the volume, by R. Buckminster Fuller, is more eloquent than ever: "We are called to be architects of the future, not its victims." This is because, as the authors themselves recount, the transformation of the city-in its most desirable future-is shot through with several crucial problems. One example is the issue of overcrowding, which has marked a decisive turning point in bringing about a perceptible state of criticality in urban agglomerations; cities have in fact become "magnets" for human beings, and those we have inherited from the twentieth century are by no means equipped to thrive under such conditions.

Therefore, there is a clear need to initiate a "conscious" process of transformation of the city, starting from the analysis of and intervention in its public spaces, recognized, in this sense, as the real stage of urban change, thus following new principles of ecological sustainability, economic balance, renewal in production and manufacturing methods, knowledge work and digital culture.

Is there, therefore, a sustainable model of urban transformation that can combine the historic city with the evolutions imposed by the city of tomorrow? More importantly, does the act of considering the future of the city have intrinsic and productive value?

As Ratti and Claudel say, then, it is not so much necessary to accurately predict the future, but rather to employ design as a systematic exploration and seed of possible futures.

It becomes clear, therefore, that, the role of the architect cannot be solely ascribed to the function of a "city-making craftsman" but must transform to approach and work on the hypothesis of future scenarios.

This opens the way for various, even questionable, paths of urban regeneration, which are nevertheless essential to expect to the needs of the city of tomorrow, and which can only be met through a "Melting of Disciplines."

The definition of an increasingly "concrete" virtual geographic space has then changed the ways through which geographic space is conceived today, leading to the definition of a new dynamic morphology that is fueled by the use of digital technologies, with "best practices" whose field of action is complementary and not secondary to the "traditional" design dimension.

However, we cannot deny that the influx of new technologies for urban investigation and design has not produced doubts in the relationship with the historic city, leading some times to think of virtual geographic space as an "alter ego" of the real one. This has entailed and entails the need (as here) to emphasize the contributions (more than the losses) that this kind of approach imprints in urban transformation processes, stressing the need to maintain that "identity preservation boundary" that the use of technology should never cross, between ameliorative contributions offered to us by ICTs and the transformation of "real" geographic space.

Giedion in "Space, Time and Architecture" said that there is a rift in contemporary man, between thinking and feeling. "Each generation must find its own solution, or rather the right proportion between internal and external reality, restoring the dynamic balance that governs relationships."

And if we consider that, in the century we are living, what most affects the marrow of our society is the relationship between "duration and change," it is necessary to understand how much can be changed and how much must change in the physical and immaterial transformation of the city, without any balance being altered.

It is with reference to this that Bertuglia and Vaio describe the processes of "complementarity and alteration" in complex urban systems. Indeed, these must prove resilient, attesting to possessing the capacity to preserve and reorganize themselves autonomously, both in their modes of operation and in their form and distribution among their parts. Edgar Morin, in his monumental work *La méthode* (1977-2004), states that every systemic relation that is at the origin of what we identify as a system (in this case, the city), necessarily involves and produces antagonism, at the very same time that it produces complementarity. Every relation, therefore, actualizes a principle of complementarity and, to a greater or lesser extent, a principle of antagonism, therefore, for Morin, every system, such as the urban system, produces within itself and at the same time antagonism and complementarity.

Although, therefore, the process of architectural digitization has had its first manifestations already in the last two decades, it is today that architects are involved in the development of a new "technological tradition," which, it appears--due to the speed of technological progress--just in its infancy, toward the creation of a "dynamic morphology."

The designer's path is therefore marked by the constant dichotomy whereby, in working on the city, one can produce "Death or Metamorphosis," although for Giedion this difficulty does not exist since "there is only the problem of developing a new tradition, and there are many signs that this is in place." (Giedion, 1979, XXVIII)

Underlying it all, therefore, is the instance for the immutable constants of the city, which consequently permeate into those of the life that must be fulfilled. If in earlier periods it was indeed relatively easy to create an environment that did not alienate man from his basic needs, today nothing is more difficult than fulfilling the simplest conditions of life.

Aid to the social understanding of the city, particularly its public spaces, then comes from the extensive studies of urban sociology brought to light to the scholarly community by the masterful works of Jane Jacobs with "The Death and Life of Great American Cities" (1961), Erving Goffman with "Behavior in Public Spaces" (1963) and William H. Whyte with "The Social Life of Small Urban Spaces" (1980).

It is necessary to highlight these texts over the others not only because of their relevance in the field of urban sociological studies, but also because they have highlighted the fact that public space is not only made up of that "physical" matter of which it is composed, but also of a considerable amount of "social matter" corresponding to the presence of the citizen-users who inhabit it, influencing its evolution and differentiating it from any other urban sphere.

Therefore, as little as the social aspect may seem relevant in the context of defining new technologies for the analysis and design of the city, it is surprising to discover how capable it actually is of influencing the directions that the various technological tools have taken over the years to investigate not only the geometry of urban space, but also its social component.

Jane Jacobs (1961), for example, brings to attention The "social morphology" of the city, writing an instant classic for the observation of public spaces in the contemporary city, with her neo-contractualist reflections on the mixed use of urban spaces, zoning for diversity, the relationship

between public street life and social control, and the relationships between context and urban system, in defense of social order for the protection of personal autonomy.

Erving Goffman (1963), on the other hand, proposes a purely sociological analysis of public space by specifying the different “modes” of behavior of citizens, in various situations, from “adapting to the place” to “violating the norm.” However, the text can be considered afferent to spatialist theory because it subsumes the need to relate behavior to the urban context from which it originates, which in turn implies the type of attitude to which the individual chooses to adhere (or not).

William H. Whyte (1981), on the other hand, in addition to the well-known volume, produces a documentary on the “Social Life of Small Urban Spaces” to describe the life of public space, analyzing the different modes of behavior of citizens in small public spaces in New York City. One of the questions Whyte asks is, “Why do some places work better than others? What keeps these places alive and what kills them?”

Through the report “undesiderable people - undesiderable place” he highlights to the scientific community the need to intervene in the community, before the physical urban structures, to transform the city, because if change does not originate from them it cannot be brought into urban public spaces.

The social nature of public space is therefore relevant in defining approaches to design and requires rethinking strategies for urban inquiry, thus starting with a reinterpretation of its condition in order to understand its socio-spatial use.

In this sense, the disciplines of Urban Planning, Urban Design and Urban Morphology have shown great interest in better understanding the urban context, implementing two different approaches on the city, supported by the use of new technologies and new methods of urban analysis.

In this sense, among the approaches to the analysis and design of the city’s public spaces we find the analytical-spatial ones proposed by Space Syntax, the ideas of Hillier and Hanson, Carlo Ratti’s Senseable City Lab. and Michael Batty’s Center for Advanced Spatial Analysis (CASA); and the collective-infrastructural ones for the implementation of collective infrastructure by the Project for Public Spaces (PPS); Temporary & Tactical Urbanism and UN-Habitat relatively the City-Wide Public Space Strategies.

If the collective-infrastructural ones prove to be useful in defining criteria for the design of urban space, after having carried out a thorough investigation to identify the problems peculiar to a specific territory (through the use of digital technologies such as GIS - Global Positioning System, for cataloging and systematizing all the information inherent to the city) it is the analytical-spatial approaches that we will focus on, because of the ability they have had to define a new urban “operability,” starting with the benefits of technological progress, from the birth of computational machines to systems for three-dimensional city design.

Thus, among the spatial-analytic approaches we find the contribution of Space Syntax, founded by Bill Hillier in the “Unit for Architectural Studies” at UCL, whose research aims at defining a scientific criterion for establishing “a descriptive autonomy of space” - hitherto lacking in academic discourses - to read the relationship between spatial organization and social life, translating this information onto axial maps. (Figure 1)

Spatial configuration is the essence of this approach, since it is able to express the systemic relationship between spaces, according to the “theory of differences” and consider their relationship with all others, in the same organization. In this sense, spatial configuration turns out to be much more complex than the simple “spatial relationship” that can occur by relating two random spaces. (Oliveira, 2016)



The goal, then, is not only to know the geometric aspects of the city, but to investigate the relationships between individual parts: between peripheral blocks and central blocks, between buildings and streets, between public spaces and people. Therefore, in their vision, technology becomes an essential tool to define the “space of possibilities” to initiate a quantitative revolution with which to approach the study of the urban context.

In order to learn how to analyze spatial patterns quantitatively, the authors highlight a “social theory” of space, taking the first steps toward “quantifying” it and turning their attention to the interiors of buildings, studying their permeability - and thus the movement of individuals - in order to understand their rules and functioning.

Therefore, not only quantitative data, but also qualitative data, to know the degree of urban livability, investigating those “urbanities” (Dovey, Pafka and Ristic, 2018) useful for understanding its functioning.

Carlo Ratti, too, in his Senseable City Lab. addresses the issue of analyzing urban space in order to grasp its functioning and guide its transformation strategies.

The goal of his research-developed since 2004 within the City Design and Development group in the Department of Urban Studies and Planning at MIT-is to creatively intervene in urban space and investigate the interface between people, technologies and the city.

Starting with Futurecraft, he proposes critical design because it must generate compasses for people, not maps, to navigate through “new value systems” (Dunne, Raby, 2013)

Design must therefore be collective, that is, include people so that they take part in defining the urban project. In this sense, for Ratti, the city is a symbiosis of design and citizens, a collection of bits and atoms.

Therefore, it is through data-driven models, centered on data, and applied to a wide range of urban systems, from transportation to energy, from construction to learning, (following the motto that citizens themselves should “Hack the city!”) that it is possible to drive a transformation of the city in line with contemporaneity. (Figure 2)

In the Senseable City, therefore, there should be what Ratti and Claudel call “ubiquitous computing” or “widespread computing” as a new reality in the making. It is a true “third wave of computing” whereby we should overcome that solid ecosystem of communication between machines, through physical space.

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This is where the suggestive definition of the “Internet of Things” (IoT) or “Internet of Things” originated, according to which individual entities, equipped with an element of digital connection, could collectively give rise to a network anchored in the physical world (Mitchell, 1999).

Technologies and their implementation are then the major theme of the work developed by Michael Batty at CASA (Center for Advanced Spatial Analysis) where, since 1995, research specializing in the application and visualization of techniques for the development of urban simulation models has been carried out in the field of geographic information systems (GIS).

The goal is to guide the evolution of a science that draws on methods and ideas from modeling, visualization and sensing of the urban environment, through specific computational systems.

CASA’s research group now operates by examining and offering solutions to resource efficiency problems for city planning and governance. (Figure 3) The Center is then active in exploring the Internet of Things (IoT) by developing research with the Technology Strategy Board’s Future Cities Catapult in pioneering the invention of new software systems for “smart cities” through the establishment of new portals.

Once again we find a common starting point with the other approaches: the observation of the “physical-social” of urban systems based on urban simulation diffusion models.

From the study of cellular automata, agent-based models and fractals, the group has thus founded a new method of approaching the city, uniting the expertise of a wide range of disciplines, united by a solid understanding of urban phenomena. Through thus a new vision of urban science, they promote their projects through constant research in defining increasingly connected and efficient technological tools to solve those problems of "organized complexity" typical of the city, from the concept of "emergence" to that of "evolution," attempting to solve this problem.

These approaches thus confirm the basic thesis that technology, from being a discipline of work performance only (Kahn, 1980), is now a tool that traverses and fills all phases of the architectural process, as a fundamental means of project organization and management, which has also defined a concrete shift from traditional urban morphology to dynamic morphology, the effectiveness of which can be appreciated in becoming.

It is then from the comparative study of the physical and social aspects of the city and its public spaces that the full understanding of urban phenomena can be obtained, and the directions in which morphology must move, in order to call itself truly "dynamic," will have to direct to mixed studies, to compare the different techniques useful for urban understanding and implement them through new technological models.

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**Figure 1.** London axial map, Space Syntax (2014)

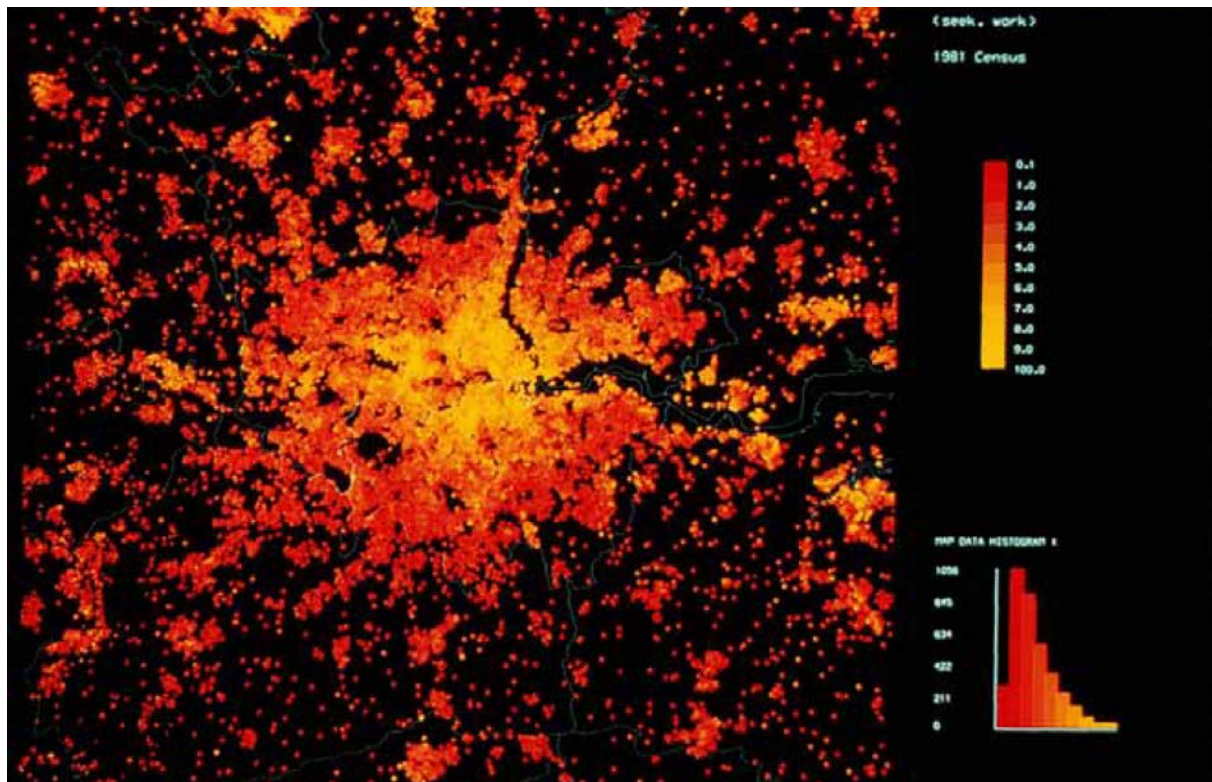
Source: Penn, A., Turner, A., "Space Syntax Based Agent Simulation." Research Gate, January 2014

[https://www.researchgate.net/publication/32884789\\_Space\\_Syntax\\_Based\\_Agent\\_Simulation](https://www.researchgate.net/publication/32884789_Space_Syntax_Based_Agent_Simulation), visitato il 25 Aprile 2022



**Figure 2.** Example of a mapping of New York city taxis. The screenshot from the HubCab platform developed by Senseable City Lab. shows the journeys made by day by New York city taxis, from the user's call to the destination on the itinerary. The journeys that taxis make in one year in the city are more than 170 million. The tool is useful for monitoring the actual use of vehicles to determine how many are actually needed and how many are not.

Source: <https://senseable.mit.edu/hubcab/>



**Figure 3.** Fractal representation of London: levels of occupational density. The use of the fractal dimension is useful for CASA both in the evaluation of buildings and as a potential generator of design.  
Source: Batty, M., Longley, P., (1994) *Fractal Cities: a geometry of form and function*, Academic Press, London





## A Systematic Approach to Urban Block: Defining Automatic Tool for Urban Form

Didem Turk

Department of Architecture. History and Project Politecnico di Torino

E-mail: didem.turk@polito.it

Keywords: Urban block, classification tree, automatic tools, urban form

Conference theme: New methods and Technologies for the urban analysis

**Abstract.** *The unprecedented rapid change in the urban form has prompted a growing number of research to analyze and understand the phenomenon in recent years. In a never-ending cycle of change and re-elaboration, the broad diversity of urban forms that we see today serves as the baseline for future and new forms. At the same time, the growing accessibility of geographic data and mapping tools have boosted urban morphology studies. The burgeoning development of automatic tools enables machines to get a human-like understanding of urban form hinged on images. In this new context, a comprehensive, systematic method of evaluation and comparison of forms needed to be defined. This study aims to present the manual definition of urban form features to create systematic input for automatic tools. Particularly, as a constitutional element of urban form, urban block is analyzed within the scope of classification approaches. The preliminary step is to present organized knowledge of urban block to understand how it is constructed. The methodological process is encompassed detection and classification of urban block by in-depth analysis of relative literature. The second step of the study is defined by using this structural classification to detect the urban block with automatic tools such as a deep convolutional neural network. The preliminary outcome of this study is the representation of urban block by providing a classification tree of the urban block based on comparative literature.*

## Introduction

Diversity in the urban area has emerged based on the never-ending cycle of change in cities. Variations that emerged based on this change led the researchers to analyze the similarities and differences. As an emerging field, urban morphology analyzes these similarities and differences in investigating the consecutive transformation by identifying the main urban components; thus, streets, building, plot, block and their contextual relationship.

The methodological approach bears great importance in this rich physical and contextual context. Protagonists of urban form studies thus M.R.G. Conzen and Saverio Muratori, defined main concepts to analyze urban form. Their approach has been discussed and evolved by scholars in time, by developing manual approaches to automatic ones (Kropf, 2009; Oliveira, 2016; Chen, 2021).

In contemporary studies, it can be seen that the impact of data used in urban form studies is game-changing. In changing society, there is diversification in the data produced every day. With the emergence of mapping tools, the accessibility of geographic data accelerated in recent years. Accessibility of data draws controversial graphs with the conventional/manual methods. Therefore, the impact of machines and tools is reconsidered in urban morphology studies. The significance of machines in this role, changes the understanding and reading of the complex system of cities. When trained systematically, machines or tools give a good quality of information and have human-like reading of urban form. Rhee (2019)) states that, the recognition of a diagram by a computer means that the computer and the architect share the architectural design language and, ultimately, the new interaction with the machine. This ideology leads urban morphologists to inquire about new methodologies rather than restrain their studies to narrow conceptions.

The research aims to provide an alternative to reading the complex form of cities. The research questions how a computer can be trained to recognize urban form through learning rules. In the case of this study, ml models, particularly a deep learning model, are considered as computers. However, the operation of the model and results are not presented. The aim is to build the relationship between machine reading and architect reading by exemplifying the case of the urban block. Considering the systematic logic behind the tools and machines, a systematic reading of the urban block is presented.

Taking block as the core, comparative literature on the urban block is evaluated. Urban block is the most important fundamental unit of urban form, shaped by the contextual relationship of plot, street and building. In order to understand the urban block, it is essential to have comparative information based on its types, shapes, size and arrangements that resulted in different periods and places. The article is structured based on a literature review of related studies, the definition of classification criteria, the identification of indicators, and the identification of a classification tree.

## Applied Methodology

Converting the urban elements into numerical indices is the most common method of quantitative morphological approach; therefore, manifold studies are devoted to quantifying urban form and its characters. Some approaches developed in this regard are analyzing the space's quantitative relationship, identifying urban form indicators, characterization of urban form, etc. (Fleischmann, 2020; Marshall, 2005; Yu, 2014).

Moreover, based on the tools of analysis, morphological formations are distinguished in different levels of analysis (D'Acci and Batty, 2019). The comparative literature shows that the first step is to define the practical analysis tool for the classification of urban form (Lehner and Blaschke,

2019). The second step is to automatically extract the morphological properties, building footprints, and analysis of urban form, for example, lidar or neural networks (Carneiro et al., 2010; Ye and Van Nes, 2014).

The methodological approach of the research is defined twofold. Firstly, it is aimed to investigate urban block components by providing a classification tree of urban blocks. Secondly, it is aimed to use the identified urban blocks to train the model. Based on this approach, the basic systematic logic behind the machine is used, thus input-tool-output. There is a systematic structure and reading in constructing the input, tool and output. Theories based on the urban block constitute the input for the machine, and it is believed that this will make it easier to train the machine to read the urban form. In this article, the first methodological approach with the results will be presented.

In order to identify learning rules for automated recognition of urban blocks, it is essential to create a relationship between machine language and theory. Therefore, the approach is to develop a systematic analysis of urban form elements (particularly urban block as the core of the study) and machine recognition. The optimized framework drawn for the question raised for this research requires a detailed analysis of the theoretical framework, which will be the article's focus. The detail about the model is not presented but mainly the preparation for input to train the model is presented. It is aimed to combine an in-depth analysis of the theoretical framework to identify constitutive components of the urban block from comparative literature to identify a classification tree to be input. Once the constitutive components are identified, the following step will be exploiting the supervised machine learning model to automatically detect the urban block to shed light for further analysis of the phenomena.

### **Urban form and the role of urban block**

The literature presents a broad diversity in urban form studies within manifold perspectives, thus economic, social, spatial, planning and geographical context. Due to recent changes in methodological applications, it is inevitable to add a technological perspective to this list because of the accessibility of big data and the application of different tools. This resulted in conducting many studies in specific contexts, and different approaches based on these contexts show substantial results. (Eizenberg and Sasson, Shilon, 2019; Kristjánsdóttir, 2019; Moroni and Rauws, Cozzolino, 2020).

Technology-based urban morphology studies have accelerated in recent years. As a representative example, integrating the different approaches within an integrated GIS environment is conducted based on various problem definitions. Diversification in studies extended between fields (D'Acci and Batty, 2019; Qin et al., 2015; Stojanovski et al., 2020, etc.). Integration of different approaches and fields of research gives a vast opportunity to develop the studies further.

Moreover, studies developed with new methodologies open new opportunities for the new field of work. From an overview of the literature and based on reviews of previous works, morphological indices are generally constructed from three main components; building, street, and block (Chen and Wu, Biljecki, 2021; Kropf, 2009; Oliveira, 2016). Comprehensive frameworks are defined to provide common ground. One approach is to define classification criteria for the urban form (Fleischmann, 2020; Dibble, 2019; Gil et al., 2012).

Due to its constitutional and contextual relationship with the urban form elements, the urban block has been chosen as the core of the study. These relationships are constructed with street, plot, and building elements. Tarbatt (2020) defines that the urban block cannot be understood as a discrete entity. Its relationship with its constitutional elements must define it.

In the literature, there is not only a single definition for the urban block. It is defined as the; 'smallest area surrounded by streets' (Rowe, 2019) and as the 'basic unit of urban fabric within a city' (Ghisleni, 2021) or cluster of houses surrounded by streets. To understand urban block, there is a need for an in-depth analysis of the literature. Comparative literature shows that different perspectives developed in order to understand and define urban blocks. In this paper, theories are systematized in order to filter the approaches developed for the urban block (Metrasys, 2012; Oikonomou, 2014, Panerai et al. 2004). In order to provide the base for comprehensive understanding, urban form studies developed based on approaches of two important scholars and their schools are evaluated. Studies conducted by Saverio Muratori and M.R.G. Conzen create the base for urban form studies. Therefore the role of the urban block in these approaches is carefully studied.

The in-depth literature analysis shows the path to define the taxonomy and classification of urban blocks, which will create a base for the tool of analysis. The pathway to defining a classification tree of the urban block goes through understanding and defining the urban block. Each element of the urban block is analyzed and categorized systematically based on numerical representation to define the taxonomy and classification of the urban block. In order to define the constitutive elements and identify urban blocks, the first step is to understand the urban block. This will lead the research to understand the relationship between form and its numerical indices.

### **Urban form elements and classification**

Studies show that the systematic approach to classifying urban form components is required to conduct rigorous analysis regardless of the methodological approach. Fleishman (2021) defines that to understand the complex entity of the cities, there is to divide them into simplified and manageable pieces of information. Joining more minor things into higher-ordered groups constitutes the essence of classification (Fleishman, 2021). Therefore, each element of the urban block will be defined to classify urban blocks based on understanding and defining them as groups.

Taxonomy and classification of the urban block are discussed to comprehend, define, and manually classify different urban block types to prepare data for and complete the initial classification tree. This will create the base for analyzing blocks through tools. Each indicator of the urban block is analyzed and categorized concerning its numerical representation, shape and size to define the classification tree of the urban block (Siksna, 1997; Tartbatt, 2020).

Through its development, urban blocks changed and took different forms over time, starting from antiquity, where the significant term 'insula' was used to define the urban block at the outset of the Roman Empire. The term is used the way that street surrounding forms the urban block (Tartbatt, 2020). Disruption in the form of urban blocks can be seen in the medieval period. In later periods the impact of certain urban forms can be seen in urban block formation. For example, in time, grid formation created another form of an urban block. The plans were developed based on a repeating grid of rectangular blocks (Tartbatt, 2020). A similar example can be seen in Barcelona, where squared block took part in the Cerdà plan. Contrary to square form, mega blocks can be seen in Copenhagen, where the plan resulted in a trapezoid-shaped block. It can be seen that literature devoted to the urban block defines mainly based on the shape and size of the urban block (Siksna, 1997). However, to understand the urban block completely, there is a need to understand each component of the urban block.

### **Urban block indicators**

The way of understanding urban block goes through understanding its constitutive elements



and the contextual relationship it develops with these elements. These elements can be summarized as street, plot, and building. Because the variations and diversity in urban block types are defined based on the combination between and within each of these elements. These variations provide a comprehensive understanding of urban blocks that will define the classification tree aimed to be summarized in this article. Eventually, they will be input for the machine learning model. The configuration of the streets, orientation and topography, have an impact on urban block types. The forms, shape, size and geometric arrangement of the plots and streets can vary, although some have similar rectilinear layouts (Siksna, 1997)

The same block size can be defined by the street's different formations, which will affect the block shape (see figure 1). Similarly, it can also affect the block shape based on the division in the width and length of the street structure. As well as street structure plot structure had a big impact on the formation of urban block types. The different configuration of plot structure in the same block is detailly studied by Siksna (1997), showing how the plot structure can affect the building configuration, etc. The examples are also highlighted by Tarbatt (2020) as back-to-back plots or through plots. As well as its relation to plot structure, building structure significantly impacts understanding urban blocks.

In addition to the above-mentioned structural elements, the urban block is defined based on its shape and size, for example as seen in figure 1, as square, rectangular and small or large (Siksna, 1997; Moule, 2005). This creates diversity in different block types. According to Siksna (1997), square blocks are generally considered the most flexible for various uses, but they cannot be described as the most efficient. Based on the street, the shape of the urban block can be distorted in many ways. Siksna defines that block can be completely lose their forth side in the skewing or dissecting process and become triangular and other take other shapes (Siksna, 1997). At the same time, Tarbatt defines that 'there is no one size fits to all formula for determining the appropriate size of the urban block' (Tarbatt, 2020, p.77). The size of the urban block can be taken as an essential component to analyze the permeability and connectivity. In terms of size, the urban blocks are defined by Siksna as small, medium, and large according to context. Similarly, Tarbatt state that 'It can vary considerably in shape and size according to the configuration of streets, preferred orientation and topography, for instance, as well as the nature of plot subdivisions and building types that are to be accommodated" and adds that it is "a component of a system that is dependent on both its symbiotic relationship with the street and the substrate of subdivisions that split it into smaller, more or less self-contained pieces of land ownership known as plots or lots" (Tarbatt, 2020, p.6).

In addition to the above-mentioned structural elements, the urban block the evolution of urban block from antiquity represents the basis for defining the urban block. The perimeter block, traditional block, and superblock are some terminologies used to define the urban block. Additionally, it is defined as rectangular or square block depending on its shape and size. However, there is a need for clarification of these terminologies. Basic geometry, shape, and within the context of usage, the connection of street and plot create the basis to define urban block.

The pure form of urban block can hardly be found due to changes and disruptions in time. According to Siksna (1997), the modification of lots, blocks and street layouts is impacted by certain factors. In order to identify contemporary urban block types, it is essential to understand the evolution of the urban block. Shape and size became vital keys to understanding how the urban block has changed/evolved. That is why this article also considers the impact of change in division and amalgamation of constitutional elements of the urban block to understand how contemporary urban block types took shape. In detail, the evolutionary aspects and

components that affect urban block formation are highlighted by Siksna as; the addition or deletion of the street and public spaces; creation of sub-blocks and amalgamated blocks; insertion and deletion of features such as alleys, arcades, and public spaces with block; subdivision, and amalgamation of lots and their effect on block structure, and compatibility of lot sizes and shapes within changing building form and process of their mutual adjustment, last but not least locational and topographical conations (Siksna, 1997)

Terminologies used to define the urban block vary in the relative literature. Tarbatt (2020) draws a clear and comprehensive definition of the urban block and its types. This study is conducted to identify not only perimeter block, which can be defined as the most common urban block type, but also other forms that urban blocks can take. It shows a clear classification of how urban block is adapted to different conditions. Types are highlighted as The perimeter block, The row block, The ribbon block, The courtyard block, and other variants of urban forms (see figure 2). Additionally, the transition between these types is identified based on the street structure, plot structure and etc. A list of possible configurations and the taxonomy of urban block layout is defined. Public-private relations are taken as the basis while defining the block types. The framework defined by Tarbatt improve the limited description of the urban block based on shape and size.

Nevertheless, block shape and size also become essential inputs for the definition of the block because the square and rectangular shapes of the block types are mainly used to define the perimeter block type. Of course, in terms of size, these variations differ, giving examples of the distinction between small and large and transitional forms of other sizes between these two. Although the literature presents a clear definition of the urban block, it is rather limited in defining all configurations of the urban block types. Based on the variations, urban block types are summarized based on the comparative literature. This leads the study to understand the notion and physical and contextual relationship behind the urban block. A classification tree is summarized to define the urban block types (see Figure 3). The classification tree represents the diagrammatical relationships to identify the most common urban block types.

The analysis conducted to build a relationship between theory and machine is twofold. Due to the machine's limitations, the research's first step aims to train the machine learning model based on identified shapes, sizes and predefined definitions of urban block types. The classification tree presented above will create input for the machine-learning model and will be used to train the model. It is observed that based on the structural configurations of the urban block, any change in its element creates another with the shape and size. The study state that once the ml model is trained with these configurations, it is expected to have automatic detection of similar configurations. The model and application process details are not presented due to the ongoing process. However, a systematic classification of the urban block and systematic input for automatic tools are presented to create the base to train the model.

## Conclusion

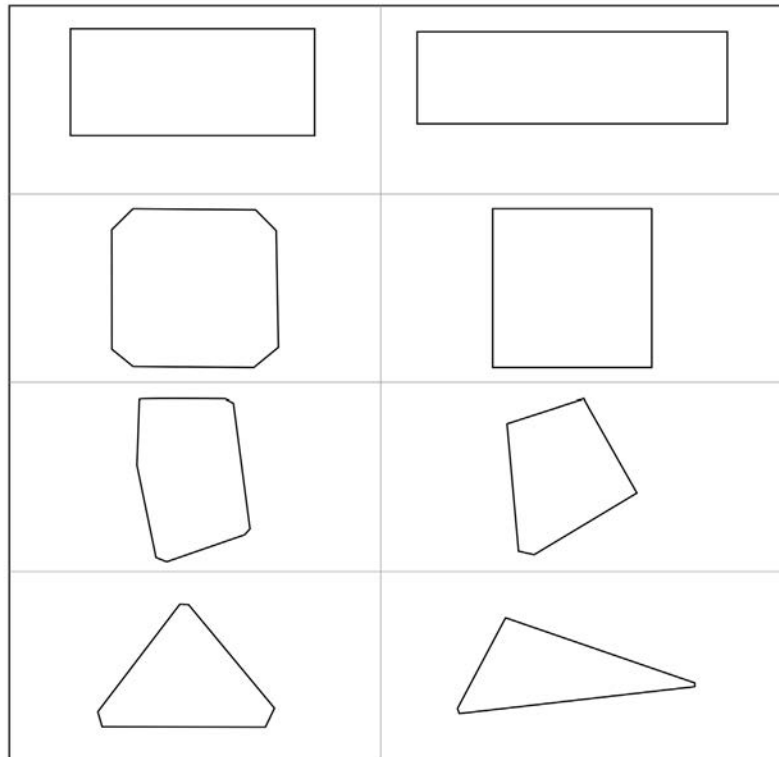
The initial development requirements and land parceling determined mainly the choice of different block sizes and shapes. Throughout history, each period shows the consistency in size and form of urban blocks and their types (Siksna, 1997). Based on the framework presented above, a classification tree of urban block types is summarized. The relation between the theoretical framework on the urban block and machine language can be built to automatically analyze the urban block. This article systematically elaborates on this relation and presents a systematic approach to urban block based on relative literature.

Urban block presents a rich input for the study in terms of its contextual relationship with its constitutional elements. Based on these relations, the summarized classification tree contains the basic formation of urban block types defined based on understanding and defining the urban block. It is believed that the literature results can pave the way for many studies, starting from applying conventional methods to automatic tools.

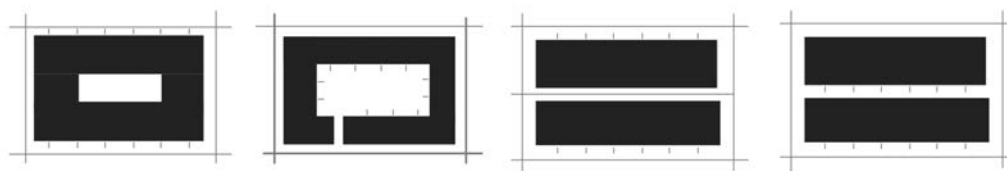
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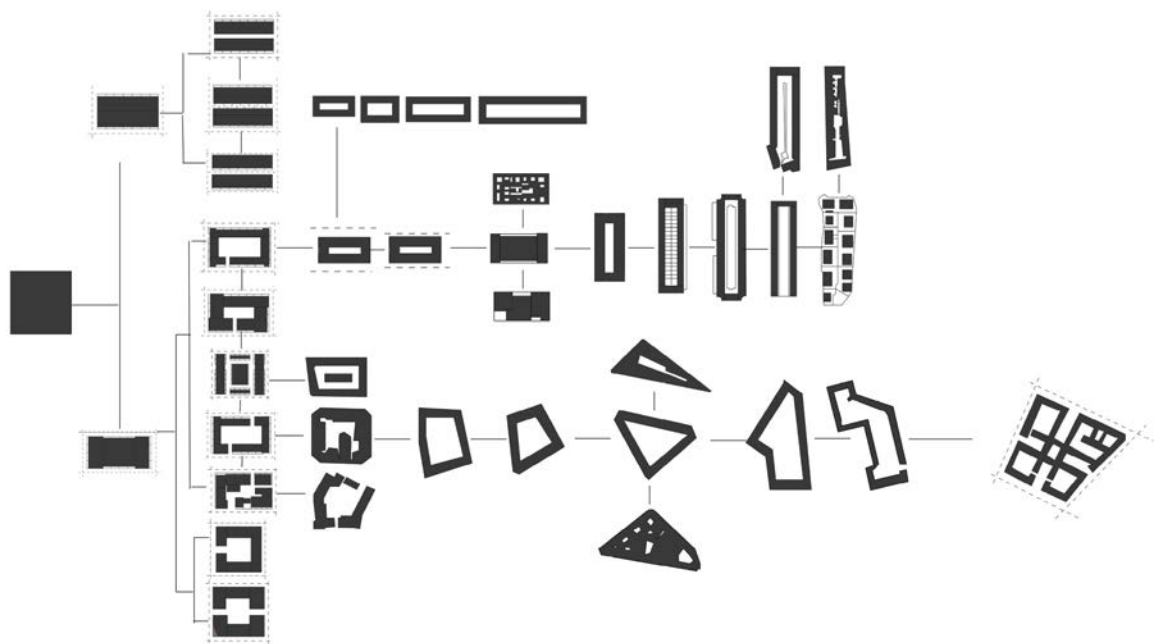
## Illustrations and tables



**Figure 1.** Urban block types based on shape and size



**Figure 2.** Main urban block types – Left to right: Perimeter block, courtyard block, row block, ribbon block-  
Redrawn from Tarbatt, 2020



**Figure 3.** Classification tree of urban block





## The role of the urban project in the transition from city to smart city. Case studies in Umbria.

Paolo Verducci<sup>1</sup>, Valerio Palini<sup>2</sup>

<sup>1,2</sup>Dipartimento di Ingegneria. Università degli Studi di Perugia. Via G. Duranti, 93. 06125 Perugia

E-mail: <sup>1</sup>paolo.verducci@unipg.it, <sup>2</sup>valerio.palini@gmail.com

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**Abstract.** *If the smart city of the 21st century will not be built only through the mechanical application of innovative technologies that implement the functionality of the city (which certainly can improve certain processes of urban development), it will depend precisely on the intelligent use of the urban project which, if it is such, it will be able to draw from the body of the city itself, from its fabric, the rules for a better and compatible construction in a logic of harmonization of the individual parts and the temporary reuse of underused and degraded areas. As we know, the new paradigm of the smart city refers to a model of interpretation of reality that enjoys great success because it is everything a city should be: sustainable, intelligent, competitive, inclusive, creative, hyper-connected, open, etc. Designing urban redevelopment in smart cities means building a 'horizontal' vision, operating on two 'registers': on the one hand, on the level of strategic planning and, on the other, on that of targeted design in an inclusive and creative logic of microeconomies. An approach that finds in the concept of temporariness the measure to intelligently rethink the nature of the public space within which the ways of use are the materials of a new paradigm.*

## Introduction

Are we sure that the Smart City as it is presented to us will be able to help us solve the phenomena we face? Rem Koolhaas, as an expert consulted by the European Union on issues relating to the impact of intelligent technologies on the construction of smart cities, in an article entitled "Are Smart Cities Condemned to Be Stupid?" and originally published by the European Commission, argues that "cities risk becoming stupid" if they are not designed by architects, but only by IT experts (Koolhaas, 2014).

Koolhaas is right, but to avoid leaving the near future of cities in the hands of digital technology specialists, architects need to be willing to change pace and work on the urban project as a tool for rebalancing. It is a question of overturning the point of view and trying to answer the question: how can the concept of smart city contribute to improving the transformative capacity of the urban project? The first issue, which emerged in all its drama during the lockdown, concerns a new way of rethinking cities and the natural environment, aiming at sustainable development in compliance with the objectives of the European 2030 agenda. not only of regeneration, but also of the management of complex situations that cannot be faced individually. In this sense, the concept of smart city could help to develop a set of good practices, operating in a comprehensive way and trying to manage the various situations in a participatory way: for example, rethinking the management of public space and pedestrian areas, re-evaluate purchases. of the shops near the house, rediscover the street as a safe place for playing, favoring the use of bicycles and soft mobility. Remodeling the urban project as a rebalancing tool, finding a meeting point between the interests of stakeholders and the community's request to live in a healthy and comfortable environment, means: encouraging public transport and the density of urban fabrics; efficiently use energy and environmental resources; addressing climate change through adaptation and mitigation strategies; use the most advanced technologies as an added value; develop solutions that guarantee equal opportunities for all; monitor land use and consumption.

A rebalancing point that knows how to find an agreement between the request for maximum efficiency and urban comfort with the possibility of freely exercising our choices, avoiding the risk of a heterodirect city. "I believe that very soon", says Matteo Robiglio, "we will find ourselves at a crossroads: choosing between systems, technologies, centralized and proprietary organizations, and open systems that marry the intrinsic nature of the city as organized anarchy. I believe that this is necessary for the development of an ecology of law, of a society and of an economy that really know how to grasp the promises that the smart city has made. Promises of efficiency, quality, comfort, marrying them with our concerns of accessibility, transparency and democratic control of the city government. It is essential in this step", continues Robiglio, "to strengthen the public skills and capacities that make up the civil and technical infrastructure of our cities: precisely the absence of a capable and competent public actor within the conversation on smart cities risks making them stumble on moral, juridical and ethical issues and to replicate some past events" (Robiglio, 2020).

This rebalancing tool will have to deal with a new paradigm. Indeed, it is likely that the solution of such complex processes involves a paradigm shift. A new way of dealing with the transformative dynamics of cities. "In the world of urban planning, architecture and landscape", says Mosè Ricci, "a new paradigm is a new way of operating that has great effects on living spaces. A new paradigm refers to an idea of science for which technologies or new discoveries can completely change the way people think or act. The same idea applies to the design disciplines: a new paradigm is a completely different way of looking at living spaces and their change" (Ricci, 2012). A change of pace in which 'big and small', 'hyper complex and simple',

'innovation and tradition' must go hand in hand. A transcalar and multidisciplinary approach must be developed that is able to analyze reality as a system of networks that vary in space, evaluating the smallest of interventions in a global logic that provides for compliance with the principle of 'Do No Significant Harm' to the environment (DNSH)<sup>1</sup>.

Cities, as we know, are the major driver for economic development (over 50% of world GDP is produced in cities with over 750,000 inhabitants), but they also represent an environmental problem: in fact, 75% of energy is consumed in cities and 80% of emissions are produced in cities. The United Nations has estimated a growth of urban residents from the current 3 billion to about 5 billion in 2030, with an expected increase of 25% by 2050, which will lead the number of citizens to exceed 6.3 billion. Probably also the migratory events, very current, will have a weight in the dynamics of growth (the escape from war conflicts, political persecutions, ethnic or religious purges, generate waves of flows of people mobilized for the search for a better life). A recent study (Xu et al., 2020) on the effects of global warming estimates that, in the absence of migration, 3.5 billion people could be found living in areas with average temperatures greater than 29 °C, a condition that today occurs only in 0.8% of the emerged lands, mainly concentrated in the Sahara. Paul Hawken, journalist, and environmentalist, assigns architectural design a fundamental role in the transition to a zero-waste society: "Today, the creation of a zero-waste society is a global movement supported by thousands of organizations. The obvious purpose is to establish cyclical systems designed to eliminate waste, not to manage it at the end of the cycle" (Hawken, 2007).

At this point, after having briefly analyzed the main dynamics of transformation and management of complex urban structures and the need for a real change of paradigm, let's try to understand how the urban project can intervene to mitigate those phenomena that are measurable over time and in the space. Currently, a phenomenon that can be analyzed and limited with scientifically verifiable criteria is represented by the urban heat island (UHI) effect (Verducci, 2017).

Before explaining the methods of intervention, we must frame the topic and try to describe the reference area.

According to projections published by the Intergovernmental Panel on Climate Change (IPCC), temperatures in urban centers will increase in the coming years, with estimates reaching up to 2100, by 4 °C, with an ever-greater climatic difference between cities and surrounding areas. Also, according to these studies, for each additional degree of temperature, the demand for electricity will increase from 0.45% to 4.6%.

It is therefore a phenomenon that risks substantially worsening the living conditions of the planet, becoming increasingly important in terms of frequency and intensity. Among the most serious cases we can mention that of the summer of 2003, when the heat wave that hit continental Europe caused about 70,000 deaths, and that of 2010, when the anomaly in temperatures recorded throughout the northern hemisphere generated catastrophic consequences, including the destruction of 9 million hectares of crops in Russia alone.

The causes responsible for the formation of urban heat islands can be traced back to three main areas:

1. morphological: dependent on the shape of the neighborhoods (or urban structures) and on the relationship between full and empty spaces with particular reference to the topic of micro ventilation;
2. material: relating to the materials that make up the buildings, spaces, and pavements of the city;
3. anthropogenic: related to the intended use and activities carried out in the city.

According to a study published in *Nature Climate Change* (Estrada, Botzen and Tol, 2017), relating to the analysis of almost 1700 cities, taking heat islands into consideration, it is estimated that the losses in economic terms would be almost 11% of GDP, against a global average of 5,6%.

"Each of the hard-fought climate change victories, globally, could be wiped out by the out-of-control effects of urban heat islands," explains in a statement Richard S.J. Tol, professor of economics at the University of Sussex.

"According to the scientist", reports Eleonora Degano, "in countering global warming we are concentrating on a planetary scale at the expense of local actions, undervalued even if they are just as, if not more, important". This reflection of prof. Tol confirms the need to rethink design tools in a 'global/local' logic, within which urban and architectural design must 'filter' the priorities and the scaling of interventions (Degano, 2017).

Another aspect linked to the quality of life in urban areas concerns atmospheric pollution and in particular attention is paid to some pollutants: atmospheric particulate matter (especially its fine fraction, PM 2.5), nitrogen dioxide (NO<sub>2</sub>) and ozone (O<sub>3</sub>) unambiguously associated with health effects such as increased respiratory symptoms, increased mortality and reduced life expectancy.

The World Health Organization (WHO) estimates that environmental air pollution causes around 3.7 million deaths a year worldwide, 800,000 in Europe alone; it is responsible for 6.3 million years of life lost and 3% of cardio-respiratory mortality. In a recent process of reviewing the scientific literature on the main pollutants, the WHO recommended urgent emission control policies and stricter air quality standards to the European Union (REVIHAAP project). The International Agency for Research on Cancer (WHO) has recently established that there is sufficient evidence of the carcinogenicity of atmospheric particulate matter (PM 10 and PM 2.5) in particular for lung cancer.

## **Methodology**

On a methodological level, it is a question of developing a transcalar and multidisciplinary approach, in which the 'architectural and urban design' becomes available to act as a driver to recompose the 'physical' layers with the 'digital' ones and opens to the possibility of incorporating intelligent systems and measurable in the scientific field for the evaluation of the impact of transformative action. (Figure 1)

It is a question of promoting pilot projects to assess cost-benefits in the field, the response of the community, to develop replicable models that act as coagulators for the production chain.

The projects presented below constitute an attempt to integrate urban design and the application of smart strategies and technologies. (Figure 2) In this sense, the criteria can be summarized as follows: 1. set up a flexible approach to design, considering urban attractiveness as a resource; 2. monitor land use and consumption through compact, resilient and highly integrated building systems with infrastructures; 3. make efficient use of energy and environmental resources, addressing climate change as an opportunity; 4. adapt the redevelopment and management of public space to the theme of urban heat islands and seismic protection; 5. use the most advanced technologies as an added value, developing solutions that guarantee equal opportunities for all; 6. encourage soft mobility and public transport.

## **Measurement and analysis**

For the measurement and monitoring of the effects of urban regeneration projects, the



evaluation of parameters and indicators capable of restoring the quality of urban spaces is of fundamental importance. The available approaches are mainly focused on the measurement of microclimatic parameters for the evaluation of the comfort of urban spaces since how the spaces can be used depends on them.

In order to mitigate the urban heat island effect, it is necessary to operate on controllable parameters, evaluating human activities and urban transformations capable of affecting the energy balance of a city or part of it.

The morphology of the urban area is decisive for the specific microclimate of a public space, which can be dimensionally characterized through the relationship between the average height of the buildings ( $h$ ) and the plan dimension ( $D$ ) of the space. High values of this ratio result in a lower circulation of air flows, reducing ventilation and favoring the accumulation of heat. This ratio is connected to the dimensionless parameter Sky View Factor (SVF, between 0 and 1) which represents the percentage of sky visible from the point under consideration on which the radiative exchange of the surfaces with the sky depends.

The presence of a land covered by vegetation can contribute to lowering the urban surface temperature thanks to evapotranspiration and shading.

The main cause of the increase in temperatures during the day depends on the scarce presence of vegetation which, through evapotranspiration, reduces the surrounding temperature. In the absence of this phenomenon, solar energy, normally absorbed by this process, raises the temperatures of the surfaces which in turn release heat to the surrounding air.

A research group is active at the Engineering Department of the University of Perugia that is studying the phenomenon with an integrated approach between engineering and architecture. The research entitled: "From city to smart city. Design techniques and methods for the mitigation of the effects of overheating and for the improvement of comfort in the urban environment" is developed in an interdisciplinary form between the sectors ICAR/14 Architectural Design (Paolo Verducci); ING-INF/02 Electromagnetic Fields (Stefania Bonafoni); ING-IND/10 Industrial technical physics (Giorgio Baldinelli) and aims to improve the design process in the urban environment through the evaluation of measurable parameters, identifying in the first place the critical areas (heat islands) through satellite surveys and aircraft capable of evaluating the surface temperatures of the ground and their trend in space and time (Figure 3), the reflective characteristics of the materials and, subsequently, developing a design strategy for achieving better management and redevelopment of the areas analyzed in anticipation of a their urban development<sup>2</sup>.

## Conclusion

Although the limits of development are not yet fully clear, there is a growing awareness that the most correct approach is to act locally, thinking globally: the only approach that allows the necessary flexibility and adaptability to cultural, socio-economic, and geophysical conditions of the places, without losing sight of the general objective of overall reduction of the environmental load on a planetary level.

The Smart City theme gives designers a challenge that must be faced without fear and without retreating into the internal core of the discipline because, as historical experience teaches, the disciplinary gaps in design are promptly filled by other disciplines. The architectural project must therefore be an element in continuous renewal in compliance with the disciplinary tradition.

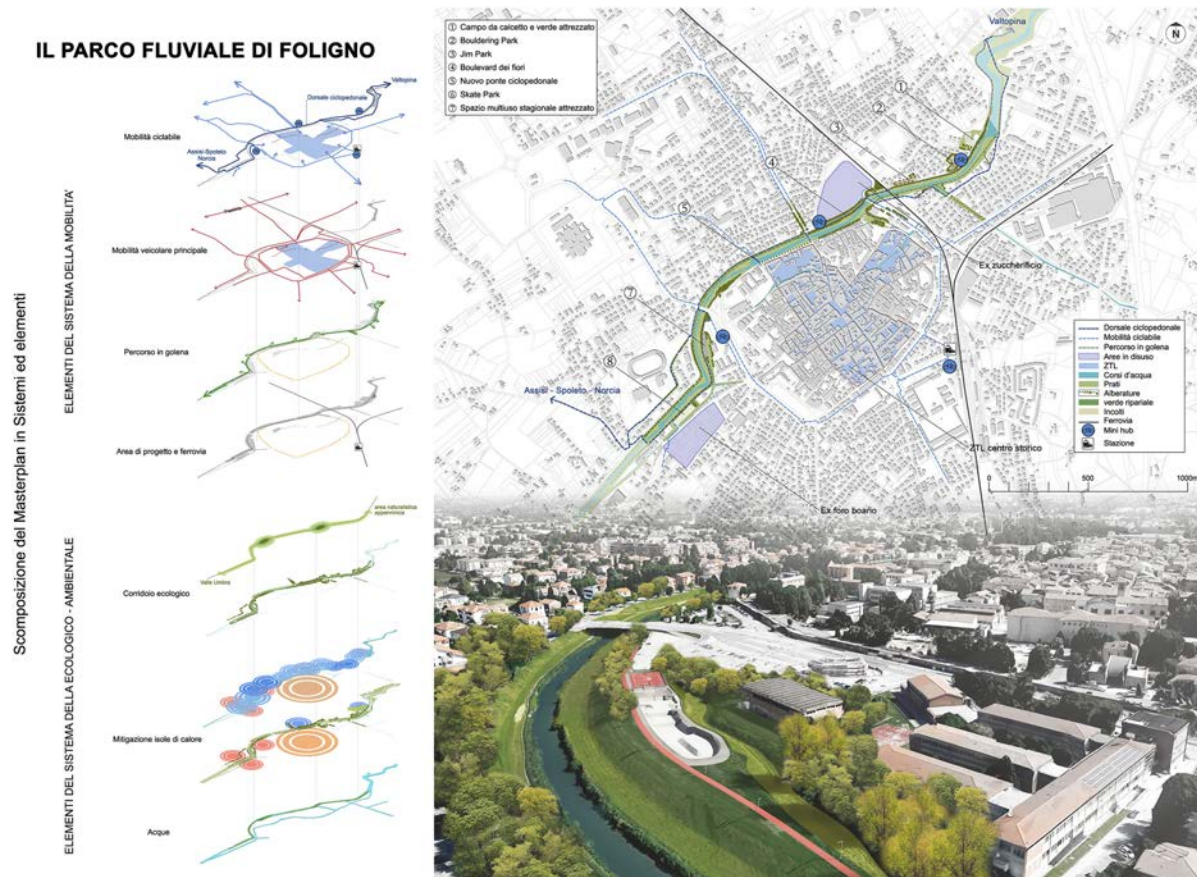
## Footnotes

<sup>1</sup>The principle of not causing significant damage to the environment (DNSH) is provided for in the circular of 30 December 2021 no. 32 of the Italian Ministry of Economy and Finance, checklist form 1 attached to the circular. It includes six key actions: climate change mitigation; adaptation to climate change; sustainable use and protection of water resources; transition to the circular economy, with reference to waste reduction and recycling; prevention and reduction of air, water and soil pollution; protection and restoration of biodiversity and ecosystem health.

<sup>2</sup>The first results of the research, as regards the phase of analysis and application of solar maps, were published in the international class A journals: "Sustainable City and Society and Sustainability" S. Bonafoni, G. Baldinelli, P. Verducci, "Sustainable strategies for smart cities: analysis of the town development effect on surface urban heat island through remote sensing methodologies", in *Sustainable Cities and Society*, 2017; S. Bonafoni, G. Baldinelli, P. Verducci with A. Presciutti, "Satellite remote sensing for the analysis of the Urban Heat Island at district level: a case study of urban sustainable development", in *Sustainability*, 2017.

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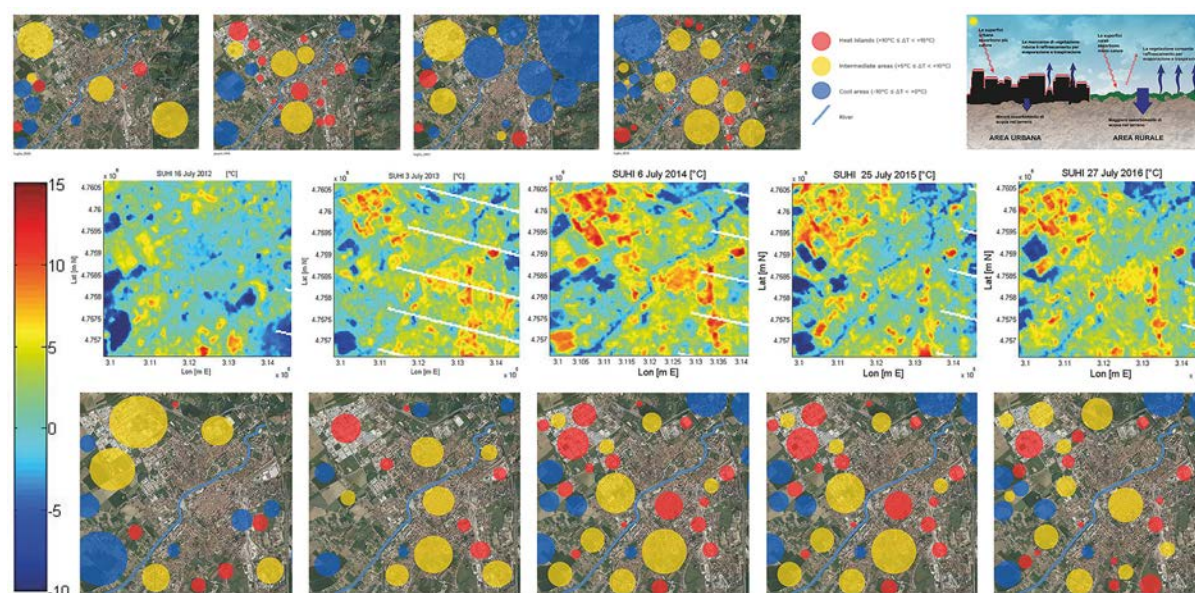


**Figure 1.** For the purposes of the project program, 5 possible thematic axes have been highlighted at the moment in reference to the objectives of the Urban Agenda: 1. sustainable mobility and interchange nodes. The project envisages the structuring of an annular cycle path on the ancient wall layout as an urban connective tool. 2. Environmental sustainability and reduction of CO2 emissions. Through a mapping of the current greenery and areas designed as parks and green ring connectivity infrastructures, the urban project will consider the thermographic analysis and will be structured starting from the objectives of environmental sustainability and reduction of CO2 emissions. 3. Cultural promotion and accessibility. The project aims to measure itself with the inclusive capacity of the urban circuit and aims to do so according to two objectives: the interaction between the territorial cultural paths and the urban historical ones for the enhancement and tourism promotion of the city. The accessibility of cultural routes will follow the universal design approach, enhancing the public heritage and promoting widespread sociality.





**Figure 2.** If we look at the elaborate relating to the cycle and pedestrian works of the Urban Agenda of the Municipality of Foligno, we can see a cycle system which, although extended in the territory, has numerous points of discontinuity. In particular, the cycle path outside the walls is not considered a unitary one, but is rather fragmentary, intended rather as a means of connecting the main road systems. In this sense, it would also be useful to verify the network of historical paths and cycle-pedestrian tourism in the territorial context to understand the vectorial axes of the landscape entering the city and the secants to the perimeter circular system of the historic center. In the light of an initial evaluation of the data in possession relating to Urban Agenda, the proposed research aims to lead to the drafting of a master plan capable of resolving the issue of heat islands with the issue of enhancing the walls and areas along the Topino river and their resilience.



**Figure 3.** The buildings, the large waterproof surfaces, the physical barriers to natural ventilation and the absence of green areas produce an increase in the air temperature causing the phenomenon of urban heat islands. The analysis shows that the most critical areas, mainly located along the perimeter of the city walls, are those with large, asphalted areas or in general waterproof and without significant trees, together with industrial structures whose roofs have very low albedo. It is precisely the trees on permeable soils that carry out the most important mitigation action. While green areas with few trees perform a much milder mitigation action. If the mitigation zones are generally punctual, the river instead acts as a linear mitigating element.

## Exploring the transitional process of the urban spatial structures of Xiaoxihu Block in Nanjing from the perspective of topological networks

Xiao Xiao<sup>1</sup>, Zidong Liu<sup>2</sup>

<sup>1</sup>DAD (Department of Architecture and Design), Politecnico di Torino, Viale Pier Andrea Mattioli, 39, 10126, Torino, TO, Italy

<sup>2</sup>School of Architecture, University of Texas at Austin, Inner Campus Drive, 310, 78712, Austin, TX, United States.

E-mail: : <sup>1</sup>xiao.xiao@polito.it, <sup>2</sup>zidong.liu.22@utexas.edu

Keywords: transitional morphology, urban morphology, urban spatial structures, cross-scale, topological networks

Conference theme: *New methods and Technologies for the urban analysis*

**Abstract.** *This paper aims to explore a cross-scale method to analyze urban spatial structures and reveal the process of transitional morphologies. The Xiaoxihu Block in Nanjing China, which is one of the 22 historic districts identified in the Nanjing Historical and Cultural City Protection Plan, is taken as a case study. This block has been a densely populated area since the Six Dynasties and is one of the few residential historical areas in the southern part of Nanjing that has wholly preserved the Ming and Qing dynasties' features. There are three distinct periods of urban morphological evolution of Xiaoxihu block, the 1930s, 1950s, and 2010s. This study takes the transformed urban spaces such as streets, together with rooms, as the nodes in the topological network, and applies a cross-scale approach from the outside to the inside of the buildings to map the topological network structures in these three typical periods. Then it uses the following metrics - connectivity, integration and mean depth - to count, analyze, and compare these topological networks and draw the justified graphs extracted from the networks. Finally, we draw the justified graphs of each period and compare them, revealing the underlying evolutionary process of urban spatial structures of Xiaoxihu Block.*



## Introduction

The research aims to explore a new approach to describe the spatial structure of cities - a cross-scale perspective on topological network transitions. It treats the city as a dynamic and complex system, and studies the state of spatial structure in each stage of urban development with topological indicators. Through this new description method, some hidden laws of urban spatial structure evolution, such as the evolutionary process of the interaction between indoor and outdoor spaces, will be revealed.

### *The topological networks*

With the spread of big data and new technologies, cities are no longer confined to simple spatial places but have become the systems composed of networks and information flows (Batty, 2013). Accordingly, the study of urban morphology is also undergoing a substantial transformation: it has shifted from the traditional study of image and form to quantitative analysis relying on mathematics and computer science.

Topology is one of the widely used mathematical tools in these quantitative research attempts. A large number of quantitative metrics in urban studies are used to describe urban networks (Graph). Graph understands urban form and space as discrete elements and focuses on the complex relationships between elements (Carpo, 2017). Traditionally, a map usually records two types of information: geometric information (including shape, distance, scale, etc.) and functional information (type and intensity of social activities). The process of converting a map into a graph is an abstract extraction of the system structure. Graph can be used to read the deep structural hierarchies of the city, which can't be read through traditional image and form analysis, and to capture the dynamics of the city structure.

To understand the topology of a complex system, we need to describe how it is formed (Barabarsi, 2015). Barabarsi studies network models by describing the evolution of a network from zero, and classifies network models based on differences in the evolutionary process. Thus, the focus of this study is to explore a topological approach that can describe the dynamic transition of the spatial structure of cities.

### *A cross-scale perspective*

Existing city network models do not achieve unity across scales. Some quantitative models focus on the study of urban street networks, while others focus more on the analysis of building interiors. How the spatial networks inside and outside buildings, at small and large scales, interact with each other has not been a central research question. For example, Hillier explicitly considered that the continuity between indoor and outdoor spaces does not exist and the boundaries have the reversal effect. Thus, he developed different models for analysis of different scales: Alpha-analysis for community layout, Gamma-analysis for interior space, and a beady ring model for space configuration. The corresponding analysis indexes of different models are also different: Alpha(outdoor) analyzes integration, choice and depth distance while Gamma(indoor) analyzes total depth and RRA. Another scholar Bin Jiang also studied the life structure model inside the scales of building, city and countries separately. Some other scholars either study only the indoor space like Julien Hanson, or only the outdoor structures (such as street structures) like Stephen Marshall and Van Ness.

However, cross-scale research has the potential and necessity. Although spatial forms and the experiences inside and outside are not the same, the interior and exterior are both projections of social structures, as assumed by the Space Syntax. Changes in social structure, reflecting changes in human behaviors, should act on both sides. There exists an obvious difference

between the indoor and outdoor users, but this difference itself is a focus of this research.

#### *The Xiaoxihu Historical Block as a case study*

Nanjing, as a large ancient capital that has survived to this day, has basically maintained the overall pattern and appearance of a famous historical and cultural city. With the Confucius Temple as the core, the Laochengnan Area of Nanjing, which extends from the east old city wall to the west wall, south to Zhonghua Gate, and north to Baixia Road, is the most densely populated area in Nanjing.

Located in the Laochengnan Area, the Xiaoxihu historical block has experienced several periods, including the Six Dynasties, the Southern Tang Dynasty, the Ming and Qing Dynasties, the Republic of China and the post-liberation period. Since the Six Dynasties, it has been a prosperous residential area and a traditional commercial and handicraft area. During the period of Republic of China, with the development of modern commerce and industry, the urban commerce and handicrafts gradually moved from the south to the north of the city, and the Xinjiekou Area gradually became the new commercial centre of the city. The commercial and handicraft industries on both sides of Qinhuai River gradually declined, and some parts of the Laochengnan Area, such as Mendong Area and Menxi Area, gradually became the residential areas, while the historical remains and traditional dwellings in the Xiaoxihu block basically maintained its original residential functions and historical heritages, with the partial addition of new buildings such as offices and education (figure 1).

The Xiaoxihu block is one of the 22 historical districts identified in the Nanjing Historical and Cultural City Protection Plan (2010-2020), and is also one of the areas with the deepest historical deposits, richest cultural connotations and densest historical heritages in Nanjing. Most of its traditional districts are still intact and the urban structure of the streets and alleys is basically clear. At the same time, Xiaoxihu has another identity as an urban shantytown, characterised by high population density, complex living conditions and many illegal building structures. The dual attributes of the historic block and the shantytown make the Xiaoxihu an indispensable part of the contemporary urban form research:

Urban historical blocks are well documented, but their urban transitions are slow (low-frequency cities) and most scholars study the perpetual urban forms and structures within them; whereas urban shantytowns develop more spontaneously, evolve very quickly and are more temporal (high-frequency cities). As a combination of such dual attributes, the Xiaoxihu block, can reveal not only the permanent urban spatial forms within it, but also the new ones that occur from the bottom up by observing its ephemeral evolution.

On the other hand, from a cross-scale perspective, with time flying, the family structure of the residents of the Xiaoxihu community changed significantly, which led to a change in the layout of the interior and a change in the relationship between the private and public, which in turn acted on the exterior, leading to a change in the structure of the community and even the city. The interaction between insides and outsides could be a potential direction for research.

#### **Methodology**

The cross-scale topological approach applied in this research is inspired by Augusto Cavallari Murat's diagrams. He attempted to link the urban spatial networks with the building interior spatial networks of buildings by topology: he utilized a specific graphic language to describe the connection between public and private space of Turin at Baroque periods. That language is one synthetic method of conjectural maps, cellular distribution schemes and so-called Ideograms of monumentality, which can study the urban morphology and guide the future

urban planning (figure 2).

The conjectural map is able to use universal icons to provide the transitional morphological information, the built time and the elevation details, etc.; while Muratorian map only represents the static ground floor plan like a frozen map. After the conjectural maps drawn, Cavallari Murat used the cellular distribution schemes to provide the function distribution of city and the layout plan of buildings. Then he invented the Ideogram to present the logic connection between public and private space: thicker or thinner lines represent the hierarchy of connection power and some certain special symbols express the importance of buildings.

This study will adopt a similar idea to promote a cross-scale quantitative analysis. The method is different with current Space Syntax researches. Firstly, these researches don't have a cross-scale perspective and the scholars adopt different models for different scale analysis. Secondly, a number of scholars utilized these three models - axial models, segment models and VGA models while I apply the convex model to analyze topological networks because I can transform the outdoor urban elements like streets into a certain space which could be calculated, compared and analysed on the same level as indoor spaces, to conduct the cross-scale research.

In this research, the transformed urban spaces such as streets, together with the interior rooms, are defined as nodes of a topological network and the connecting relationships of spaces are acted as links, thus drawing a cross-scale topological network from outdoors to indoors. The key point is that, although each building connects to the street in a different location space, the relationship between the interior and exterior is simplified and restricted to the central point of the street convex space. The research steps are as follows:

- 1) Draw the street hierarchy map and morphological typological map for three typical transitional periods in Xiaoxihu, and analyse the evolution characteristics of each period.
- 2) Use a plot in the Xiaoxihu block as a sample, draw topological networks based on its morphological maps and explain how to link indoor spaces to streets, and thus to plots, blocks and cities.
- 3) Use DepthmapX software to carry out a convex spatial analysis, calculate various topological indicators (connectivity, integration and mean depth) and then analyse them.
- 4) Draw justified graphs from topological networks for different periods, compare and extract the underlying permanent or new spatial structures.

## Case Analysis

Transition analysis in three typical periods: streets, plots, forms and morphology

1930s: The outer boundaries of the Xiaoxihu block have remained largely intact since the Ming Dynasty, with a clear structure. The main roads were Madao Street on the south side and Gutong Lane on the east side; Dayoufang Lane on the west side connects the block to the Inner Qinhuai River and the road turns narrower compared with the main road; Xiaoyoufang Lane and Xiaoxihu Street on the north connected the western and eastern sides of the site respectively and the road hierarchies decline. There were five main streets and lanes within the block. Many of the large plots of the period occupied large widths along the streets and were mostly owned by wealthy families. There were also many plots with small widths and large depths along the streets, reflecting an underlying commercial economic pattern. Meanwhile, traditional multi-courtyard residential buildings predominate and were mostly located along Madao Street; the building outlined largely rejoin the plot boundaries; there were mostly wooden structure dwellings of up to 2 storeys, and the basic types of this wooden courtyard building can be combined horizontally and vertically, resulting in a rich typology with a strong

sense of order.

1950s: The outer boundaries of the block remain largely unchanged, with Madao Street and Gutong Lane remaining the main roads; within the block some new lanes and a number of end paths had been added. Changes in the family and social structure after the war led to a smaller plot pattern, with large plots being cut up in the depth direction. The drying up of the Xiaoxihu Lake in the centre of the block led to a re-division of the plots. At the same time public housing sites and educational sites emerged, and new types of school and public housing dwellings as well as office buildings appeared. The layout of the houses became free and the orientation changed from facing the street to facing south.

2010s: The overall outline of the block was compressed due to changes of the road red line, resulting in the disappearance of Xiaoxihu Lane on the north side. Madao Street and Gutong Lane remained the main status and were significantly wider. The width of the internal streets had narrowed considerably, with the emergence of many small end alleys. As a result of the land reform, most of the properties had been converted from private to public then to private again, result in the great changes of the plot shapes and the street spaces being encroached upon by privately erected structures, which leaved little public space and weakened connectivity. The presence of school buildings on the north side led to a dramatic change in the urban fabrics, and the northeast side became more fragmented (figure 3).

#### *Topological networks analysis*

In this step, the author chose a plot on the south side of the Xiaoxihu block as a sample to construct topological network graphs based on morphological maps for the 1930s and 2010s. The 1950s graph was omitted because the street structure, plot divisions and the morphology of this plot that occurred in the 1950s were minor and could be left out for the time being. So only the other two periods need to be focused on and compared.

The street hierarchy network is the key in this topological analysis: it connects downwards to the interior topology and upwards to the structure of the plots, the blocks and even the city. The rooms are firstly mapped as the lowest level (white nodes) of the hierarchy network, then connected to the courtyards, the semi-public spaces (dark grey nodes), which are one level higher, and finally linked to a higher level of the topological network (e.g. the street network). The street spaces themselves act as convex spaces (black nodes) and are connected to the interior spaces through the entrances. The link intensity are different between different hierarchies (figure 4).

#### *Convex space analysis and topological indicators comparison*

The topological maps of the 1930s and 2010s are graphically analysed in the DepthmapX software. During this process, three indicators (connectivity, integration and mean topological depth) are calculated and, visual graphs are generated and the relationships between the indicators are analysed by statistical tools.

At the connectivity level: in the 1930s, around 13% (22) of spaces had a connectivity indicator greater than 3, 9% (14) spaces occupied a number more than 4 and 4% (6) spaces had a value greater than 5, all of which were smaller than the 2010s' values of 19% (28), 10% (15) and 6% (9) respectively. This indicates that more and more non-distributed spaces are appearing and that more corridors have emerged: a significant change in spatial configuration happens (i.e. more cases of one space connected to many other spaces have arisen).

At the level of integration and mean depth: the interrelationship between the integration and mean depth(m-depth) for the two periods conforms to a power-law distribution (zipf' law).

However, the difference is that the values of m-depth in the 1930s is generally smaller than that in 2010s, and most of them are concentrated in 4-7 steps, with a maximum of 8 steps; while the m-depth in the 2010s is mostly concentrated in 5.5-9 steps, with a surprising maximum of 13 steps. This clearly suggests that by 2010s, the spatial structure within the Xiaoxihu block became more enclosed, less integrated, less accessible. The internal streets and alleys as well as public relations are more complex and segmented. This is also consistent with the results of the previous qualitative analysis on morphological transitions (figure 5).

#### *Permanences and transitions of spatial structures between 1930s and 2010s*

The topological network diagrams of the two periods are drawn as justified graphs containing spatial attributes, topological depth, and degree information. The same criteria are used to draw the graphs as in figure 4, with black nodes representing streets, dark grey nodes for semi-public spaces such as courtyards, and white nodes for interior spaces (figure 6).

The comparison between the two graphs shows that the spatial structure in the 1930s was distributed symmetrical, whereas in the 2010s it was more towards a non-distributed asymmetrical structure. Four changes are evident. The first is the emergence of a new architectural form, the corridor housing, which can be read directly from the 2010s graph. The second is the change in the spatial transition between indoor and outdoor spaces. The original spatial transition relationship has disappeared, which is the spatial sequence of the street - the entrance foyer - the courtyard - the main hall of the courtyard houses left over from the Republican period and were replaced by a simple transitional way of grey space at the entrance connected to the street or by no transition between indoor and outdoor spaces at all. In addition, the average degree calculation reveals that the nodes of the middle level down the hierarchy change significantly, with the nodes changing slightly the closer they are to the upper levels. The general pattern of dwellings with maximum topological depth remains more or less unchanged, but their spatial symmetry, originally evident in the 1930s, almost disappears.

#### **Conclusion**

This research explores the transitional process of the urban spatial structures of the Xiaoxihu block through three typical historical phases (1930s, 1950s and 2010s) by means of a cross-scale topological network approach, including morphological analysis, topological network mapping, quantitative convex spatial analysis and justified graph comparative analysis, and extracts the mutations as well as the permanent urban spatial structures.

The present study has largely referred to the convex model of Space Syntax to research the transitions of urban spatial structures. However, the author deems that the convex model defines a long street and an indoor space (such as a bathroom) as a node, which is too rough and erases some key information about the cross-scale structure of urban space. In the future, the author will further explore new models that can better describe this cross-scale relationship.

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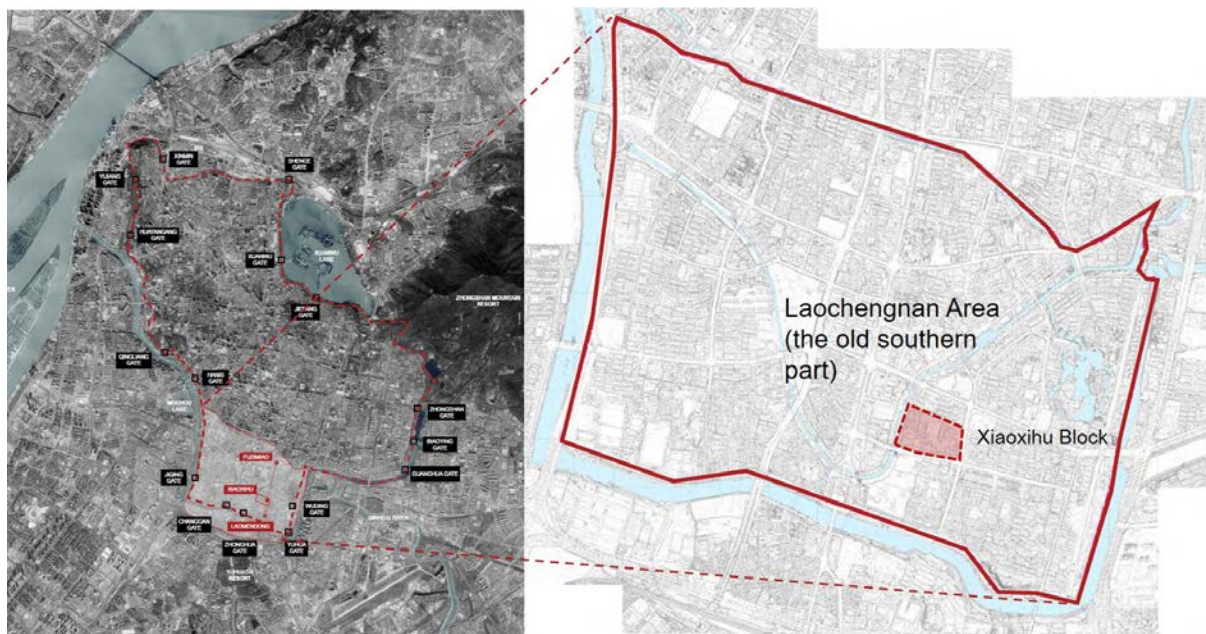
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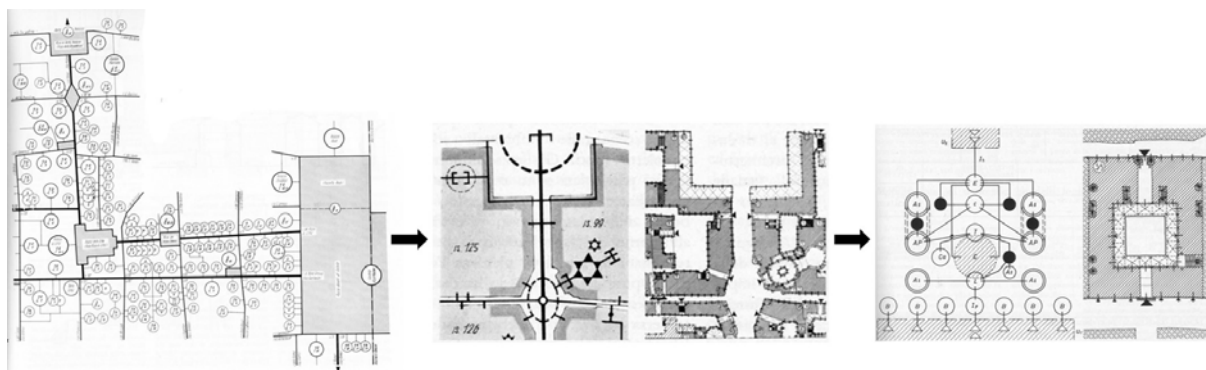
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## Illustrations and tables



**Figure 1.** The location of Xiaoxihu Historical Block (Nanjing, China). Source: edited by Author (Original Source by Xiaoxihu Regeneration Design Course, Southeast University)



**Figure 2.** The topological diagrams by Augusto Cavallari Murat. Source: Augusto Cavallari Murat, *Forma Urbana ed Architettura nella Torino Barocca*



**Figure 3.** The transitions of street networks and urban morphology in three periods, Source: by Author



**Figure 4.** The transition of Topological Networks, Source: by Author

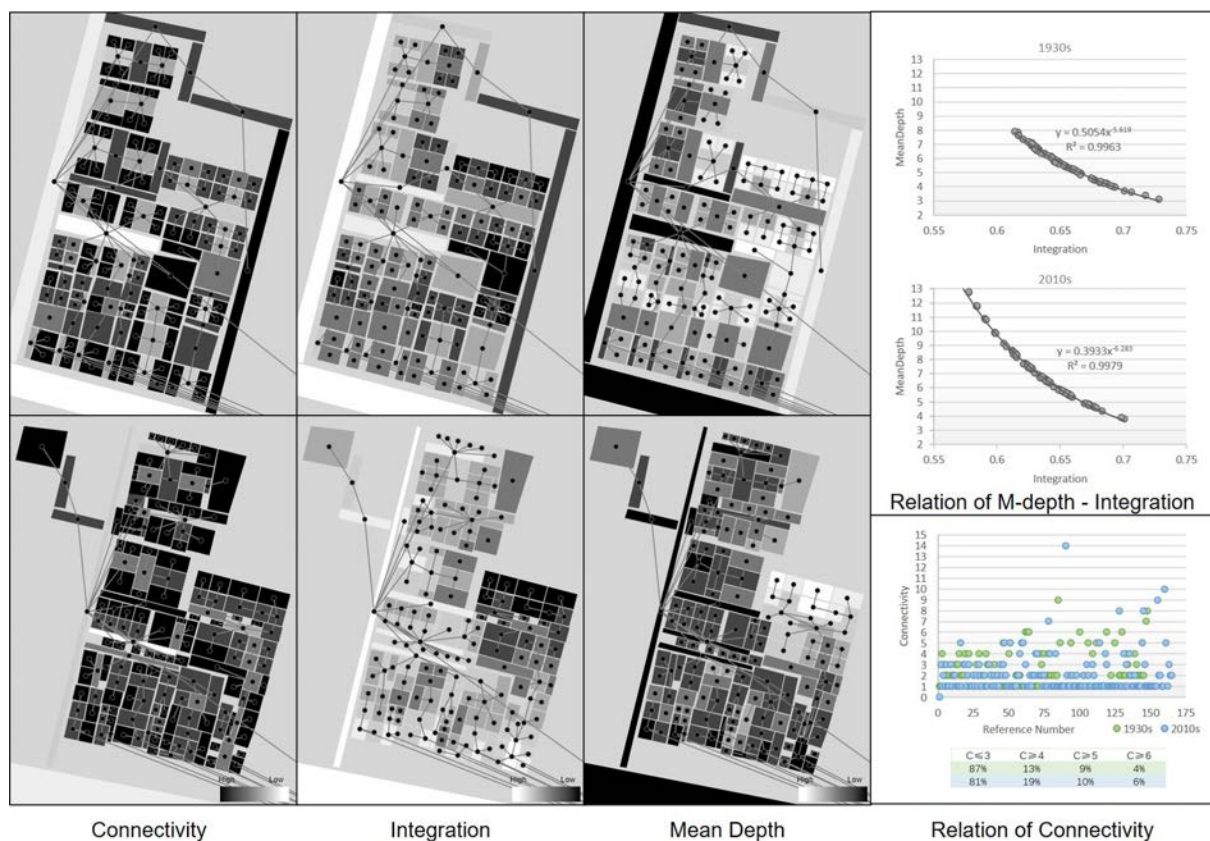


Figure 5. Comparison of Topological indicators in 1930s' and 2010s' graphs, Source: by Author



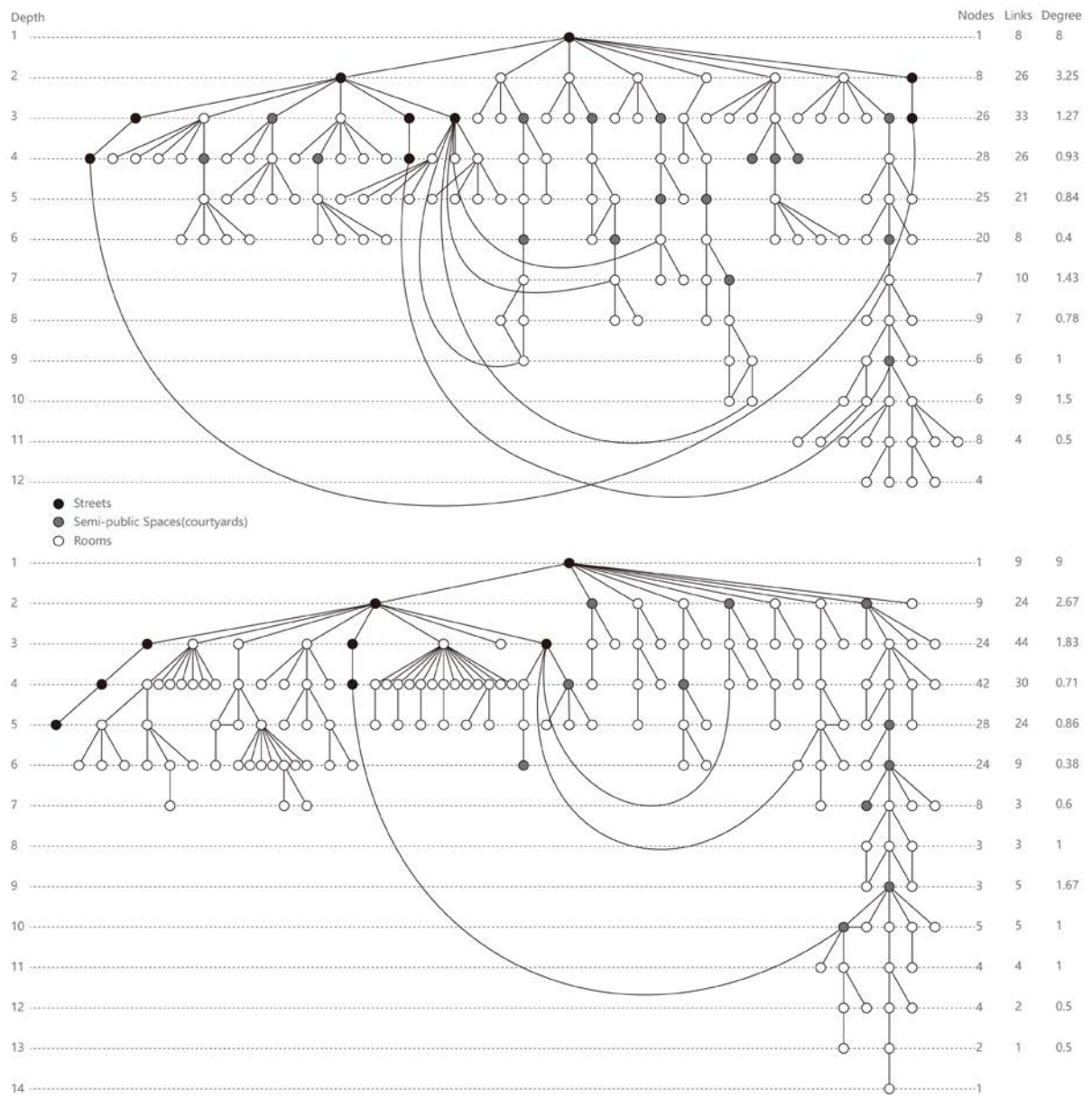


Figure 6. Justified Graph of 1930s and 2010s, Source: by Author

## Street space as contact space - A comparative analysis of street regeneration projects between Rome and Barcelona

Francesca Ambrosio<sup>1</sup>, Sophia Arbara<sup>2</sup>

<sup>1,2</sup> Università degli studi Roma Tre, Dipartimento di Architettura, Via Aldo Manuzio, 68L, 00100 Roma RM, Italia

E-mail: <sup>1</sup>francesca.ambrosio@uniroma3.it, <sup>2</sup>sophia.armpara@uniroma3.it

Keywords: street regeneration, historic urban areas, Eixample, Trevi, Pantheon  
Conference theme: Reading the Changing Urban Form

**Abstract.** *The socio-morphological character of contemporary street spaces in core European urban areas still reflects the consequences of a planning and design culture which favored circulation and monumentality. Although streets can perform both as spaces of connection and contact, in many cases, recent design approaches came at the cost of designing streets as spaces for everyday users and social exchange. Recent approaches both in academia and urban design practice challenge the established culture fostering more inclusive and accessible street spaces.*

*This paper aims at investigating through two case studies, located in Rome and Barcelona, the potential of street spaces to perform as porous and dynamic spaces, capable of adapting to everyday needs. In the case of the historic urban area of Rome, street regeneration projects already initiated during the early '00s are examined. A closer analysis of the routes connecting the Trevi fountain to Pantheon allows for a critical evaluation of the project and comparisons between design intentions and actual outcome. The case of Barcelona, on the other hand, consists of an ongoing transformation of the Eixample historic urban area. Here, through systematic interventions of street sets the block types are being included into larger superblocks transforming entire districts of the area initially planned by Cerdà. In both cases, the socio morphological changes of the interventions are comparatively analyzed with the aim to identify potential success indicators and critical points for mid-scale street requalification projects in historic urban areas.*



## 1 Introduction

Central urban areas are highly vulnerable to natural and human-made hazards (Ferreira and Ramírez Eudave, 2022). Both the built environment and the open space have been affected over the past years with changes in land use, climate - related issues and tourism pressure being amongst the largest challenges. These phenomena have impacted both the city's private and public spaces. While, however, the morphological aspect has not undergone drastic alterations, the character, livability and users' perception especially of public spaces has faced significant changes.

This paper focuses on one slippery part of public space: the street spaces in historically planned contexts of the city. Unlike other public spaces, street spaces imply a sense of circulation creating the necessity to differentiate it from the broader research on public space (Giudici, 2014). To set a theoretical framework for this inquiry, street spaces are perceived as spaces performing both; spaces of connection or circulation and spaces of contact (Choay, 2003; Giudici, 2014). The present analysis of the case studies puts weight on the second one; aiming at understanding how and whether spatial strategies, design proposals and social engagement may enhance or even hinder a culture of street spaces as spaces for everyday uses, social interaction and inclusion.

Two street regeneration projects in Rome and Barcelona are analyzed. The two case studies are placed in different chronological periods; the Roman case consists of a route transformation in Trevi - Pantheon at the early 00's and the case of Barcelona involves an ongoing regeneration project in the Eixample district. The aim is to reciprocally draw references from these two interventions and critically reflect upon past and present approaches on street space design in historically planned contexts.

The two projects are analyzed through the following main concepts: the proposal as part of a broader strategic design of the city, the spatial transformations of the design and the existing or expected social impact of these. Lastly, a synthetic evaluation of these two projects is conducted with the aim to critically reflect upon past and present practices that have informed street design projects within the field of architecture and urban design.

## 2 Rome: street regeneration of the Trevi – Pantheon route in the early 00's

### 2.1 *Strategy and city's agenda to increase attractiveness and its global image*

Street regeneration and pedestrianization projects in the historic area of Rome were part of a broader strategic approach undertaken during the period of 1993 to 2008. During that period, an entrepreneurial city model was followed (Harvey et al., 1989) with a strong focus on raising awareness of the global image of the city, an increase in public-private partnerships and an investment in a tourism-based development of the city (Gemmiti, 2019). The historic urban area became a key element to implement a model like this.

The presented case study is located in the heart of the historic center of Rome and includes two of the most visited monuments in the city, the Trevi fountain and Pantheon. Located within a walking distance of less than 10 minutes from one another, these two attraction points are often being visited in sequence, creating specific culture-led itineraries within the historic city. In terms of street regeneration projects, the Trevi - Pantheon route was the first, pilot project of a series of pedestrianization projects planned for the historic ensemble of Rome (Comune di Roma, 1994). The documents released by the municipality in 2002, a few years after the Trevi – Pantheon project was realized, demonstrate a more strategic attempt to realize an almost entirely pedestrian network that would tie important cultural attractors. This would align with the initial goals that the Trevi – Pantheon route would be “a pilot project for all the street

maintenance works and urban fabric", a project that would requalify and transform the center of the city into a more accessible and livable place (Ufficio della Città storica, 1995). The programmatic goals described in the municipality's technical brief describe these goals as follows: "To realize an urban route, pedestrian and touristic within the historic-monumental city to carry on through a renovation of the street and urban equipment in the part between Piazza della Rotonda in front of Pantheon and Piazza Fontana di Trevi" (Ufficio speciale interventi sul centro storico, 1995).

## *2.2 Spatial transformations; street pavement and urban furniture*

In December 1990, the city of Rome (Town Council Resolution no. 9442) announced a competition for the requalification of the historic center (Comune di Roma, 1994). The competition call was focusing on the development of two major road axes in the commercial part of the historic center: the Trevi – Pantheon itinerary and the Via Condotti – Via Fontanella Borghese itinerary. Amongst the goals of the competition was to find "the best possible solution for the use and image of public spaces in the historic center" (Comune di Roma, 1994). The competition ended with the announcements of the winners by the Jugding Comission in May 1994 and was approved by the Town Council resolution in August of the same year. The competition was approved in 1994 and the work concerning the streets Via dei Pastini, Piazza di Pietra and Via di Pietra was completed by 1998 (Ufficio della Città storica, 1995).

The initial proposal of the architects and the realized one were characterized by deviations in the initial plan. The architect's proposal for Piazza di Pietra was never realized and changes in the administration demanded significant alterations which were seen by the architects with skepticism (Andriani and Terranova, 1996). During the phase of implementation, interventions regarding the paving material, signage and illumination, underground infrastructure and a protected route for people with special needs were realized. The pavement turned the traditional cobblestones into a new single floor material facilitating movement. However, the interventions put in place for the visually impaired did not operate (Porfyriou, 2010) and part of the touristic signage is no longer present in the area.

While the changes in the final design project were only minimal and mostly oriented around facilitating visitors' movement and ameliorating the infrastructure, the quality of life in these routes and intensity of movement has changed significantly. Neither significant changes in the urban morphology of the blocks are observed. An overlapping of Ganbattista Nolli's map created in 1748 of public-private spaces and built forms with the contemporary urban fabric reveals only minor changes in the city's urban morphology. In areas with such a consolidated setting, a reading through circulation space becomes even more relevant as in terms of urban morphology only small changes have occurred. Yet, the notion of urban space and particularly the human activity of the street space, has shifted creating pedestrian-intensive areas with presence of cultural and historical poles of attraction (Sepe, 2010).

## *2.3 Social impact*

In globally attractive urban areas, regeneration projects taking place in historic districts tend to attract a variety of human and economic activity (Amira Elnokaly and Elseragy, 2013). In the present case study, the municipality's ambitions to create a pedestrian network of movement within the historic center, starting from the Trevi-Pantheon route coincided with the expansion of the global tourism market (Bertocchi et al., 2020). Strengthening the city's attractiveness along with facilitating entrepreneurship and realizing spatial interventions of connecting Trevi to Pantheon with a pedestrian street (designed for the visually impaired) "implied creating a

privileged itinerary especially attractive to tourist groups and flows, who immediately adopted it as the only real direct connection between these two monumental urban spots of the city" (Porfyriou, 2010).

#### *2.4 Consequences of the Trevi-Pantheon regeneration: a European trend?*

Today, two decades after, the impact of the regeneration project is spatially, economically and socially visible. On one hand, the intensity of daily visitors of these two attraction points reshaped how the city is lived and perceived by its daily users. On the other, commercial activity and land uses have changed to serve the demands of visitors, almost eliminating daily uses and the possibility for a viable street space. This reflected not only on the integrity of the heritage sites but reshaped the way the city is being lived and perceived by its inhabitants.

A reflection on lessons learned from this project to prevent the current consequences on future street regeneration projects are summarized in three points. First, comparing the actual design outcome which was downgraded to an infrastructural upgrade with few of the suggested design qualities to the initial plan raises the question whether design qualities could have played a role in ensuring a more livable urban environment. Second, the absence of any involvement of the inhabitants before to safeguard the quality of life for both daily users and visitors. And third, the lack of provision and successful policies to mitigate the intensity of activity and generate a better quality of life in the historic center.

The case of Trevi - Pantheon was chosen as one of the most characteristic street regeneration projects in historic urban areas. It is however not a single case, as strategies to increase the attractiveness and global image of European historic cities was a common practice during the early 00's. It is important therefore to contextualize the particular moment that the city of Rome was undergoing during the '90s, also in relation to similar strategies of raising attractiveness through urban regeneration projects being adopted from other European metropolitan cities. Barcelona, being chosen to host the Olympic games in 1992 carried on also afterwards a series of urban regeneration projects combining both large scale strategies with urban regenerations during the period of 1979-2004 (Monclès, 2003). In Athens, in the wake of the upcoming Olympic games in 2004 neoliberal policies put in place to redesign its public spaces, increase the city's attractiveness, and create a large archeological itinerary were realized. A milestone case was the two km long pedestrianization of Aeropagitou street in 2001 (Kalantidis, 2010; Kanellopoulou, 2016).

Returning to the initial inquiry and comparing the two cases of Rome and Barcelona which occurred during two different timeframes, the following question arises: are there today lessons learned both in strategies and in the practice of urban design from cases such as the aforementioned ones?

### **3 Barcelona: the ongoing Superilla Eixample program**

#### *3.1 Strategy: a new hierarchical order to the district's road network*

The case of Barcelona involves the Eixample district area. It is located in the center of Barcelona and geographically also at the heart of the metropolitan city.

Its planning began in 1859 with the city extension project designed by Ildefonso Cerdà, called Cerdà Plan (Cerdà, 1867). The plan consists of a network of streets with a width ranging from 30 meters to 60 meters forming a grid. The main axes form the backbone of the plan and define the various areas of the district where the same design principles are applied. Its strict and homogeneous organization is iconic of this part of the city and is made up of street axes and manzanas, quadrangular blocks with dimensions of 113 x 113 meters. The corners of the blocks

are smoothed by a 45-degree diagonal cut of 19.8 meters. The relationship between open and built space was designed to provide to the city green areas and public spaces. The manzanas were designed to be open, with a maximum of three built sides and should not exceed the height of 16 meters. The space inside the blocks had to be public including green areas (Busquets, Gómez, 1983; Schiavo, 2005; Busquets, Corominas, 2010). Subsequent speculation has impacted the initial plan and its main principles, significantly influencing the quality of space. Currently the Eixample is made up of closed blocks with private courtyards inside. Furthermore, the building's growth in height has led to an increase in population density exceeding that of 36,000 inhabitants/km<sup>2</sup> (more than double of Barcelona's average density). These events are related to multiple challenges common to several European cities which in the case of Barcelona have had a greater impact in the Eixample area. A contextualization of the district at the urban scale reveals insights regarding the relationship between its spatial configuration and the city in its metropolitan extension. Its position and its structure made up of orthogonal axes gave it a great permeability of through movement at a city scale. As a result, the Eixample is today the part of Barcelona with the highest levels of traffic, noise and air pollution and widespread presence of heat islands, exceeding the maximum levels recommended by the World Health Organization. The aforementioned conditions have put interventions on the Eixample district at the top of the city's agenda to improve livability facing at the same time challenges related to global climate change emergencies (Agència de Salut Pública de Barcelona, 2018; Ajuntament de Barcelona, 2020a, 2021a, 2021d).

Superilla Eixample is a systematic district redevelopment program carried out by the Barcelona City Council. The path leading up to today's proposal began in the 1980s with the elaboration of the supermanzana theoretical model.

Initially, the main objective of the study was to address the problem of noise pollution, as the Eixample district had reached the highest values in the city (Ajuntament de Barcelona, 1987, 1988). The scheme considers an area of the district of 400 x 400 meters called supermanzana, including 9 blocks (manzanas) and proposes three different street levels: the main city street, the local street and the neighborhood street, which is the street at the human scale (Rueda, 2016, 2017). Although it is directly linked to the morphological condition of the Eixample, the initial model is flexible and has been used as a reference for several interventions outside the district. The long-term aim consisted of acting on the whole city. The first supermanzana was realized in 1993 in the neighborhood of La Ribera. Later, in 2006, the supermanzana in Vila de Gracia was completed and after almost ten years, between 2015 and 2020, the supermanzanas in the neighborhoods of Huerta, Hostalfrancs, Poblenou and Sant Antoni were realized (Agència d'Ecologia Urbana de Barcelona, 2021; Ajuntament de Barcelona, 2016, 2017a, 2017b, 2018a, 2018d). The supermanzana of Sant Antoni will be integrated into the Superilla Eixample program. The configuration proposed today by Superilla Eixample differs from the previous designs and turns from a redevelopment of circumscribed areas, the supermanzanas, into a redevelopment of street axes space (Magrinya, 2021; Rueda, 2020, 2022). The reference of this transformation is a set of studies conducted within the Polytechnic University of Catalonia and with the support of the municipality of Barcelona. Starting from the morphological analysis of the district, the studies aimed at facilitating the identification of intervention strategies using tools compatible with the Eixample's initial condition (Busquets, Gómez, 1983; Barjau et al., 1990; Font et al., 2010). The program's configuration derives from the idea of obtaining public space through transformations of the vehicular road network by superimposing a new grid on the existing orthogonal system (Ajuntament de Barcelona, 2021d; Font et al., 2010). The set of linearly extended interventions includes the creation of 21 squares and the transformation of 21 axes

realizing a “green network” inserted in the homogeneous grid of the district (Fig.10).

The key to the operation is therefore the addition of another hierarchical order to the district’s road network: a sort of linear park with services, where the use of space is flexible and varies according to areas and needs. Vegetation plays an important role. More than a system of roads it aspires to be an environmental, “green” infrastructure capable of generating new public spaces for the city while contributing to the ecological transition reducing noise and air pollution.

### *3.2 Spatial transformations: a single platform*

From a morphological point of view, the intervention at the architectural scale proposes a new street concept. The current Eixample standard street is mainly vehicular, with a width of 20 meters, made of pavements and asphalted carriageways consisting of two different levels. The “21st century street” proposed by Superilla Eixample is mainly pedestrian and has a single platform. Through the idea of the single level, space becomes free and flexible: the external space is in direct relation to the internal one composing a unique public area rich in spatial sequences. New trees also occupy the central part of the street section in coherence with the idea of a free and natural system. Thus, from asphalted axes dedicated to vehicular mobility, the new green axes will be converted into a place to walk and stay, becoming a reference point for social relations.

### *3.3 Social involvement*

The development of the Superilla Eixample will be carried out by sub-areas, involving the inhabitants through a public participation program. Any citizen can take part in meetings and activities organized with the aim of discussing the different aspects of the transformation. Design choices are debated, discussing both the urban and neighborhood scale aspects of the different intervention areas. Participation takes place through information sessions and workshops open to citizens. Representatives of important stakeholders are also involved in the transformation. For each intervention area, a group called Grup Impulsor is formed. This group turns into a reference during the entire process with the task of acting as a link between the technical experts and the inhabitants. It is a group made up of the general public as well as representatives of the neighborhood with the aim to raise the critical aspects of the transformations and possibly make modifications or additions to the final version of the projects. The evolution of the process is publicly transmitted through the Barcelona City Council’s website, where it is also possible to make notifications, observations, and questions. The objective is to create the conditions not only for a socially accepted transformation but also for a valorized and widely supported program through a multidisciplinary working process (Ajuntament de Barcelona, 2019a, 2019b).

Since the substantial change proposed by the Superilla Eixample program concerns the transformation of vehicular road axes into a predominantly pedestrian network, some of the current activities of the ground floor are directly impacted. Therefore, specific meetings are organized with the most closely involved entities, to discuss potential measures to safeguard the continuity of these uses. As a way of accompanying this aspect of change, the Pla d’Usos de l’Eixample was approved in March 2022. It is a plan drawn in order to control the ground floor uses and ensure a functional mix preserving the existing neighborhood businesses and preventing the development of monofunctional activities mainly linked to restoration and tourism. It was presented on the 21st of July 2022 and identifies three types of uses (public activities, such as restaurants or cultural activities; food shops; and establishments linked to



tourist activity) with the aim of regulating the maximum and minimum number of each district's uses. (Ajuntament de Barcelona, 2022b).

### *3.4 Expected outcome: a new perspective?*

Rethinking the hierarchical order of the Eixample, its complexity increases and the current street layout is being enriched. During the summer of 2022 construction work on the first part of the infrastructural intervention has started and the goal is to conclude all the phases of the project in the whole district by 2030. The ambition is to intervene equally in all the district, following the principles that led Ildefonso Cerdà to build a homogeneous structure for the new Barcelona.

The core vision of the Superilla Eixample operation concerns the expansion and enhancement of public space originally included in the Cerdà Plan but never fully realized due to speculation. Returning to the public spaces defined by the 1859 draft plan in Eixample today would be a utopian approach. The inner courtyards would have to be expropriated and without demolition of the entire block fronts they would not have the permeability needed for a public space. Superilla Eixample seeks a compatible form of intervention with what preexists. That way it responds to different needs of the city establishing a relationship of coexistence with the existing context without affecting its morphological identity.

However, in order to have a relevant impact which responds to contemporary challenges, the plan has to become the starting point of a broader and integrated transformation process. To achieve this, a city as one thing approach (Hillier and Vaughan, 2007) would align with the idea of equality that underlies both the Cerdà Plan and the initial theoretical model and principles of the supermanzana.

### **Synthetic evaluation and conclusions**

The two cases reflect two approaches and strategies to urban design adopted twenty years apart. In the case of Rome, the redevelopment aimed to facilitate the crossing of a part of the historic city with complex flow management due to tourism: priority was given in improving the conditions of the street space to make the route more accessible and attractive. On the other hand, in Barcelona, the main goal is to transform the use of the street. From driveway to pedestrian, the new network not only aims at providing the city with a new public space, but also to improve its environmental conditions and initiate a process of ecological transition.

In both cases the intervention includes little or none morphologically invasive transformations. In the case of Rome, there were no structural changes in the street section and the intervention involved the replacement of the pavement material, signage and the substitution of the lighting system to make crossing easier. In Barcelona, the configuration of a single level converts the ground floor into a continuous and flexible space, where green areas with new trees will be combined with paved ones. The choice of new material in this case is driven by the goal of improving ecological and water cycle conditions: the impermeable pavement will be replaced by a permeable one.

From the social point of view, the impact of the intervention in Rome is still observable. Flows have increased and, over the years, activities related to the daily life of the inhabitants have been replaced by those targeting mainly the tourism economy. As a result, the area became progressively depopulated. To avoid consequences alike, in the Eixample district the transformation is controlled through the aforementioned regulation of uses to protect existing activities and increase neighborhood commerce. The aim is to improve the quality of life of the inhabitants, who are therefore directly involved in the process.

A comparison of the two cases shows how the transformation of street space has been interpreted in two different ways and modes of use. On the one hand, in Rome, the function of the street as a single element of connection prevails, and its efficiency is directly proportional to its ease of crossing. On the other hand, in Barcelona, the ambition is to create a street space which will perform as a public space, responding to the needs of the inhabitants, promoting social exchange and meeting the challenges of contemporary Barcelona.

The change in perspective from the case of Rome to that of Barcelona, reveals that a radical shift in priorities emerged. In the global climate change emergency, compact urban areas play a key role. The increase of soft mobility, the reclaiming of public space, the activation of local planning, the transformation via public and private partnerships are achievable goals optimizing the urban system. Starting from the existing configuration and through design interventions it is possible to contribute through nature-based solutions stimulating at the same time social exchanges. This shift in design approaches is putting on the foreground the public space, including street spaces, stimulating the role of the street space as contact space and as a driving force of transformation and change.

## Funding

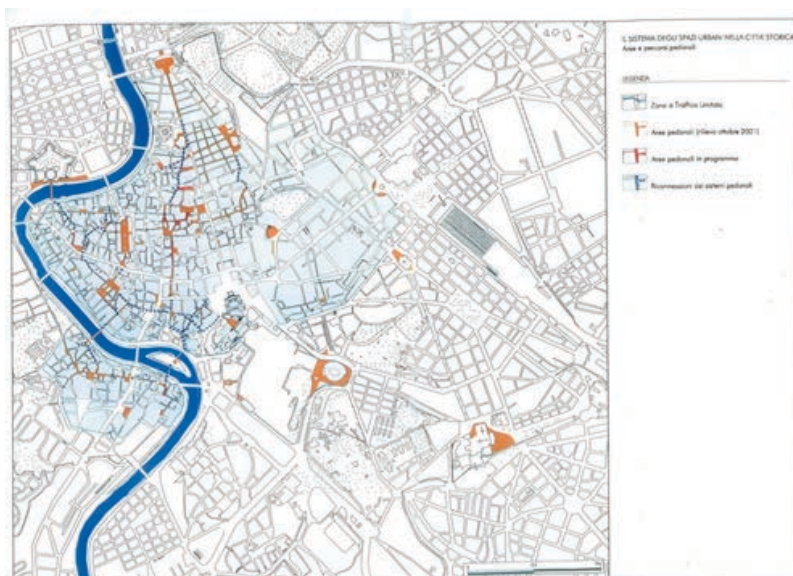
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## Illustrations and Tables



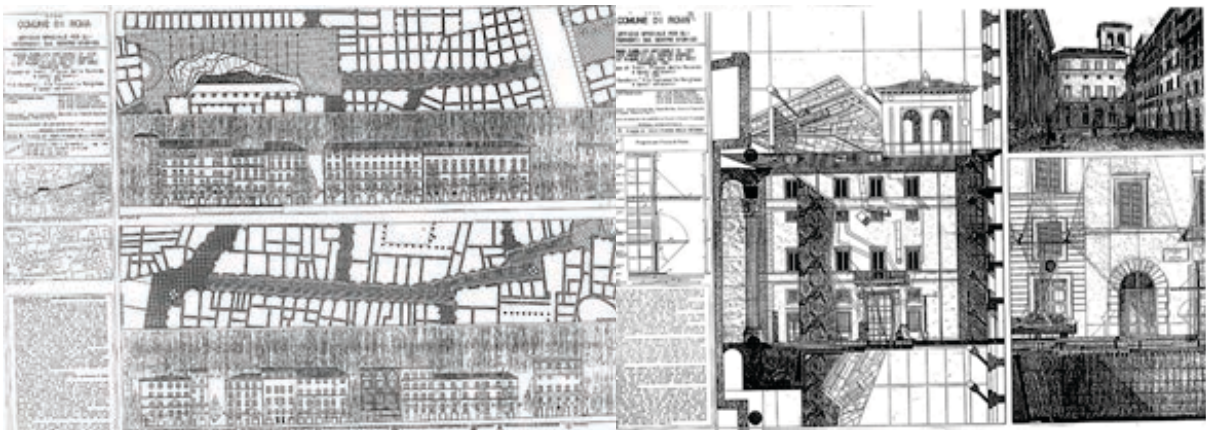
**Figure 1.** Existing and planned pedestrianization of the historic urban area

source: Riqualficazioni e pedonalizzazioni nella città storica, Programma dei lavori 2002, Ufficio per la città storica





**Figure 2.** The requalification of the Trevi - Pantheon axis  
source: Riqualficazioni e pedonalizzazioni nella città storica, Programma dei lavori 2002, Ufficio per la città storica



**Figure 3.** Top and front view of the requalification project in the Trevi - Pantheon  
source: Architectural archeological investigations, Design charette on the relationship between architecture and archaeology in the city of Rome, Topos: European Landscape Magazine #15 Pathways, 1996



**Figure 4.** Morphological changes in the area Trevi - Pantheon from 1748 to today  
source: <https://web.stanford.edu/group/spatialhistory/nolli/>, last accessed 07.09.22



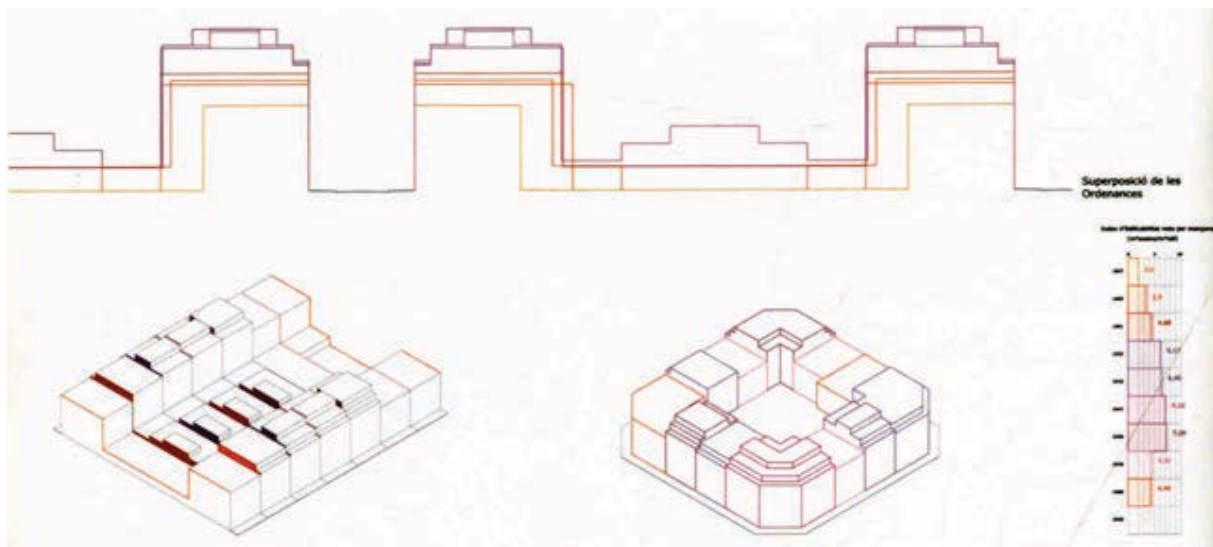


Figure 5. View towards the Trevi fountain (photo by Sophia Arbara)



Figure 6. The Eixample district. Source: Google Earth Pro

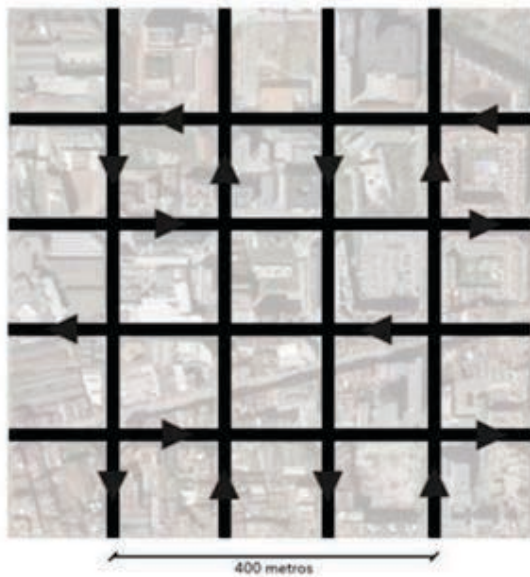




**Figure 7.** The Eixample blocks evolution

source: Busquets J., Corominas M. (edited by) Cerdà i la Barcelona del futur. Realitat versus projecte (Barcelona, 20 octubre 2009-28 febbraio 2010), CCCB, Direcció de Comunicació de la Diputació de Barcelona

#### SITUACIÓN ACTUAL



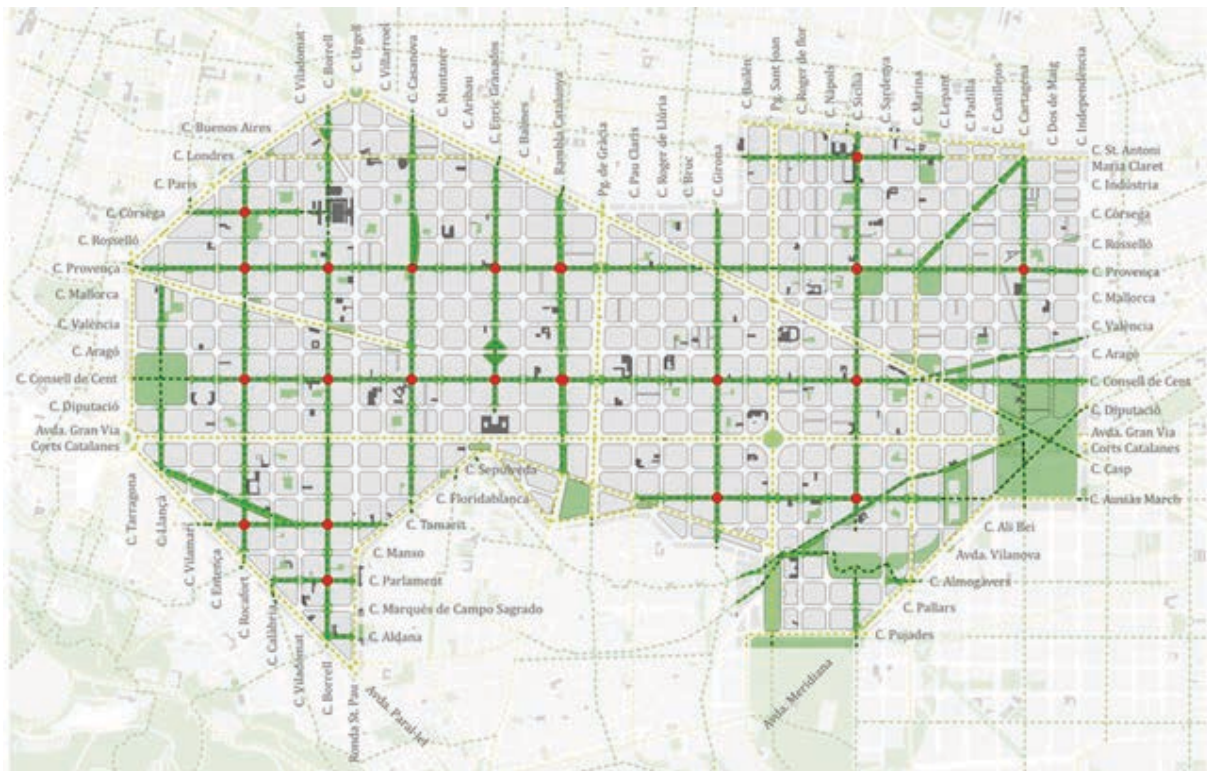
#### SUPERMANZANA



**Figure 8.** The supermanzana model (source: BCNecología)



**Figure 9.** Superilla Sant Antoni: the surrounding neighborhood market that via Carrer del Comte Borrel will be part of the new network (Photo by Francesca Ambrosio)



**Figure 10.** The Superilla Eixample program (source: Ajuntament de Barcelona)



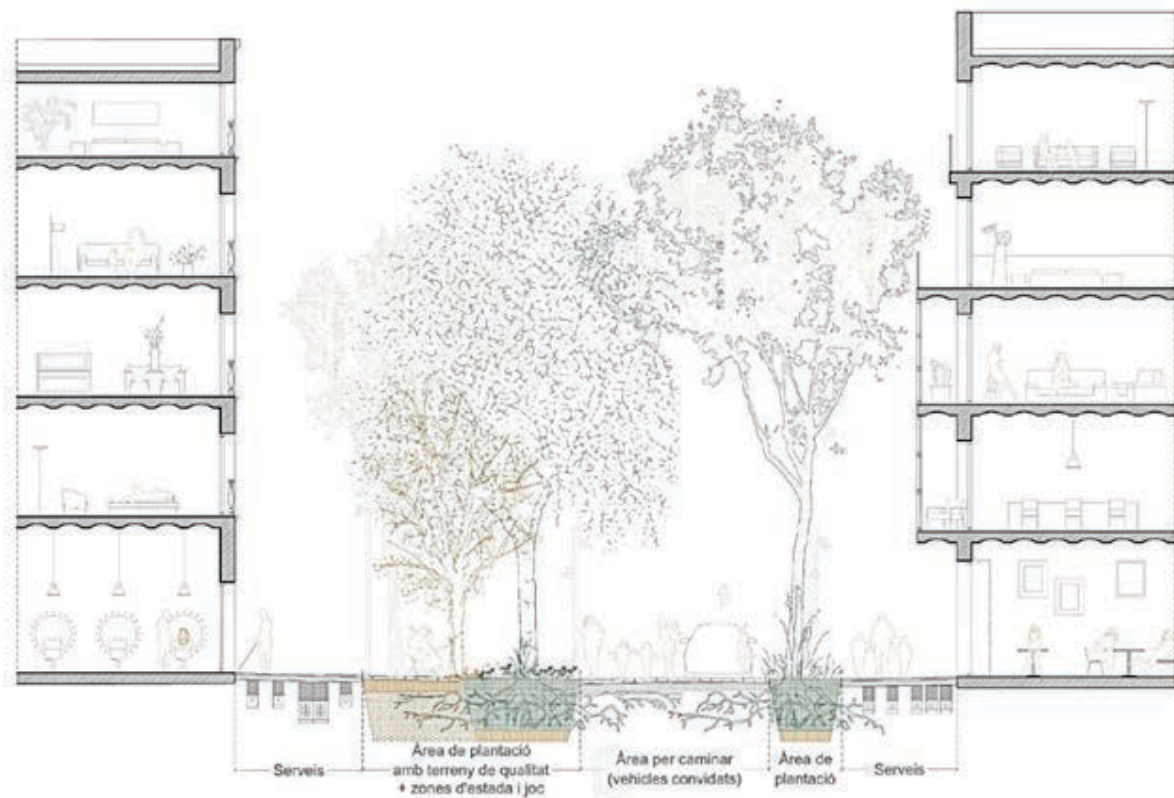


Figure 11. The new street section (source: Ajuntament de Barcelona)

## Mapping Time: Structures for the Imagination

Lamberto Amistadi

Department of Architecture. Alma Mater Studiorum University of Bologna

Cesena Campus, Via dell'Università 50 – 47522 Cesena

E-mail: lamberto.amistadi@unibo.it

*Keywords: Architectural Composition, Urban Form, Mapping, Imagination.*

*Conference theme: Reading the Changing Urban Form*

**Abstract.** *Reading the Urban Form is a fundamental activity for identifying the structures that constitute it.*

*The Archea research - funded as part of an Erasmus + Strategic Partnership program - has read and redrawn the Urban Space of two medium-sized European cities, Bologna and Aachen, according to 5 different interpretative approaches: Mapping Spaces, Mapping Places, Mapping Natural Space, Mapping Centralities, Mapping Social Space. The idea is that the different characteristics that make the European city particularly liveable can be traced back to the quality of its Urban Space.*

*Mapping Time is added to these readings. The diachronic reading that Muratori makes of the San Bartolomeo district in its Storia Operante is assumed synchronously as the expression of a field of possibilities. In a figurative approach that refers to the Italian tradition of architectural and urban Composition, Mapping Time is understood in a synchronic way, in which the different configurations that the parts have gone through over time, unfold an open range of possible solutions and that we can imagine.*

*In other words, the terms of the discourse oscillate within the relationship between Urban Morphology and Architectural Composition, the outdatedness of which alone allows us to imagine a better world than what it actually is.*

## Introduction

The basic idea is to link the concept of Mapping to that of imagination, so that in mapping an artefact, the relationships which allow its transformation can be recognized. We are then faced with two fundamental issues: the structure of the (urban) artefact as an invariant; and the structure as a finite set of possible relationship within which to follow the transformation, in other words, the Mapping as a representation of the artefact that evidences the field of possibility within which to imagine the transformation of the artefact itself, in this case, the city.

If the Mapping, or rather, the product of the act of mapping, is a representation, then this must be circumscribed within a framework that is both literal and phenomenal: literal when the artefact to be depicted is represented at different scales within the framework; phenomenal when the conceptual framework proposes the choice of signs to be selected and reproduced in the map. On this point, of interest is the difference that Aldo Giorgio Gargani (1993) established between descriptive technique and construction procedure, where a representation is always a construction procedure in which the object is produced, by representing it, while the outcome of the representation is unpredictable.

## The Map of Imola

The map of Imola drawn by Leonardo da Vinci in 1502 [fig. 1] is the first example in which the city was represented against the background of a territory abounding in monumental landmarks, a watercourse, signs ofcrofting limits, rural farmsteads. Its paradigmatic value derives from the intentionality with which the dialectic between figure and background manifests, where the city appears as a figure that stands out against the background of the countryside and in this way, the dialectic between city and countryside immediately rises to the paradigmatic evidence of an abstract concept: the reading of the elementary figure/background relationship as the "zero degree" of the overlaps that inform the contemporary city, but also of the intelligibility of the parts that make it up. Because, if with the concept of "figure", attention is focused on its dialectical relationship with the background and, more generally, on its role within a configuration (i.e., the work it performs within the city), the concept of "part" refers to the minimum unit of meaning, from geometric-topological and mnemonic-perceptual points of view; which is to say, according to the same phenomenological approach with which the concept of the part defines that of the (urban) landscape, and vice versa, in the European Landscape Convention (2000): "'Landscape' means an area [i.e., a certain part of a territory, t/n], as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."

In our plaster models for Bologna [fig. 2], as in the maps of ancient Roman surveyors, in addition to the historical heart of the compact city, also the mountain and the forest take on figurative values and stand out against a background faintly marked by the course of the Reno and Savena [rivers, t/n] and interconnected by the main traffic routes. A part is only such in relation to others (and therefore, in relation to the whole to which they refer) and this relationship is exercised with respect to the enclosure that delimits them: in other words, its role is defined in relation to the other parts, in the field that it encloses within itself and in the position that the monumental focal points take with respect to its edges.

From a topological point of view, we can have figures that contain others (as in the case of the Cerchia dei Mille and the Circla in Bologna [two historical rings of the city's walls, t/n]), which overlap each other (with all the modernist charm of the concept of "transparency" as explained by Colin Rowe and Robert Slutzky), and the concept of "between" or the interstitial space between one figure and another. As I have already written about extensively in "Drawing the



City" (Amistadi, 2021), the logic with which monuments take their position with respect to a part is relative to the edges delimiting it: the Monastery of San Domenico is located on the outer edge of the Cerchia dei Mille, the Monasteries of San Francesco and Santa Maria dei Servi take position on its outer limit, the Convent of San Giuseppe and the Church of the Santissima Annunziata nestle in the gap between the Circla and the slopes of the Tuscan-Romagnolo Apennines [fig. 3].

### The Example of Venice

As we know, Venice is the perfect example of a formally completed city. Its completeness is a consequence of the fact that it cannot be expanded. It is an island whose limits are set by water and starting from this condition not only has it founded its own beauty, it has elaborated some of the most useful thoughts for the architectural and urban understanding of the contemporary city: in 1960, the *Studi per una operante storia urbana di Venezia* (Studies for an Operative Urban History of Venice) and in 1964, the "Novissime" project by the Samonà group. In the Report on the "International Competition for drawing up the urban masterplan of the Nuova Sacca del Tronchetto", we read: "The restoration of large urban voids, beyond the conservative recovery of the original structure and the functional enhancement that they come to assume, is linked to an interpretation of the city as an element closed to the large outdoor spaces and yet visible, from the inside as well as the outside, by means of large open spaces, great views on which the canals and the choices of urban amenities remain as the only margin of integration and completion of the original structure. By creating large open spaces, the removal of the dying fabric frees compact areas which are completely efficient: where the confluence of the flows of interests and people coagulates in a precise layout, in whose meshes and at whose margins are placed the empty spaces, once the privilege of the aristocratic citizenry, and to whose recovery the masses can now claim an even greater right. (Samonà, 1964)

"For two or three years during lessons we considered ancient cities on the drawing board, as on an operating table, and with the students we cleaned the ancient fabric, redesigning its morphology, as dentists do with old dentures; caries are treated, and detritus is removed." (Semerani, 2006)

The main idea was to make space, precisely in Heidegger's sense of thinning, "freeing a bit of freedom" and opening clearings that allow us to perceive, to put in the right perspective and embrace with our eyes the monumental landmarks, finally able to emerge from the confusion and ambiguity of the overlaps. It is only a question of making the differences visible: in his *Meaning in the Visual Arts*, Panofsky (1983) identified the basic antithesis of artistic intention in the antithesis between differentiation and continuity (Amistadi, 2022): if the city – as Leon Battista Alberti stated – is a discourse, then the terms of the discourse must be intelligible, that is, the words, propositions and grammar that regulate them must be used deftly and the elements of the urban phenomenon must be distinguishable.

In the *Studi per una operante storia urbana di Venezia* the city was "re-created" and "re-built" precisely in the sense that Panofsky gave to the interpretation of the artistic phenomenon. Saverio Muratori used expressions such as line of development, origin, initial factors, successive stages of development, structural-spatial originality, individuality of new forms in the extant and within the previous forms, genesis, matrix, but, more simply, Muratori's Venice appears to us throughout the field of possibilities that the different phases of its historical development show us. I called this idea Mapping Time, after in *Mapping Urban Spaces* (2021), which collected the theoretical results of the ArchéA research – Architectural European Medium-sized City

Arrangement, we had included several other Mapping approaches: Space, Places, Natural Space, Centralities, Social Space. The idea of "mapping time" concerns, in other words, that of considering the different phases of the historical development of Venice synchronously, rather than diachronically. However, not in terms of a matrix or a genetic indication, but more inconsequentially as a place of possible configurations (just like the potential space of Plato's *khôra*) within the limits defined by the part, where, in the case of Venice, the limits are the canals or, in the case of the example, the part being the whole district of San Bartolomeo [fig. 4].

Over time, Muratori's map of the city came to verify what had already been said about Bologna regarding the role the monuments play – that is, the work that the figures perform – in the city: as in Bologna they take up position on the limit of the part [fig. 5]. However, in the case of Venice, whose expansion is intrinsically prevented by the limit of the canals, all transformations are endogenous, generating cityscapes in which the churches synchronously signal the difference between the moments of a configuration whose variants are provided only within the corresponding part. In other words, the fact that the neighbourhoods of Venice have their "space counted", tends to define the rules of a game whose moves are innumerable, but finite. This finiteness is intimately related to the identity of a place or even an entire city, where its deepest meaning consists precisely in its vocation to be transformed while remaining true to itself: "The city is therefore an artificial place of history in which every era – every society that has come to diversify from the one that preceded it – attempts, through the representation of itself in architectural monuments, the impossible: to mark that determined time, beyond the needs and contingent reasons for which the buildings were built. (...) The 'witness' of the monuments remains valid precisely by virtue of the continuous transformations or adaptations that these, presuppositions – 'eternal' at their birth, undergo in historical-social time, reconfirming in this their character of temporal validity that the longer they last the more they tend to the limit, to a possible 'eternity' (understood as the continuity of a presence)." (Aymonino, 1975)

### Structures for the Imagination

The possibility of representing a city at different stages of its historical development or according to different approaches, and of recognizing the same fact in the different representations of the artefact, is a property belonging to language that semiologists call "elasticity". This "elasticity of language" allows us not only to have recourse to the structural similarity between artefacts, but also to be able to flow freely within a "formal space" which, however vast it may be, is nonetheless defined by the constraints of its internal relations. Thus, as Melville reminded us, we are both a 'Loose-Fish' and a 'Fast-Fish', that is, we are forced within the limits of the formal structure to which the artefact refers, but also free to "mix at the same time the Attic world or the Egyptian world and the modern world, to see the modern world as ancient and to be able to shuffle the cards." (Polesello, 2002)

The relationship between bond and freedom is a fundamental relationship of artistic intent, as much as the role of the imaginary within this dialectic; De Chirico liked to say that "the virgin mind is blind", Goethe had already recomposed this duplicity with the concept of "objective fantasy". But in the case of Mapping, it is the mapping itself that acts as a vehicle for the imagination, unless it is understood as merely a descriptive technique ("The first problem that arises in these terms is: will the description be exhaustive and complete? Will our analysis be truly final? Inevitable questions for the descriptive technique that unfolds concepts for institutions and processes, which are always taken for granted. If in fact numbers and formulas are assumed as entities, as things, the obligation of description is triggered and for the description

there is no end", Gargani, 1993), but as a construction practice, a regulated symbolic procedure in which the same structures and entities must be built step by step, in its intermediate links. As Samonà said (1994), "gradually": "(...) our descriptive analysis intends the object to a particular type of description, which gradually encodes the first image of it, and forms a second in which are replaced, to the signs of mere similarity of the various elements of the object, signs corresponding to the intention that you wish to give the new image, detecting characteristics of substance that influence the shape and prepare a third image in which the form tends to integrate with the substance itself to achieve the unity of an intentional and significant image, which we define as an icon as the point of arrival of the iconic process that began from the first naïve image."

The "descriptive analysis" of which Samonà spoke is actually a construction procedure to the extent that the "intentional image" or "icon" is the result of a process which transforms the first "naïve" image, that is, the starting entities, into a design in which "the laws that govern the design are clearly visible". The characteristics of this design (image) are: 1. Intentionality or non-neutrality; 2. Summary (that is, the construction procedure, unlike the descriptive one, gives rise to a finite representation); 3. Not predictive, that is to say, the result is different from what was imagined.

Which brings us back to drawing as a tool for designing, or rather, producing a work whose process takes place within a constraint along which ideation or imagination, representation and realization or fabrication are arranged (to quote Nelson Goodman's *Ways of Worldmaking*, 1978). This is the same circle which Panofsky used, in his idea of "history as a humanistic discipline", to interpret the work of art through (as we have said) a work of re-creation or re-construction. Thinking of the process to produce the work as a circular line of development within which "every degree towards the system that 'makes sense' presupposes not only the previous but also the subsequent" (Panofsky, 2010) triggers our imagination and lets us graft its starting point onto one or any of these different degrees.

John Hejduk (1985) explained this very well, talking about the two-dimensional representation of an object and then architecture. "I can imagine a jug, an apple, a table and put them in relation to one another, i.e. compose them. I can draw these objects pictured on a two-dimensional surface, and represent them inside a frame. Drawn on a paper surface, what I imagined is a fiction, but is also a realization, the reality of a drawing on a sheet of paper. I can also realize the jug and the table that I imagined and arrange them in three-dimensional space, in the so-called 'real space'. I can make a film with a video camera shooting all around the building from 360°, with different natural light from dawn to dusk or create a light source myself. I can also photograph the jug-apple-table, producing a still image of the representation of a construction. But of course, architecture and architecture of the city are more complex than a painting and cannot be conceived starting from a single image, but rather from every image, albeit partial, from every fragment that is grafted along the entire (circular) line of development between conception and construction: "There are many kinds of architectural realities and interpretations of those realities, which include the major issue of representation of re-presentation. Whatever the medium used – be it a pencil sketch on paper, a small-scale model, the building itself, a sketch of the built building, a model of the built building, a film of the built building, or a photograph of the above realities – a process is taking place.

(...) Whatever the initial catalyst is, let us assume that an architect has an architectural image inside his mind's eye. The initial image is like a single still-frame, because I do not believe that at first any architect has a total image of an architecture simultaneously – in my experience or knowledge, it does not work that way. There may be a series of images one after the other over

a period of time, but that period of time, no matter how short, is a necessary ingredient for the evolution toward a totality. It must be understood that so-called 'total architecture' is ultimately made up of parts, fragments, and fabrication. Put another way, when we look at a painting, we see the total image at once. Of course, after the initial viewing of the image presented, our mind, through our eyes, can have the pleasure of rummaging through the painting, revealing all of its intended subtleties and nuances and some of its mysteries. We are able to study it. But the whole so-called 'real image' we can see immediately.

(...) The architect can make a number of representations on a blank, two-dimensional sheet of paper. He is able to draw images of ideas upon its surface. In drawing plans, elevations or sections, he is basically making notations that run parallel to the paper's surface. He is also able to make isometrics, axonometrics and perspectives on the surface, each one giving a different depth connotation ranging from the shallowness of an isometric to the extended deepness of a perspective. All are specifically real (pencil and paper), all are representations of proposed arrivals, and all are illusions regarding space and depth. Although the perspective is the most heightened illusion – whereas the representation of a plan may be considered the closest to reality – if we consider it as substantively notational, the so-called 'reality' of built architecture can only come into being through a notational system. In any case, drawing on a piece of paper is an architectural reality."

There exists a fine drawing in which Hejduk had mounted a plan above an elevation with the edge of the sky crushed against the wall of the Grandfather Wall House [fig. 6]. The scene is flat and thanks to that, anti-theatrical: it is impossible to see where the rays are perfectly parallel to the object they intercept. This flatness objectifies the 'things', both the clouds and the cylinder, which belong to the formal space in which humankind creates the images of its own world. The cards are shuffled and removed from the danger of automatism: the sky reverses its position with respect to the plan. These disruptions have no practical reason and do not correspond to any functional programme, even less do they have anything sadistic or hallucinatory about them (as Tafuri reminded us). This is instead an anti-scenographic theatricality in which the mind is forced to imagine new ways of travelling and inhabiting the spaces of a composition in fragments, in which – as Samonà, and before him Aby Warburg, had anticipated – it is the (architectural) image that directs and guides the idea.

## Conclusion

As Benjamin (2004) said, there are two types of de-signs: "We could say that the substance of the world is crossed by two sections: the longitudinal one of painting, and the transverse one of certain forms of design. It seems that the longitudinal section has a representative function, in some way contains things; the transverse section is symbolic: it contains signs." For Alain-Bois (1993), some masterpieces of European abstract art and American minimalism, but also Picasso's *papiers collés*, "belong to certain forms of design" and have the value of a technical, symbolic and above all strategic model: "Like chess pieces, like phonemes in language, a work has significance, as Lévi-Strauss showed, first by what it is not and what opposes, that is, in each case according to its position, its value, within a field – itself living and stratified – which has above all to be circumscribed by defining its rules." As in the chess metaphor, the strategy includes a definition of the field and the value of the elements depends on the reciprocal position. Strategy and field must be understood in the military sense, both as a technique of identifying the general objectives to be pursued and that of developing the most suitable actions to achieve them. Vitruvius translated the term "ordinatio" from the Greek "taxis", which means "order on the battlefield". Le Corbusier (1999) was the first to speak of the plan as a

strategic model, surpassing the traditional definition of the geometric-projective type. "The plan is the generator. (...) the plan is the determination of everything. A plan is not a pretty thing to be drawn, like a Madonna face; it is an austere abstraction, it is nothing more than an algebraization and dry-looking thing. But the work of the mathematician anyway remains one of the highest endeavours of the human spirit. Order is an unstoppable rhythm that acts on any human being in equal measure."

Although it is not up to us to establish the connection between these two models – the representative and the strategic – linguists, and especially scholars of poetic language (Kristeva, 1979), speak of a "formal space" composed of layers (like our psychic consciousness) that presents, that is, different levels of depth, from the most representative one located on the surface to the deep and even deeper one corresponding to the rhythmic arrangement. Taking into account the depth, arrangement and elasticity of this space could prove useful to the architect and architecture alike.

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Figure 1. Leonardo da Vinci, Mappa di Imola, 1502

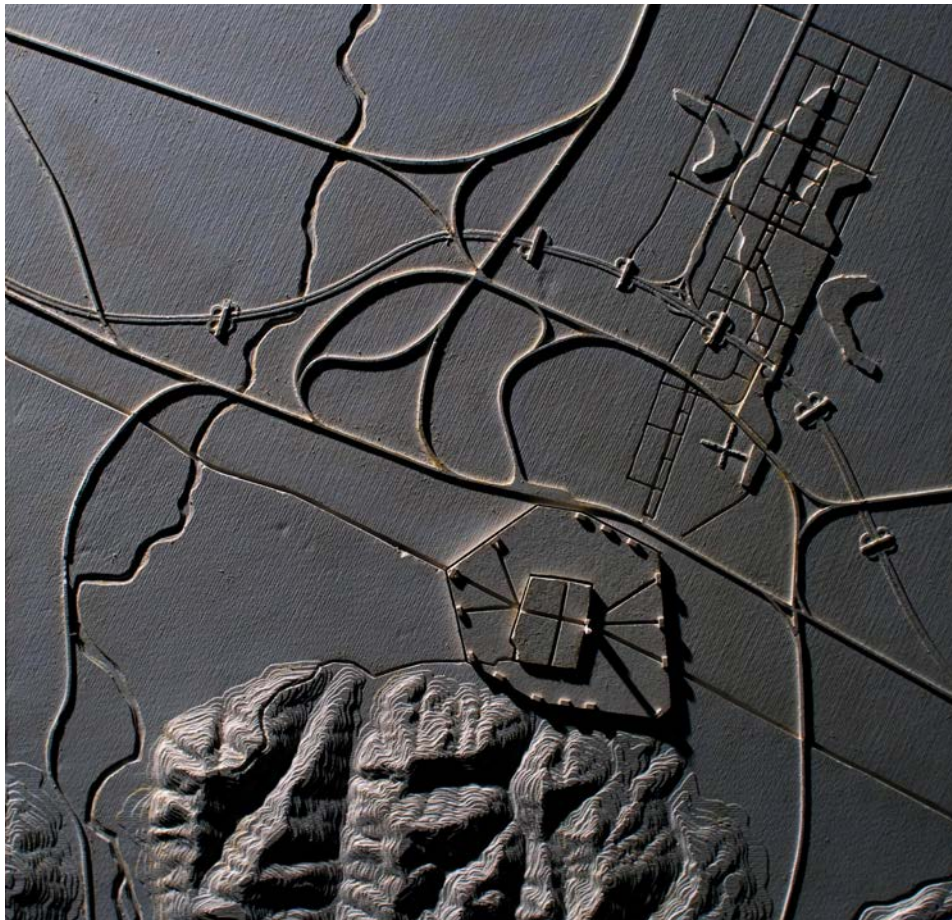


Figure 2. Lamberto Amistadi, Kuno Mayr, Bologna, 2008. Plaster model



**Figure 3.** Lamberto Amistadi, Drawing of Bologna with the Circle of Thousands (dashed red line in the center of the drawing), the Circla (continuous red line) and the monuments: 1. Monastery of San Domenico; 2. Monastery of San Francesco; 3. Monastery of Santa Maria dei Servi; 4. Convent of San Giuseppe; 5. Convent of the Santissima Annunziata at Porta Procula; 6. Monastery of San Michele in Bosco; 7. Margherita Gardens. Original drawing in 1:10,000 scale. ArchéA program

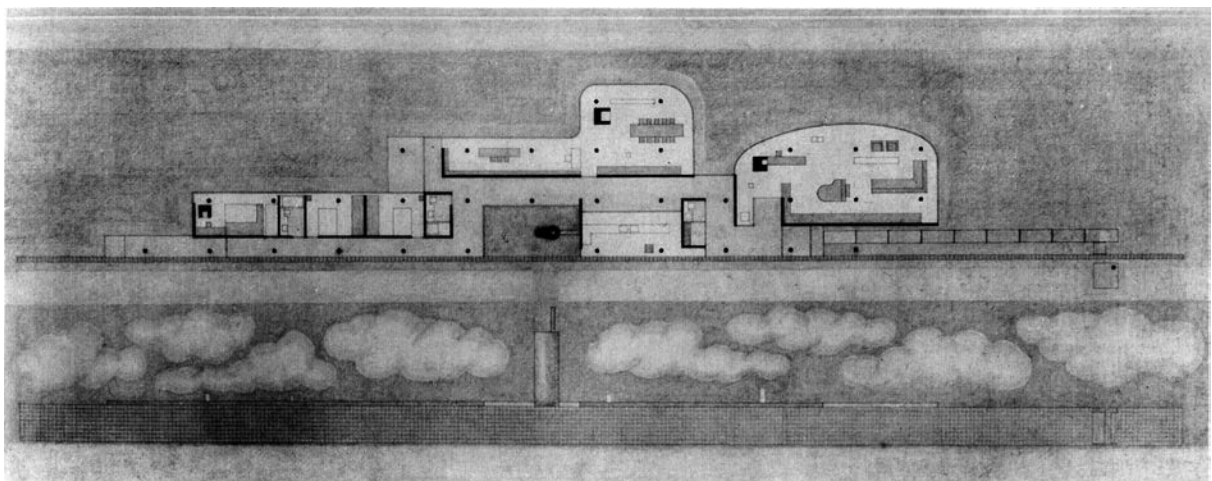


**Figure 4.** Saverio Muratori, Drawing of the four development phases of the San Bartolomio District in Venice. From *Studi per un'operante storia urbana di Venezia* (1960)





**Figure 5.** Saverio Muratori, Drawing of the second development phase of the San Bartolomio District in Venice. Interpretation by L. Amistadi



**Figure 6.** SJohn Hejduk, Grandfather Wall House, 1966-76

## Reading the Changing Urban Form of Siberian Cities.

Daria Belova

DiAP Department of Architecture and Design, Faculty of Architecture, Sapienza University of Rome (PhD student); The Institute of Architecture and Design, Siberian Federal University (docent)

E-mail: dariia.belova@gmail.com

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**Abstract.** *This paper is part of broader comparative research dedicated to cities sharing similar urban form and context. The selected case studies in Siberia, the first foundational cities along the route of the Siberian Tract were characterized by a similar environmental and geomorphological context. The identity of these cities is the result of a diachronic, gradual weaving of local spontaneous patterns with external cultural influences, and regular plans. The aim of this part of the research is to investigate the initial step of the formative process of cities in Siberia that have had a partly spontaneous and partly planned development. The study, based on the typomorphological reading, presents the chronological sequence of the first phase of urban form development of the Siberian city.*

## Introduction

Architectural studies of Siberian cities have mostly been devoted to the period of their development since the 19th century. A period in which settlements began to resemble cities, finally connected by roads with the central part of Russia, with new stone buildings and with industry beginning to develop. It should also be taken into account that the first phase of development of Siberian settlements left almost no obvious physical artefacts in the appearance of modern cities, e.g. wooden buildings disappeared, and road configurations underwent significant changes. It is quite understandable that the early phase is the one that interested historians and architects the most. Apparently, this period established some fundamental principles of the organisation of life in the Siberian city and left important traces that defined the current configurations, which certainly cannot be ignored.

Only a few historical documents and maps of the early period have survived. Practically, architectural research is significantly different from historical research and tends to be pre-design in nature, aiming to inform architectural practice: not everything can and should be accurately and historically documented. That is why it is useful to analyse, from this point of view, the few surviving maps, which have allowed, if not to draw an accurate and well-founded picture of the reality of the past, then at least to formulate hypotheses that could potentially enrich architectural practice today. In this case, historical maps can serve as an important source of information for the 'reading of urban form'.

The writer refers to the hypothesis that the identity of local places is the product of the exchange between local culture and external, dominant cultural influences (C.O Sauer, 1925). In fact, if we look at historical Siberian cities, it is apparent that they are the product of formal synthesis and interlacing of the reorganised and redesigned external models and types with a more 'spontaneous' (the main terminology in 'brackets' is borrowed from G. Caniggia's typology (Caniggia& Maffei, 2001) local settlement principles significantly intertwined throughout history, forming local identities.

The text is extracted from a broader comparative study, which is currently underway to define the types and ideas that shaped and influenced the development of Siberian cities and to determine how much influence external ideas and internal local patterns had. The given study focuses on the spontaneous development phase of the first wooden settlements in Siberia, which were also linked to types and models distilled from the local culture. Although this primitive matrix has only survived in very rare traces and no large-scale archaeological excavations have been carried out, it is extremely important to at least hypothetically fill in this blind spot, in order to give an idea of the historical development of the urban fabric and understand how people in this particular area shaped their space. This reading, which we define as operant (Muratori, *Studi per una storia operante di Roma*) should ultimately allow us to extract recurring behaviours and rules that are sustainable and valid for the contemporary city as well, which although have not attracted the attention of architects outside the historical perspective, and have been left out of projects, are extremely important for the preservation of local territorial identity and the continuity of environmental development.

A general framework of the ongoing research

The character of the development of Siberian cities has been different in comparison with the development of cities in Central Russia, i.e. Moscow, St Petersburg, etc. (Quilici, 1976). Siberian historians of architecture said that the construction of fortresses in Siberia has become a unique phenomenon in itself (Gorbachev et al., 2011). In the given research, the process of creation of the first Russian initially wooden settlements in Siberia is roughly divided into four large steps or periods (phases of typological formation):



1. The first period of development was constituted by wooden fortresses and growing village-like wooden settlements within the first wall and beyond ('small' and 'big' fortress respectively);
2. The second period was influenced by the experience of St. Petersburg, which in turn was inspired by a collective image of 'ideal' regular plans of European cities and parks; the period is known for the adaptation of 'classic' models and regular urban plans;
3. The third period started with the formation of the Soviet Union, was influenced by the ideas of 'ideal cities' and Soviet utopian top-down ideas, and resulted in supergrids, superblocks (Moudon, 2019) and collages of morphological regions;
4. Contemporary city has been developing like a collage (Rowe & Koetter, 1978) of different morphological regions, primarily since 1991.

The overall structure of the formative process resembles the one described by Caniggia, the main principles of which characterise 'spontaneous' formation stages nearly everywhere. However, it is important to have a profound immersion in these steps and see them in the detail, to grasp also the local identity formation. Each period can be potentially further divided into morphological sub-periods. The phase of typological transformation appeared in between the phases of formation. The Russian history in general it is possible to distinguish, so to speak, 'waves' of borrowing and searching for 'cultural' identities - phases of transformation and formation respectively. As for Siberia, which has always been characterized by strong inertia, waves reached it in a much less pronounced form, which means that large historical cities were characterized by relative continuity in comparison to the cities in the western part of Russia.

Historians said that the instructions for the builders of the first fortresses were sent by central governments: 'Apparently, there were abstract, imaginary models of fortresses oriented towards specific tasks. Depending on the initial, given parameters and taking into account local circumstances, the models became real. In the written instructions - letters and orders to governors and mayors, as a rule, the model of their behaviour on the place, beginning from the relations with natives and ending with the recommendations of how to build a fortress, indicating its parameters, harvesting methods, placing people and set of buildings inside the fortress, including the church and public buildings, was described in details. When the work was finished, schematic drawings showing the location of the fortress were sent to Moscow along with the report' (Gorbachev et al., 2011). The description of Gorbachev directly corresponds to the widely-accepted understanding of the notion of type (for instance in G. Caniggia): a record of collective experience (perhaps some collective image of the existing fortresses of the western part of Russia, which in turn arose under the influence of the long history of the construction of fortifications) that doesn't contain the precise parameters, but rather the main social, functional, cultural and technological ideas, which can be grounded differently on different geomorphologic situations, still forming collectively the type.

The type of first wooden Siberian fortresses can be easily interpolated based on graphical reconstructions made by such local historians as Gorbachev, V. T., Tsarev, V. I., Kradin, N. P., Kradin, N. N., Stepankaia, T. M., etc. The description of the first type of Siberian settlement can sound as follows. At the first step of the colonization of Siberia, rivers served as roads (intercity routes in urban morphology). The first Siberian wooden fortresses - so-called ostrogs - emerged as 'poles' - at the intersections of two or more 'rivers-roads' (many fortresses went roughly through several stages: from a fortified area - 'ostrog' to a city with log walls). The first small ostrog (as a rule, a quadrilateral) was usually built near the river, on the most elevated flat bank. The fortress towers, the residential building, prison, warehouses, customs buildings, administrative buildings, and churches - all were usually made based on the same 'basic cell'

- srub (different techniques existed), dictated by available building material - wood. The settlement inside the walled perimeter was spontaneous (in contrast with Roman fortresses).

### **Methodology of the case study: reading formative process**

The first maps (Fig. 1, 5) of all Siberian cities were more graphical interpretations of the cities than actual maps in today's terms. Several historical cities along the route of the Siberian Tract, which are characterized by the similar geomorphological context, are considered.

The maps of Irkutsk of 1784 stand-alone, it is one of the most detailed and precise, at the same time it is possible to notice that Irkutsk has experienced a minimal number of changes compared to other Siberian cities of that period. That's why Irkutsk with its early maps was selected as a basic case study for the research dedicated to the 'spontaneous' period of development beyond the city walls. Relying on the map of 1784, it is possible to reconstruct the basic logic of Irkutsk's development and compare it with several other Siberian cities to confirm the hypotheses. The time frame of this research is limited by the end of the step of dominating spontaneous development of the city - with the emergence of the first regular masterplans in all the described cities in the late 18th century.

At first sight, it is quite difficult to define whether the mentioned map of Irkutsk of 1784 was distorted in relation to the current map or whether it was the physical form itself, which changed over time. However, even though the blocks changed configurations and internal boundaries, their number and position remained roughly the same. In fact, no quarters have survived completely within the historic part of the city, within the footprint of the former city wall. Besides, in 1879, a fire destroyed the city again, and the provincial archive died as well, destroying memory, which makes it difficult to confirm or disprove the results of the morphological reading of the map. However, many directions of the map of 1784 have survived in the orientation of houses, fragments of plots, often in the depth of blocks, and look illogical in today's city, but can be explained by the map of 1784 - they have retained past directions. Such buildings and plots helped to align, somewhat re-drawing the map of 1784 block-by-block, so that the distorted blocks depicted on it aligned with today's buildings and plots (Fig.3). In Figure 3, lines, contours and directions that still exist or left traces on the modern cadastral map and aerophotomap are highlighted in blue. These lines have served as milestones or reference lines for linking fragments of quite significantly distorted historic cadastral map to the existing one in order to establish correspondences and restructured elements. Red lines don't correspond or are aligned to any existing elements. Arrays of lines of red or blue colours show how much the areas of the historic centre have been altered and changed, and suggest the dimensions and configurations that actually existed before (Fig.3).

The following morphological reading allows us to suggest a preliminary hypothesis of the typological formation of the Siberian city of the first period, which can be confirmed by comparison with the other Siberian cities and historical descriptions.

### **Context**

Mostly, the locations of the first Siberian settlements shared similar geomorphological characteristics. Irkutsk is one of the largest and most important historical cities in Eastern Siberia, currently with a population of more than 600 000 people. Like many Siberian cities, it is located on the banks of the River called the Angara, at its confluence with the rivers Irkut and Ushakovka, around 60 km from famous Lake Baikal. The climate is sharply continental, and earthquakes are regular: 'It is located on the Angara, on the picturesque spurs of the mountains, surrounded by taiga. The planning structure of the city is extremely fragmented: three rivers, floodplain areas,

mountains, a railway, industrial enterprises, seismically active zones and faults.' (Gorbachev et al., 2011). The first settlement of Irkutsk was located on a flat platform, at a place where the main river makes a sharp turn. Like other Siberian cities, Irkutsk was founded as a wooden fortress - 'ostrog', presumably in 1661 (Several researchers attribute the emergence of Irkutsk to 1620, others believe that in the 1650s when the Russian winter settlements appeared), with the aim to collect yasak (a form of 'taxes') and to control borders. Being largely wooden in its first period, the first settlement was damaged or even destroyed by frequent fires, the largest was in 1716 and 1879. Similarly to the other cases of Siberian wooden settlements, these fires influenced the city's urban form, but not as much as, for instance, in Krasnoyarsk. Following the fate of many Siberian cities in the XVII-XVIII centuries, Irkutsk flourished in the Siberian gold industry.

## Results and discussion

As can be seen on the maps, in the XVIII century, the streets of Irkutsk remained curved, and spontaneously developed. In the 1760s, the first Irkutsk governor wanted to 'to improve the city' straightening the existing streets: Ogly stated: 'In 1768, the first plan of Irkutsk was drawn up in the local drawing agency, indicating territories for handicraft and other industries, administrative and trading centres, a complex of existing stone church buildings. In 1792, Catherine II approved the first regular plan of Irkutsk, executed by the local provincial architect A. Alekseyev. The plan preserved the planning basis of the old part and outlined a clearer rectangular structure in the new areas, beyond the line of the former 'posad'. By the end of the century, with the strengthening of trade ties, Irkutsk was developing geographically along the main directions of trade and postal routes - Moscow, Yakutsk, Baikal, where suburbs and working settlements are being formed.' (Ogly, 1980)

The given map of Irkutsk allows suggesting the following steps of formation of the first settlement beyond the first city walls, based on the criteria described by G. Caniggia, using the method of morphological reading (Fig. 6 a-b):

- 0 step: a wooden fortress and the road, which connected this fortress with other settlements are visible; the direction of the road was conditioned by the presence of a hill, which had to be bypassed, at the southern end.
- 1 step: formation of the 'spontaneous' settlement with fortress as the main polarity, connected with the trade square by matrix road, and with several nodal points (churches), which were interconnected by secondary roads; the moat outside the city wall is clearly visible, hatched in grey; the outer roads determined the positions of the city gates, while the city gates determined the position of, for example, the monastery to the east (this situation is visible also on the map of 1729 (Fig. 4)).
- 2 step: further densification and formation of 'building roads' - some of them were perpendicular to the secondary roads, some parallel.
- 3 step: the city wall disappeared and the plots previously adjacent to it formed a band of pertinence for new roads, which replaced the wall; new pertinence appeared on the other side of that roads; the formation of roads outside the former walled city began.
- 4-5 step: new nodes started to appear beyond the city wall - market, churches, military centre, etc.; 'building roads' are mostly parallel to the matrix and orthogonal to the city wall and moat.
- 6 step: the former moat previously filled with water was becoming a road connecting new nodes, which appeared near it; the new road due to the irregularity of pertinent plots resembles the restructuring road; the first fragment of a masterplan and the orthogonal grid is visible.

The described step of development could be summarised as follows. During the development of the settlement beyond the city walls, the main 'polarity' appeared near the main ostrog, it might include the market square with associated buildings, the cathedral and administrative buildings. Inner 'matrix' road usually connected the 'main pole' with the 'secondary pole' - trade square or the church square, and with city gates. One or several new nodes were usually interconnected and marked by churches. Positions of city gates were defined by external roads. One of the gates was usually marked by a monastery located nearby. The growing settlement behind the first fortress was based on the 'spontaneous' principle (Caniggia & Maffei, 2001), in contrast, for instance, to Roman colonial settlements (e.g. Bonn). Directions of external roads, their positions and configurations defined main inner roads. The places of former city walls were usually later transformed into roads. River banks had an 'antipolar' character - a smooth connection with nature. The physical limits of this step were determined by the limits of the natural flat platform. This period already formed such 'natural' features of Russian city as urban 'void' - empty field within the city, or meadow separating city wall from quarters of estates, etc., and the 'poetic' or even 'melancholic' connection of settlement with the landscape. All the above can be proved by the analysis of three more Siberian cities of the same time. For instance, a presumable formative process in Krasnoyarsk had a similar character (Fig. 7).

The analysis clearly shows the existence of a 'spontaneous' stage in the development of the first Siberian settlements, most of the patterns of which correspond to the description of the principle of formation given by G. Caniggia and characterise urban development in different cultures. The fact that the configurations present on the cadastral map of Irkutsk in the late 18th century still determine the directions and configurations of the existing urban fabric supports the idea that the described stage left no physical artefacts, but largely determined the current urban fabric. Next, even a cursory glance at the later historical maps of Krasnoyarsk illustrates the hypothesis of the interweaving of the superimposed regular plans and the previously established spontaneous principle of development (Fig. 8).

## Conclusions

The hypothesis that the identity of local places in Siberia is made up of a diachronic, gradual weaving together of local spontaneous patterns and various kinds of external cultural influences, needs two steps to prove. First, local spontaneous vernacular patterns should be excerpted. Second, the study should gradually demonstrate how ideal regular plans landed in the spontaneously developed settlement.

Spontaneous steps of the development of wooden Siberian settlements hardly left any physical artefacts; only a few maps of the period survived. That is why it is difficult to restore the exact sequence of the first stage of development. However, the methods of morphological reading (Caniggia), being applied to these survived maps, can help to excerpt the main logic of the diachronic formative process common to many different cultures, and to define local specificities, which determined the further development and even lifestyle, being multilayered, belonging to type. These specificities and common formative principles (i.e. parallel building roads, distribution of public and private spaces, local building types, specificity of densification, etc.) intertwined with every step of regular and 'ideal' planning, forming local identities and local tradition. That is why it is safe to say that various ideal and regular models 'landed' differently in Siberian cities, being influenced by the persistence of this vernacular tradition and geomorphology. It will be task of the next step is to determine how elements of local culture and imported cultures were intertwined.

The described period laid down some important physical traces in a Siberian city, which can explain current configurations and directions, scale, the definition of public and private spaces, etc., that's why it cannot be ignored. Morphological reading revealed the first 'symptoms' of local identity: the introversive quarters of the communities of the northern type of courtyard wooden houses bonded in the spontaneous tissue, in which the role of urban void 'embodied' in the improporionally wide roads framed not by continuous facades, but mostly by the rhythm of wooden facades and fences; giant squares without particular program, also not framed by facades; spontaneously landscaped gardens, river banks provided the connection to nature, etc. The density of Siberian cities was lower than the density in central Russia. Further research is required to finally broaden the list of morphological specificities, which are the result of intertwining the superimposed regular and the spontaneous vernacular development.

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## Illustrations and Tables

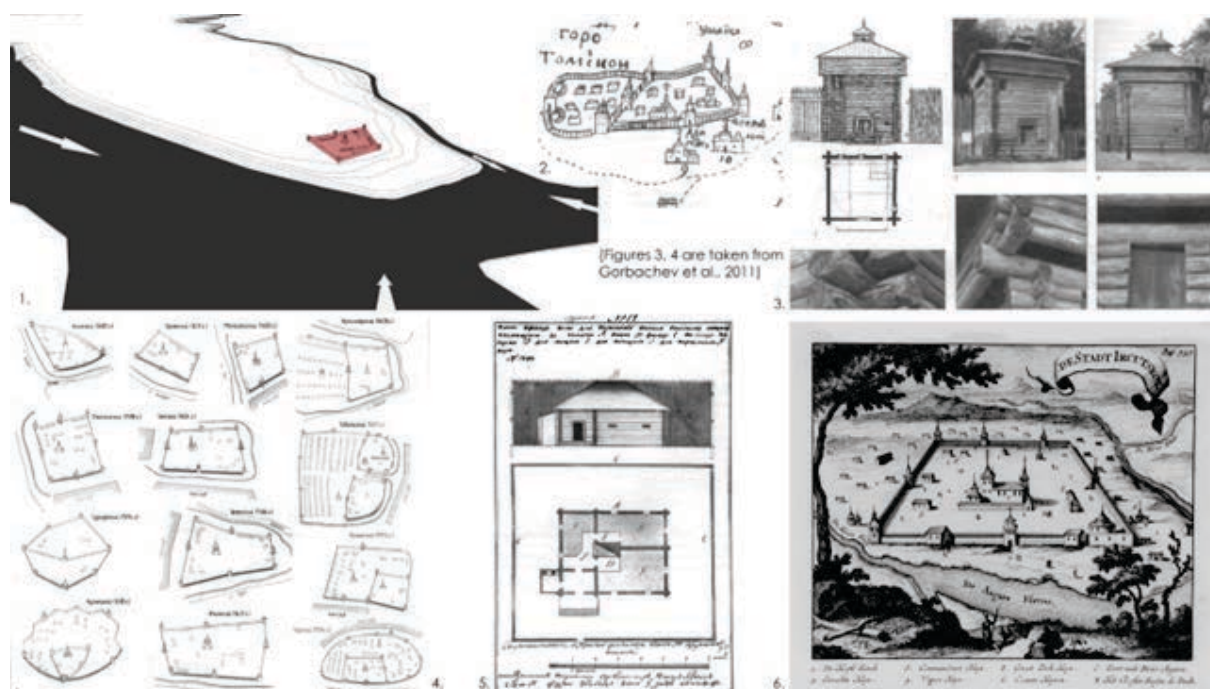




Figure 3. The methodology of map adaptation: three steps.

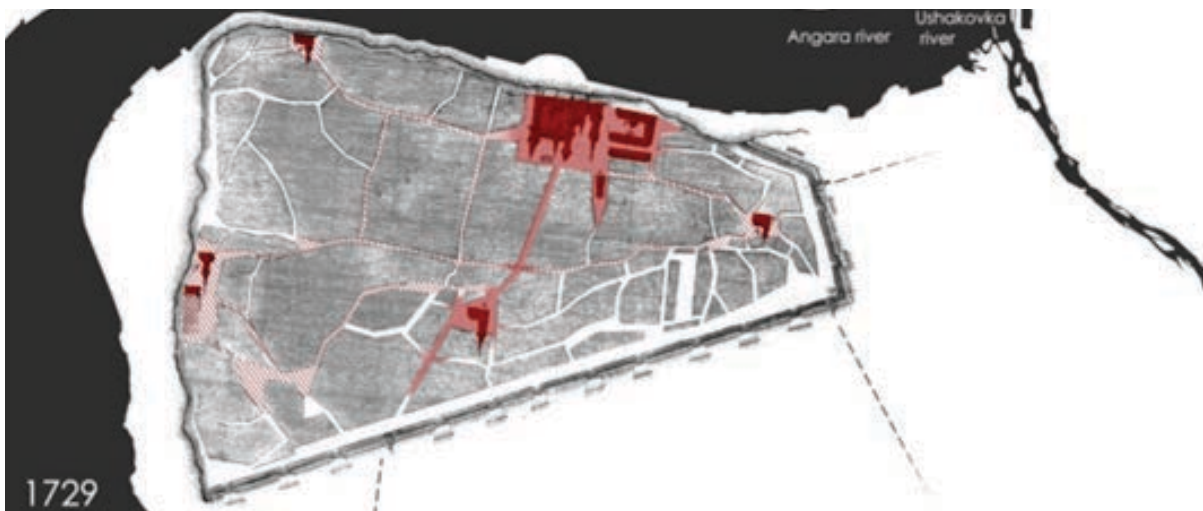
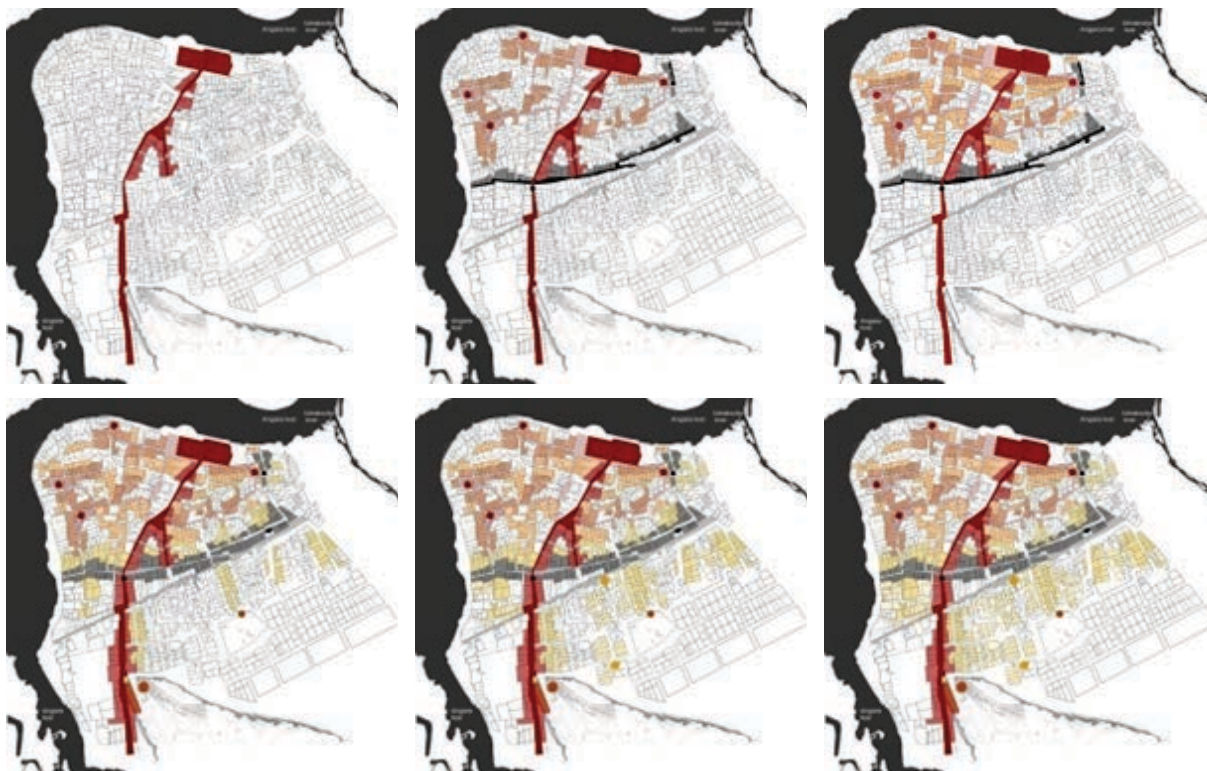


Figure 4. The first Irkutsk map of 1729 - was distorted and analysed. The main 'polarities' and the 'matrix road' are marked in red. The hatching indicates secondary roads and nodes.



Figure 5. Formative stage of the first period: scheme and historical maps of Yeniseisk, Krasnoyarsk, Irkutsk, Tomsk (model by D. Belova, historical maps provided by local museums).

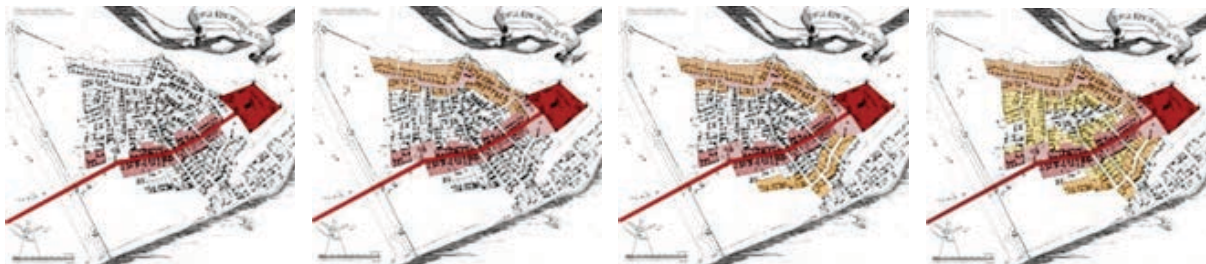




**Figure 6a.** The hypothetical steps of the formative process of Irkutsk before 1784.



**Figure 6b.** The final hypothetical step of the formative process of Irkutsk before 1784



**Figure 7.** Formative process of Krasnoyarsk before 1748 (based on the reconstruction of E. M. Panov).



**Figure 8.** The example of the intertwining of the regular masterplan and 'spontaneous' reality in Krasnoyarsk (fragments of maps of 1828, 1852, 1967).





## The formation process the Regio quartadecima Constantinopolitana. Relocating Constantine's walls.

Alessandro Camiz

Özyeğin University (Department of Architecture), Nişantepe Mahallesi, Orman Sokak, No: 34-36, 34794 Çekmeköy, İstanbul, Turkey

E-mail: alessandro.camiz@ozyegin.edu.tr

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Conference theme: Reading the Changing Urban Form

**Abstract.** The paper addresses the reconstruction of the formation process of the fourteenth region (Regio quartadecima) of Constantinople by using the available documental sources and archaeological data and by processing them by applying the urban morphology analysis methods, such as the cyclical inversion of limits and poles, the orientation analysis and the attraction analysis (Caniggia, 1976) (Strappa, Ieva and Dimatteo, 2003) (Camiz, 2018). Within the buildings mentioned in the Notitia urbis constantinopolitanae, none of which have been localised with certainty yet, we tentatively localised some monuments in reference to the morphology of the territory as described by Dionysius of Byzantium. The form of the site is the only permanent element in a context of continuous changes, demolitions and reconstructions. The Pontem sublicium sive ligneum was part of a street grid system: we localised it following the individuated formation process of the territorial organism, as the starting point for the reconstruction of the topographic mosaic. The analysis of building types, the orientation of urban tissues, and the hierarchy of paths together with the reconstruction of the territorial organism provided the general methodological framework for the placement of the main monuments mentioned in the Notitia Urbis Constantinopolitana within an interoperable GIS which applied predictive models and was able to redefine the position of Constantine's walls. This paper is part of a wider research project on the topography of Constantinople (Camiz, Özkuvancı and Verdiani, 2019) outlining by comparison the formation process of the Regio tertiadecima (Galata) (Saglam, 2018).

## Introductions

This paper is part of an ongoing wider research project on the topography of Byzantine Constantinople (Camiz, Özkuvancı and Verdiani, 2019) and is based on the morphological analysis of urban tissues, the attraction analysis of the diachronic evolution of street networks, combined with archaeological data, geological data, historical sources, cadastral plans and numismatic sources in order to create, using a GIS, a predictive model for the localisation of the buildings mentioned in the *Notitia Urbis Constantinopolitana*. The XIII region, also known as Galata or Pera, is across the Golden Horn, the XIV region is instead the territory of the historic peninsula delimited by the Constantinian walls and the Theodosian walls.

## Methodology

The cyclical limit and centre inversion was theorised by Caniggia and Maffei (1979) and it assumes that the evolution of an urban organism follows different phases and each part is added to the other so that what used to be the limit becomes the centre in the following configuration.

The authors illustrated different examples in relation to the site's morphology, in valleys, on the mountains or next to a river's, sea or lake shore. Pera's configuration resembles closely the scheme provided by Caniggia and Maffei (1979) for an urban settlement along the shore. Figure 2 illustrates the formation process of Constantinople through 1500 years in 4 phases, starting from the earliest foundation of Byzantium as a Megarean colony (VII BC). In phase 1 the original walls of Byzantium are outlined, and in the next phase what used to be the gate of the city became the centre. It is the location of today's Hagia Sophia which was built much later. In the following phase that gate became the Tetrastoon and later the Augusteion. What used to be the limit became the centre. In the III century Septimius Severus built new city walls and gates, and in the following urban enlargement, the main gate along the Mese became the new centre, the forum of Constantine the great. The following step was the construction of the Theodosian walls (404-413), but the location of the new forum of Arcadius does not correspond with the Golden gate along the earlier city limit of the Constantinian walls as we know them (Mango, 1985). So either the theory is wrong or the location of the walls should be updated. The XIII region as depicted in Buondelmonti's city view (fig. 1, right) shows the walls of Pera built in the XIV century as the continuation in plan of the Theodosian walls. This is not true, you can see the real proportion instead in figure 2. Either this plan is a collage of two different plans to fit the drawing or there is something wrong with the drawing itself. Instead, if we continue the Theodosian walls on the opposite side of the Golden Horn we would obtain a limit corresponding to where Taksim square is today. The XIII region is described in the *Notitia Urbis Constantinopolitana* including: 431 houses, 2 porticoes, 5 private baths, a church, the *thermae*, the forum of Honorius, a theatre and the shipyards. Figure 1 (centre) shows in blue the archaeological evidence of some tombs, and in red the location according to written sources of Greek temples dating to the Megarean phase: the temple of Venus Placide, the temple of Diana Lucifera and the Aianton (Dallegio d'Alessio, 1946). These were compared with the population's distribution according the survey established by the Ottomans after capturing Constantinople, showing the location of the Greek community (Eldem, 1993). This overlaps with the position of the early Megarean monuments. We may therefore assume that Argyropolis was established in that area as the first colony.

The subsequent growth phases of the XIII region, Justinianopolis, follows the Byzantium's evolution with the direction of the streets parallel to those on the opposite side of the Golden Horn. Tentatively we reconstructed the evolution of the XIII region in analogy to what is known on the opposite side. The theory of attractors (Camiz, 2018) has been introduced to explain the

diachronic evolution of routes, describing how streets change in time according to the attractors deforming their path in time. The description of the XIV region in the Notitia gives important morphological indications: "Est vero progressus a porta modicum situ planum, dextro autem latere in clivum surgente usque ad medium fere plateae spatium nimis pronum; unde mare usque mediocris haec, quae civitatis continet partem, explicatur aequalitas", outside of the gate we have a valley, a flat area and on the right side climbing uphill and reaching the top, we can go to all the way to the other side. The position of this gate and of the flat area is not clear not yet, but our reconstruction provided a coherent interpretation for it. The limits of the XIV region have been discussed in the last 400 years, where Du Cange (1826) believed that the XIV, XII and XI were all included in the area between the Theodosian and the Constantinian walls, but more recently Schneider (1950) has clarified that the XIV region corresponded to the entire territory between the two walls.

In the XIV region according to the Notitia, there was a church (ecclesiam) a palace, a nymphaeum, thermas, theatrum, lusorium (hippodrome) and a bridge, a wooden bridge, plus 11 streets, 167 houses, two porticoes and five baths. The bridge could only have been across the Golden horn, connecting the XIII and XIV region. It is quite evident that the name pons sublicius was meant to be the replica of the Roman pons sublicius, the earliest bridge of Rome, also a wooden bridge, on which Horatius Cocles defended heroically the city according to Titus Livius.

The exact location of this Roman Bridge is still under discussion, with Tucci (2012) as last proposal, anyhow it was connecting the XIV region Transtiberim with the XIII region Aventinus of Rome, just like the bridge with the same name in Constantinople was connecting the XIII and XIV region. In 330 AD, following the city refoundation by Constantine, a coin was minted in Constantinople depicting a bridge, which has been interpreted as the Milvian Bridge in Rome. This interpretation is very unlikely because the coin shows a wooden bridge whereas the Milvian Bridge is in masonry. It should be interpreted instead as a bridge in Constantinople, more coherently with the foundation: why depict a building of another city in the time of the transformation of Constantinople into the new capital of the Roman Empire? Analysing the description of Dyonisius of Byzantion (Reitemeier, 1784) it was possible to localise the toponyms mentioned therein along the Golden Horn including a bridge, built by Philippus II in 340 BC. According to the reconstruction of the territorial organism (fig. 1, left) we tentatively placed the bridge along the shortest path across the Golden Horn so to connect the territorial routes from either side. Surprisingly that location found correspondence in the bathygraphy of the Golden Horn where you can still recognise underwater the 2 submerged piers, also clearly represented in the coin. Moreover Gyllius described the location of the bridge noting that he could still see the foundations of the piers "ubi prope fundamenta pilarum pontis videtur" (Gyllius, 1611: 10) confirming our interpretation. Constantine the great in 324 AD on November 11th refounded the city with the construction of new walls. Their path is described in the Patria Constantinopoleos by listing the buildings along those walls in the X century, some 600 years after the walls were built. None of those buildings existed at the time of Roman Constantinople, neither the walls existed anymore at that time as they collapsed following the earthquake of 447 AD, and furthermore none of the buildings listed in Notitia exist anymore today. In fact the Patria is describing the walls according to the topography of the X century, so it is indeed very difficult to locate the line of the walls today. But Vavassore in his perspective drawing illustrates the walls including gates and towers, providing a hint for their position as a continuation of the western edge of the harbour of Theodosius. The buildings mentioned in Patria are listed in table 1, and the previous topographical reconstructions of the walls are all based on the Isa Kapi

mosque (Jesus gate in Turkish) assuming that this place name corresponded with the Golden Gate's position. If the walls and the Golden Gate were located here, it would not correspond with the position of the forum of Arcadius, contradicting the centre limit inversion theory. By analysing quantitative data from the historical sources we could redefine the location of that Gate. Zosimus (2, 40, 4) mentions the distance between the two sets of walls as 15 stadia (fig. 3, upper left) corresponding to the forum of Arcadius. The Notitia indicates 14.075 feet from the tip of the peninsula to Constantine's walls, which measured along the Mese also corresponds again to the location of the forum of Arcadius (fig. 3, upper right). Furthermore the Patria describes the foundation of the city including details about the stonecutters cutting out the side of the mountain along the walls, and the geological map shows (in red, fig. 4, centre) some geometrical cuts in the rock corresponding with that description, and their position is again along the path that other sources suggest. Finally the morphological analysis of the street network on the German map of 1913, (fig. 4, right) shows a regular grid on the inside with a typical Roman block measure of 240 feet (71 m), and a very organic pattern on the outside of a dividing line (in yellow) matching the location given by quantitative data.

## Conclusions

Following these considerations it was possible to relocate the walls (fig. 6, red line) confirming the centre limit inversion theory: the limit given by the walls became the new centre in the next phase with the forum of Arcadius. This interpretation was confirmed by archaeological findings, recently next the western edge of the harbour of Theodosius archaeologists uncovered the junction between the Constantine walls and the Theodosian walls. On this updated information we based a predictive model for the localisation of the buildings listed in the Notitia using an algorithm which would require more space to be described in detail. We localised the buildings listed in the Notitia (fig. 6, in grey): the church of the forerunner next to the gate of the prodromos, the nymphaeum and the theatre. For the palatium we found 4 possible locations, based on the morphological analysis, the orientation, and the probable connection with the water distribution system. The lusorium was localised along the longest straight street in Constantinople, along the bottom of the Lycus valley in analogy to the location of the Circus Maximus in Rome. The baths have seven possible locations in relationship with the water distribution system, so their position was not determined with certainty. The Sigma, a columned street in the form of the lowercase crescent S in the Greek alphabet which is listed in the Book of ceremonies, is clearly still recognisable in the urban tissue. (Berger, 1996).

Finally by examining Constantine's urban project we noticed that the orientation of the Mese, turning to that direction after the forum of the Oxen, is  $232^\circ$ , corresponding to the sunset on the day of the foundation, 26 November 324 AD. The foundation of the new capital of the empire was done following the Roman pagan tradition or orienting the main street on the sunset of the foundation day. Like in Rome, the via sacra and the structure of the forum is directed towards the sunset on the foundation day (April 21st, 754 BC) (Camiz, 2004). Therefore the foundation was entirely pagan, in fact at that time Constantine was not a Christian yet, he was baptised on the bed of death. One of the foundation coins (fig. 5, left) shows the Golden Gate with the sun represented above, and another one the Angel planting the spear in the earth. This corresponds with the Patria's narrative of an Angel indicating in such a way to the emperor the location of the new walls. Finally we know that Justinian, in 537 AD, after conquering Ravenna from the Goths redesigned the city walls following the model of Constantinople. There the 12 numeri, corresponded to 12 groups of soldiers each guarding one section of the walls. Consequently we can assume that the place names proton, deuteron, triton, tetraton,

pempton, exon and hebdomon, were located accordingly in Constantinople (fig. 6). Using the GIS we located the sequence of the different city limits, the position of the main roads, the bridge, the main buildings, the main gates and a set of praedial place names, ta rodanou, tra probou, ta dominiou, ta prothasiou, corresponding to the 12 generals which Constantine brought from Rome and to whom he gave a plot for their domus in order to build the new Rome as much as possible similar to old Rome.

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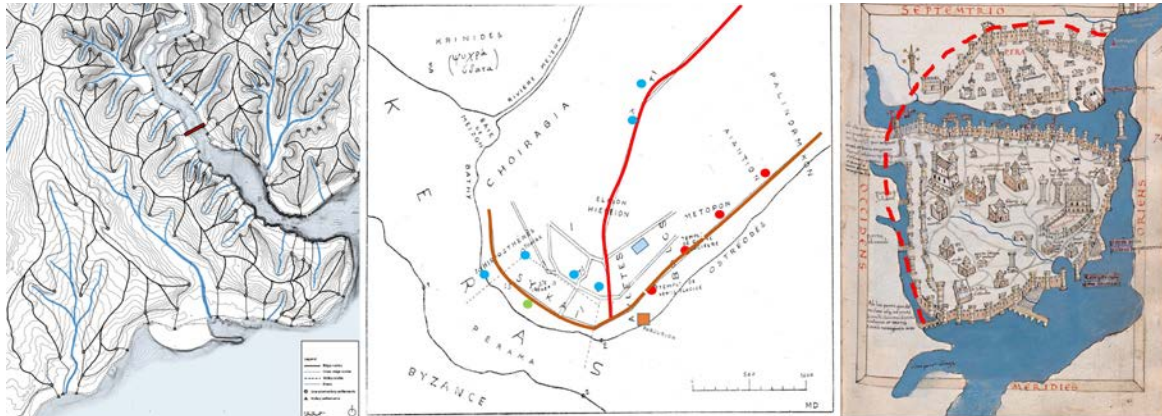


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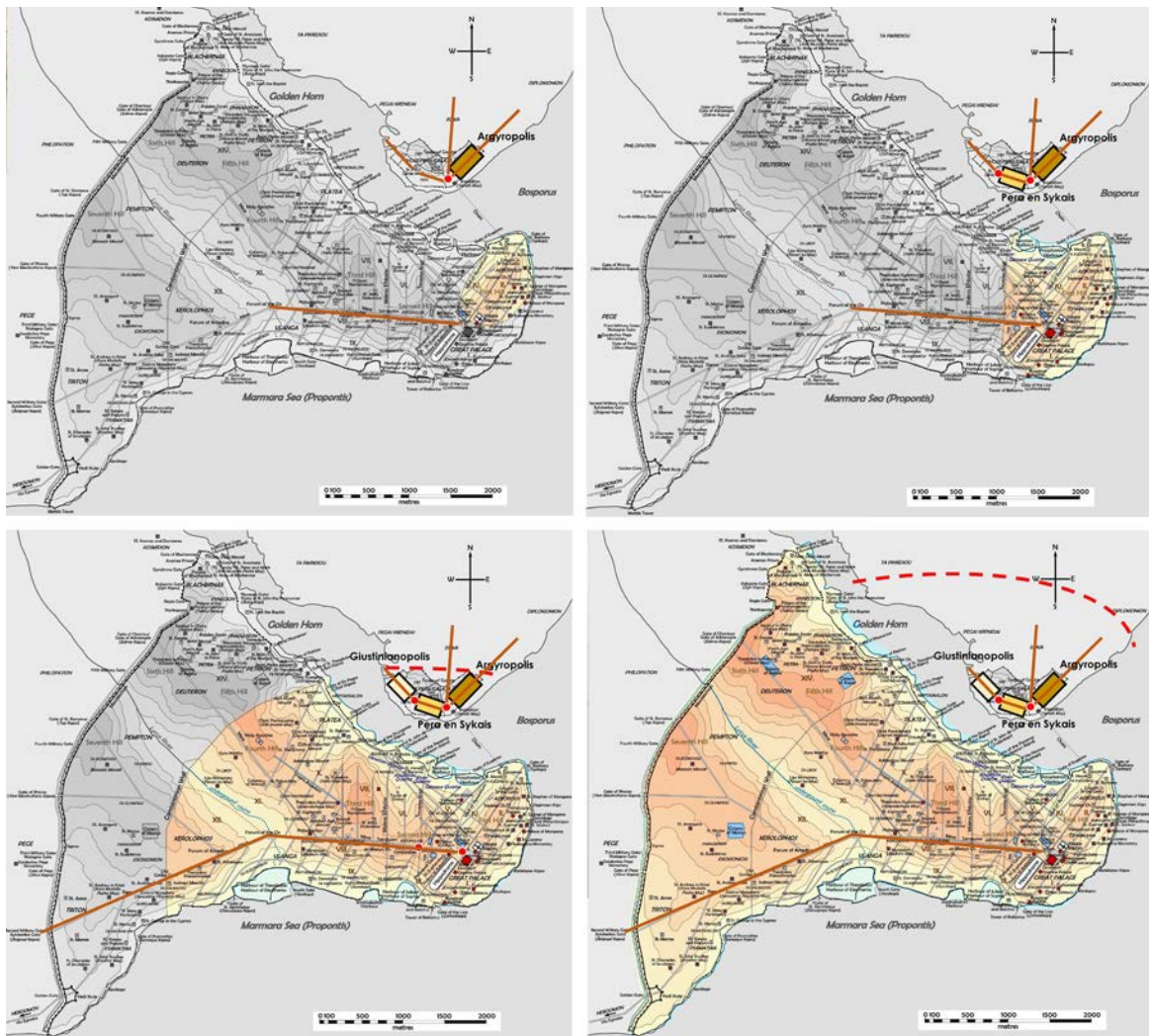
## Illustration and Tables

	<b>Patria, 995 AD (Preger, 1901)</b>	<b>Patria, Codinus, XIV cent. (Bekker, 1843)</b>
Sea walls north	Tower of Eugenios	Acropolis
	S. Antonios	Tower of s. Eugenios
Sea walls south		Zeugma s. Antonii
	Topoi	A Topis
	S. Marv of the rod	S. Marv of the rod
Land walls	Rod	
	Exakoinion	Hexacionium et miliario
	Old gate of John prodromos	Old gate of John prodromos
	Monasterv of Dios	Monasterv of Studii
	Monasterv of Iksia	Monasterv of Iksia
	Cistern of Bonos	Ad cisternam Boni
	S. Manuel and Samuel and Ismael	Templum ss. Martvrum Manuel. Sabel et Ismael
	Ta Armatiou (s. Antonios)	Armari (s. Antonios)

**Table 1.** Constantine's walls path according to the editions of the *Patria Konstantinopoleos*

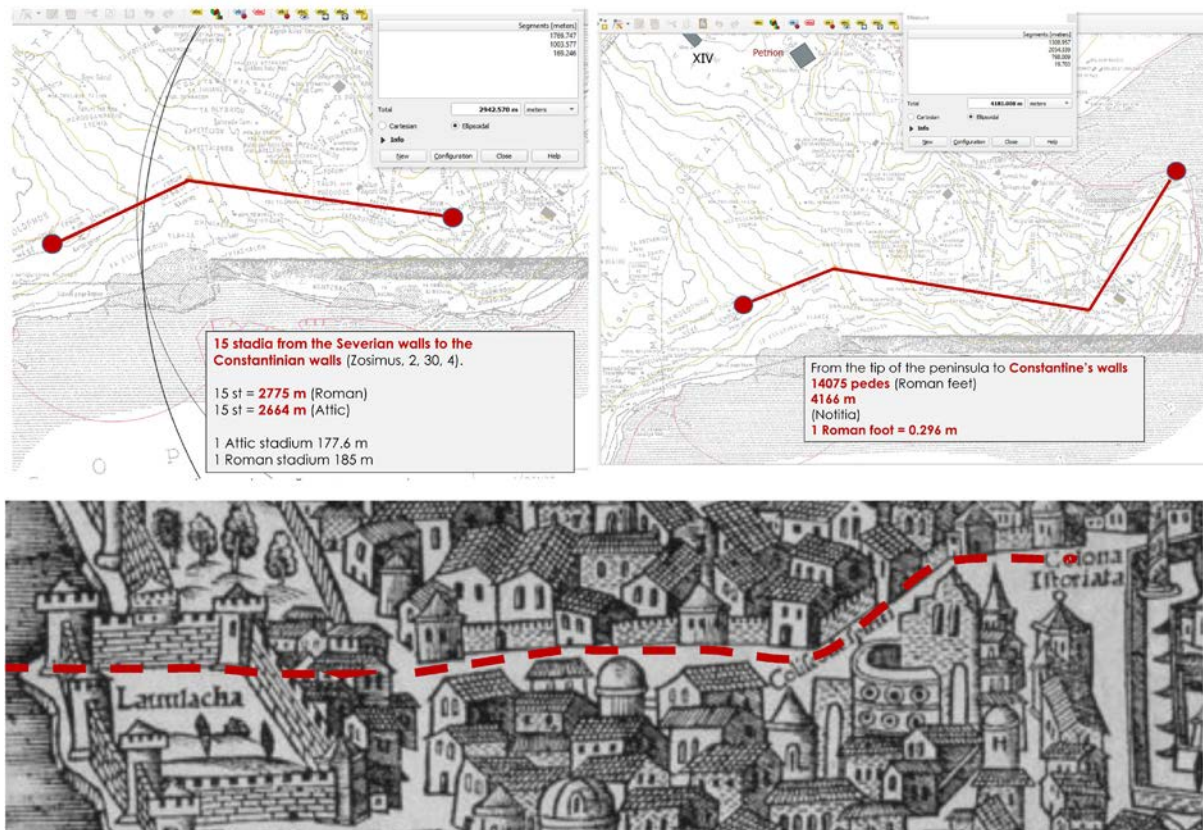


**Figure 1.** Left: Istanbul, formation process of the territorial organism (Özkuvancı, 2021); centre: Galata's plan showing in red the Megarean monuments, in blue the tombs (Dallegio d'Alessio, 1946); right: the curious mistaken alignment of the Theodosian land walls and Galata walls (Buondelmonti, 1470).



**Figure 2.** Cyclical inversion of limits and centres, comparing the XIII and XIV regions of Constantinople; upper left: Megarean foundation, VII cent. BC; upper right: Severan expansion, III cent. AD; lower left: Constantinian refoundation 324 AD; lower right: Theodosian walls, 404-413 AD (Author's drawings, 2021, on Constantinople in the Byzantine period (2008) [https://en.wikipedia.org/wiki/File:Byzantine\\_Constantinople-en.png](https://en.wikipedia.org/wiki/File:Byzantine_Constantinople-en.png)).

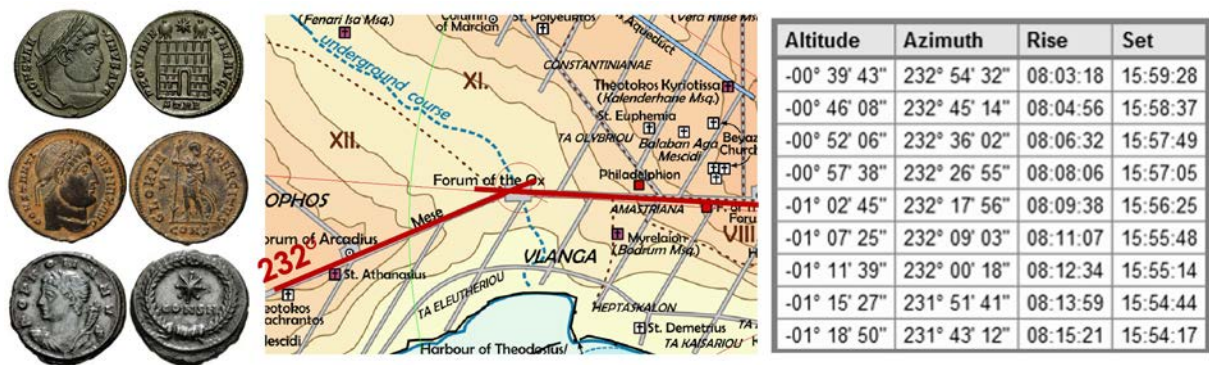




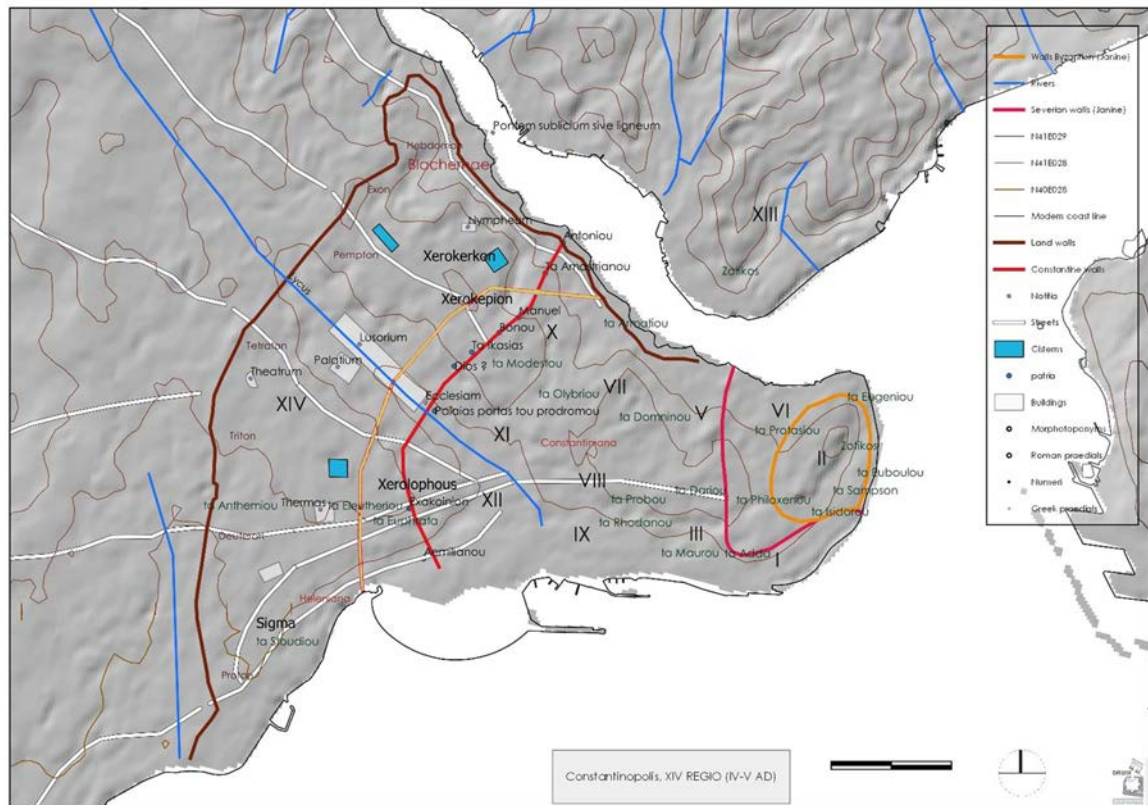
**Figure 3.** Above left: Distance between the Constantinian and the Severian walls (Zosimus); above right: distance between the Constantinian walls and the peninsula's tip (Notitia), QGIS version 2.18.27. Las Palmas de G.C. (Author's drawing, 2021); below: dashed red line outlining the path of Constantine's walls, Vavassore, G.A. (1479-1490) Byzantium sive Constantineopolis, detail.



**Figure 4.** Left: Constantine's walls (Preger, 1910) in red our proposal including the Golden gate; centre: the rock cuts evidenced (in red), Fener's Geological Map, <https://gis.fatih.bel.tr/webgis/>; right: regular grid and organic tissue (in red), the dividing line (in yellow) interpreted as the path of Constantine's walls (Alman Mavileri, 1913-1914) <https://gis.fatih.bel.tr/webgis/>.



**Figure 5.** Left: Constantinople foundation coins; centre: the Mese changes direction to 232° after the Forum of the Ox; right: sun ephemeris on the city's refoundation, 26/11/324 AD, 2nd indiction, 5837, 1, CCLXV Olympiad (Patria) (SkyMap Pro v 9.0.9, Copyright 1992-2002 C. A. Mariott).



**Figure 6.** Historical GIS with the indication of the city walls (in red our proposal for Constantine's walls), the buildings listed in the Notitia, the regions, the noumeroi and the praedial toponyms, QGIS version 2.18.27. Las Palmas de G.C. (Author's drawing, 2021).





## Novi sed antiqui methods and techniques for urban analysis and project. Knowledge and design for the Vkhutemas museum in Moscow

Renato Capozzi<sup>1</sup>, Federica Visconti<sup>2</sup>

<sup>1,2</sup> Dipartimento di Architettura. Università degli Studi di Napoli "Federico II". Napoli. Via Toledo, 402. 80134

E-mail: <sup>1</sup>renato.capozzi@unina.it, <sup>2</sup>federica.visconti@unina.it

Keywords: Urban analysis, theory, urban form, urban project  
Conference theme: Reading the Changing Urban Form

**Abstract.** The city is, not only an organism, but above all, a "slow construction", a "great architecture", and a "deposit of efforts". It can change over time but with some inertia and sudden accelerations. The city is built through fixed points, parts and gaps, in a strict relationship with the forms of the earth, the geography and pieces of nature. In this sense, Moscow is a clear example of radio-centric city crossed by a river, from which it takes its name, that, at the territorial scale, is innervated of green wedges that reach the center. The Gorky Park represents the head of a wider natural corridor that gradually opens to the south following the river bend up to Passeri hill. For this urban part, in the consultation for the project of the Vkhutemas museum – proposed by PhD course in architectural composition of the IUAV of Venice –, a set of analytical methods and techniques was developed aiming at understanding the morphological characters of the study area. The canonical investigations on the formal, geomorphological characteristics of the natural system and fabrics have been placed side by side spatial analyses and "exercises of measurement" as a specific and fertile ways of knowing places, fabrics and urban facts, the relationship between primary elements, through already known forms. The known urban systems, their figural structure, can verify in re the possibilities of renewal of the urban form and of the increasingly consistent city-nature relationship, between urban compositions and open spaces. A method and a technique that call into question the analogue thinking, in addition to the logical one, as the trigger of the invention but also as a specific way of knowing.

## Introduction

The here presented case-study – of analysis and design – represented an opportunity for a reflection on urban form (Capozzi and Visconti, 2022) and its transformation in relationship with the ways of architectural composition within an activity of the national coordination of PhDs in Architectural and Urban Composition promoted by the PhD School of the IUAV University of Venice, involving the PhD program in Architecture and Construction of the University of “Sapienza” University of Rome, the PhD program in Architecture of the University of Naples “Federico II” and the PhD program in Knowledge and Innovation for the Heritage Project of the Polytechnic of Bari. The group, which had already worked on the city of Berlin in response to the call of the Deutscher Werkbund on Berlin West (Dal Fabbro and Pirina, 2020), selected the city of Moscow as the place for the second experimentation experience and in particular the theme offered by the competition for Vkhutemas museum which offered many possibilities in relationship to different places in the Russian capital. The national coordination has promoted numerous seminars to approach the subject starting from the recognition of the characteristics of Russian architecture of the twentieth century, from the relationship with the avant-gardes and, in particular, from the critical reconstruction of the singular history and the precious legacy, now centenary, of Vkhutemas school (Meriggi, 2022). Five teams of the Roma Sapienza PhD program<sup>1</sup> decided to work on the same area – that of Gorky Park in close relationship with the right bank of the Moscova River – widely sharing the analytical, descriptive and interpretative part of the work, with numerous elaborations and techniques put in comparison and already able, through exercises of analogy, to trigger the following project choices. The results will be collected in a book, under publication, edited by Domenico Chizzoniti (Chizzoniti, i.p.) in which, after some lessons on the theme of the museum, starting from an investigation phase (of analysis and interpretation), each group will demonstrate consistency and coherence of the formal and settlement choices, proposed always starting with the analogical technique of the exercises of measurement and the consequent procedure of “admissible variations”, able to verify and improve the correctness and appropriateness, but also the effective degree of operability, of the referents employed. In this shared framework, the team coordinated by the authors of this text experimented some analytical and synthetic techniques through which to interpret and, at the same time, modify the study-area. The analytical-design methodologies adopted, the results of the analyses, the triggering effects on the compositional invention of the proposed exercises of analogy will be summarized below.

## Methodology

According to some authors, the city would be an organism, for us it is above all a “slow construction”, a “great architecture”, and a “deposit of efforts” that certainly can change over time, but with some inertia and sudden accelerations. The city is built through fixed points, parts and gaps, in a strict relationship with the forms of the earth, the geography and pieces of nature.

From a methodological point of view, the approach to the project has preliminarily passed through some essential analytical-cognitive phases and, starting from known ‘shapes’ and

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<sup>1</sup>The teams were coordinated by: Dina Nencini; Renato Capozzi and Federica Visconti; Domenico Chizzoniti and Luisa Ferro; Anna Irene Del Monaco; Luca Lanini and Francesco Costanzo; Tomaso Monestiroli.

<sup>2</sup>In order to understand the theory that analyses and classifies the urban specs with their degrees of “interior” and “exterior” spatiality, see the thought by Uwe Schröder and, in particular, (Schröder, 2015) where the researcher of Aachen codifies and defines a tool for the reading of the urban spatiality, the Rotblauplan (from the German “Red and Blue Plan”).

'figures', a series of useful 'exercises of measurement' and 'variations-translations' have been proposed, on one hand, in order to know and make intelligible, from a spatial and dimensional point of view, the place of intervention and, on the other hand, to develop selected 'morphemes' (or monemes) on which to work for the design definition. The preliminary investigation as "collection of information" gone from the historical analysis of the evolution of urban forms and from the recognition of primary elements and morphological characters to spatial analysis, to the natural system, to the description of the project area. Moscow appears, in the eighteenth century, as an aggregate of urban constructions, fortifications, convents and important palaces, but what emerges with particular evidence, starting from the Michurin plan of 1739, is the character of "exterior" spatiality of the city which, from the twentieth century, began to be replaced by the "spaces of interiority"<sup>2</sup>, with the exception of the area where, in 1929, the Gor'kij Culture Park will be designed, a very unique place in its simultaneous relationship with the consolidated city, to the east, and the natural element of the Moskva River, to the west. Before the definition of the exercises of measurement – through the assumption of architectural and pictorial references – and, with them, the design solution at the architectural scale, the urban theme was investigated, through the study and understanding of city characters. In this sense, the critical redesign of some precious historical maps of the city was used to understand its evolution, both in formal and spatial terms. The figure of Moscow emerged as a clear example of a large radio-centric city crossed by a river, from which it takes its name, that, at the territorial scale, is innervated and supported by green wedges that reach the centre. Among these, the Gor'kij Park, which represents the head of a larger natural corridor, which gradually opens up to the south of the city following the Moskva bend to the Passeri Hill.

### Urban, spatial and formal, analysis as way of interpretation

A theory of analytical methods and techniques, related to the project and aimed at understanding the morphological characteristics of the study area, has been developed by the research team coordinated by the authors of this essay for the selected urban part, of an inter-scalar character, for the project of the Vkhutemas museum. The canonical and unavoidable surveys on the formal, geomorphological and of the natural system characters and of the urban fabrics, spatial analyses have been added. The historical analysis was added to the codified urban analysis tools – Straßenbau and Schwartzplan –, as well as spatial – Rotblauplan (Schröder, 2015) –, to investigate respectively the formal and spatial characteristics of the architecture of the city. These analyses made possible to understand the elements on which the city is founded, the constant and reference elements, the typologies, the axes, the empty and full spaces, which, once recognized, have guided the design choices. Moscow, built on a substantially flat ground form, has a radial and concentric structure that recurs beyond the ancient city walls and is characterized by a dense and homogeneous urban fabric, where the only "exterior spatiality" is concentrated near the ancient walls and embankments of the Moskva River, as well as in the project area, along the north head of the Gor'kij Culture Park. Therefore, the analysis was useful to understand the intrinsic characteristics of Moscow – albeit in a "specific point" –, the elements that structure the urban fabric and the reciprocal relationships that reveal the compositional syntax of the city, the rules and principles on which it has been built in view of its "modification".

<sup>2</sup>In order to understand the theory that analyses and classifies the urban specs with their degrees of "interior" and "exterior" spatiality, see the thought by Uwe Schröder and, in particular, (Schröder, 2015) where the researcher of Aachen codifies and defines a tool for the reading of the urban spatiality, the Rotblauplan (from the German "Red and Blue Plan").

### **Analogy and exercises of measurements as forms of invention**

The proposed "exercises of measurement" have been intended as a specific and fertile way of knowing places, urban fabrics and artefacts, the relationship between primary elements, through already known forms. It is precisely the already known and successful urban systems, their figural structure, that are able to verify in re the possibilities of renewal of the urban form and of the increasingly consistent relationship between city and nature, between urban compositions and open spaces. We're thinking of a method and a technique that call into question, in addition to the logical-analytical one, the analogue thinking as the trigger for invention but also as a specific way of knowledge. The first compositional 'exercise' – "from form to figure" – starting from "world-buildings", finally selected the Locomotiva 2 project by Gianugo Polesello, Aldo Rossi and Luca Meda, as the referent and, defining the corresponding 'morpheme' through the abstraction of the forms inside the enclosure, brought back to the pure figures of the circle and square, proposes to open the enclosure towards the river, thus also evoking a second and closest reference: the Admiralty Palace in St. Petersburg. The second compositional 'exercise' – "from figure to form" – starting this time with some selected paintings by Kazimir Malevič, used the Red square and the Black square, translating the background into a plinth and the two squares into a tower and a hall-building, 'figures' on the 'tensional field' as a neutral elective place where the topological relationship between the figures is manifested.

The first compositional exercise, primarily selected those projects capable of fulfilling the task of building the architecture of the city and producing a world of evocative, of values and meanings, forms. In this sense, two main formal categories have been identified to select the works assumed as a paradigm: world-buildings and Group form (Giedion, 1998) or ensembles (in Russian ansambl'). The first morphological class includes the Diocletian's Palace in Spalato and the competition project Locomotiva 2 in Turin by Gianugo Polesello, Aldo Rossi and Luca Meda; on the other hand, the Narkomtiazhprom-People's Commissariat for Heavy Industry in Moscow by Ivan Leonidov and the Campo dei Miracoli in Pisa are in the second class.

The most relevant reference for the morphogenesis of the project was exactly Locomotiva 2, a work of significant dimensions able to establish a new significant relationship, in terms of size and character, with the city as a whole. After placing the measuring architecture in situ, it has been transformed through a theory of admissible "variations" that were then synthesized, by abstraction, in morphemes. The "translation/betrayal" of the assumed paradigm involved the selection and identification of the forms inside the large suspended courtyard, then transformed into the figures of the circle and square, and the subsequent opening of the front towards the Moskva – in the same way as the Admiralty Palace in St. Petersburg – thus making the park behind able to look out. Therefore, the "form" becomes a "figure", according to the position of the Krymskij bridge, thus becoming orthogonal to the entrance door of the Gor'kiy park, while, on a larger scale, it establishes a topological and analogical relationship, as well as a dimensional, with the Donskoj Monastery located at the base of the natural wedge to the south. Finally, the "translation" exercise contemplated – as in the Dominican Motherhouse by Louis Isadore Kahn in Philadelphia – the insertion of the 'spaces of repetition' in the perimeter arms of the open courtyard – in Kahn the cells, here laboratories and teaching rooms –, while the central space is populated by free and convex autonomous bodies: the circular tower and the square tower which respectively accommodate spaces for research and residence.

The second compositional exercise assumed as reference some works of art by Malevič and, in particular, Double Square, Red Square and Black Square and Suprematist painting, rectangle and circle. The selection of the compositions of figures, silhouetted against a neutral background,

recognizes in the constructivist way a marked aptitude to support both the pure sensitivity and plasticity of the primary forms in the dialectical relationship between figure and background. In fact, Malevič's works represent the pure forms of the square, the circle, the rectangle that stand out against a background – a “tension field” – that becomes the neutral elective place where the topological relationship between the “figures” is manifested. Precisely this pure expression, purely abstract and diaphanous, has allowed the transformation of “figures” into “forms” and, therefore, into architecture. The favourite composition by the definition of the project resulted, after a series of checks and comparisons, Red square and black square, characterized by a background against which two squares of different sizes and positions put us in tension, through clear proportional, weight and collocation, underlying, ratios. In the same way as in the first exercise, also in this case, the pictorial work was inserted in the project area through a further operation of abstraction and, at the same time, of reification. The “translation/ betrayal” of the reference involved the isolation, and therefore the highlighting, of the background and, consequently, of the few figures placed in the foreground. The Locomotiva 2 project and the work Red square and black square clearly declare and manifest the design choices and the “spiritual” and formal “families” that have been adopted to define the theme. If the project by Rossi, Polesello and Meda highlighted the peculiarities related to the courtyard typology, on an amplified scale, Malevič's painting defined the pure relationships that are established between the elements within the enclosure delimited by the large city-building open to the river that welcomes them. This compositional scheme, including “figures” in a courtyard, is still evident, among other things, in another paradigmatic work taken as the reference of the proposal: the Admiralty Palace in St. Petersburg that, consisting of an open courtyard where the three main axes of the city converge, allows to define a strong relationship with the “river roads” enclosed in the “arms of the building”. Moreover, the Palace encloses three relevant buildings that define the front and, at the same time, face the buildings on the opposite bank. Similarly to what happens for the project area, chosen for the Vkhutemas museum, two clear relationships can be identified: the first with the elements of the city and the second with the natural system, the river and the park. Also in this case, the “translation” process was useful in reaching the “invention”, selecting the form of the enclosure of the Palace and inserting in it two architectures clearly attributable to the work of the Russian artist. Ultimately, the “figures” of the red square and the black square in the “form” of the Admiralty Palace define the project, entitled Figures in the Form, developed by our team.

### **Analogical assembly as morphological-formal synthesis**

The compositional exercises were decisive for the choice of the ‘morpheme’: that minimal and generative formal element that, combining the open enclosure on the river of the Admiralty Palace and the square forms placed ‘in tension’ by Malevič, differentiating their height in the typologies of the Hall-building and the tower, could determine the form of the ensemble (or assembly), able, in its concise formal morphological synthesis, of establishing relationships in proximity or at distance with the other primary elements of the city, on the one hand, and with the natural system, on the other. These diaphanous figures have then been transformed and hypostatized into specific architectural forms of different nature and weight, attributable to different architectural typology. In particular, the background defines a crepidoma, a plinth, and the figures become a hypostyle hall and a cruciform tower. The Plinth, as Marco Biraghi (Biraghi, 2019) opportunely stated, supports and verifies the hypothesis of an archipelago city by Oswald Mathias Ungers to Pier Vittorio Aureli; precisely the latter, regarding the proposals of Ludwig Mies van der Rohe argued that: “The bases by Mies reinvent the urban space as an



archipelago of defined urban artefacts [or facts]. The base introduces a stop in the fluidity of urban space, thus evoking the possibility of understanding urban space not as ubiquitous, pervasive and tyrannical, but as something that it can be framed limited, and thus potentially situated as a thing among other things" (Aureli, 2011).

If the plinth follows the limit of the Moskva River, establishing a strong relationship with the natural element that becomes the place of view of the entire composition-assembly, the hall-building and the tower preserve the same positional and metric relationships as the Russian artist's painting. The hall establishes a close relationship, in terms of size, calibre and orientation, with the Tret'jakov gallery, located to the north-east; the tower becomes autonomous in gaining a long-distance relationship with the Kremlin towers. The exhibition spaces are located in the hall-building, while in the tower there are the additional laboratories and offices provided for in the program for the Ideal Museum of Vkhutemas.

The square courtyard looks like a walled element "raised from the ground" that defines, at the height of the city, a continuous public space able to host the hall-building and the tower. The Große Hof – about 200 meters on each side, 27.40 meters high and with a thickness (triple body) of 22.90 meters – rises from the ground by 13.50 meters, supported by massive columns that contain the vertical connections. The interior spaces are intended for training and research and host large classrooms/laboratories for cultural and exhibition activities characterized by double height spatiality. From the point of view of the character, the court appears as a "two-faced" building which, towards the outside, shows the continuity of the wall while inside, and in the crowning, opens and, through the adoption of tectonic discontinuity of the framed structure, defines the possibility of looking out over the river.

The condition of delimitation offered by the suspended courtyard defines a public place inhabited by two all-round forms (*solitaires*) that adopt a common form, compositional and constructive at the same time, which governs the definition of the elevations and the plans. In this way, the hall-building, 62 meters on each side, is presented in the ratio of 1:3 with its height of 22 meters as a blind envelope, a *temenos* raised from the ground, whose permeability is guaranteed only by the continuous windows that define the entrances on the ground floor. Internally, it consists of a hypostyle level, above which a platform free from supports allows visitors a complete view of the exhibited works of art on the silent walls of the building, suspended by beams supported by 16 columns placed on the perimeter, with variable section, which in turn define the condition of semi-coverage of the interior space.

The tower, a prism with a square base of 36 meters on each side and 153 meters high, explores a further variation within the trilithic-wall rule that governs the ensemble, grafting and suspending trilithic frames to a cross wall that defines the core of the building, whose height is punctuated by two hiatuses called to separate the blocks that reverberate on the façade the compositional module already used in the façade of the courtyard, however giving reason for the proportions and construction methods typical of the tall building.

Following the words of Abbot Laugier repeatedly evoked by Le Corbusier – for which the tumult dans the ensemble cannot exist without an exact *unité dans le détail* – the assembly (and not montage) in Moscow is composed through the 'frame' of the courtyard and a careful collocatio both of the two forms/parts within it and of the whole ensemble, in a distant relationship, to the north of the Krymskij bridge, with the nearby Tret'jakov Gallery, that is specified through the definition and location and of the autonomous bodies put in tension.

Ultimately, it can be said that if in the city of history the square, as a void subtracted from the compact mass of the urban fabric, constitutes the public space we know, for the Moskva bank, on the other hand, in a different dimension of the city and in a spatial condition aimed

at openness, the ensemble aims to be the representative centre of an urban environment, a place for the public life of the citizens who live there, able to establish long-distance relationship between the other Moscow poles and constitute a system of polar tensions between the conspicuous buildings to indicate, as in the masterpieces of Ivan Il'ič Leonidov, the relevant places of this part of the city.

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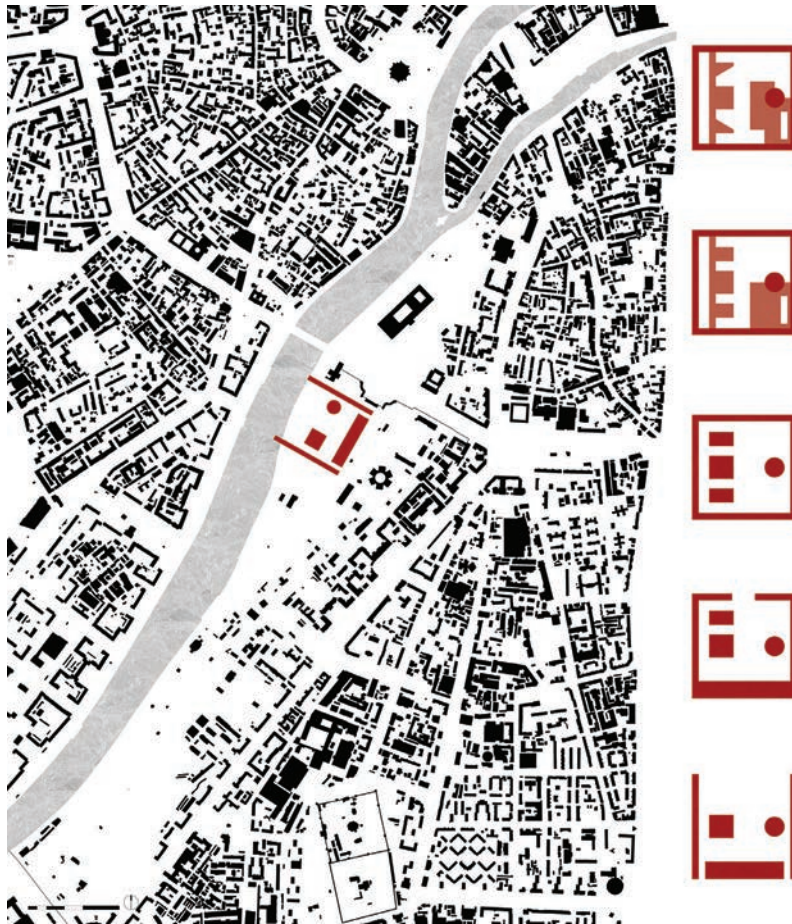
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## Illustrations and Tables

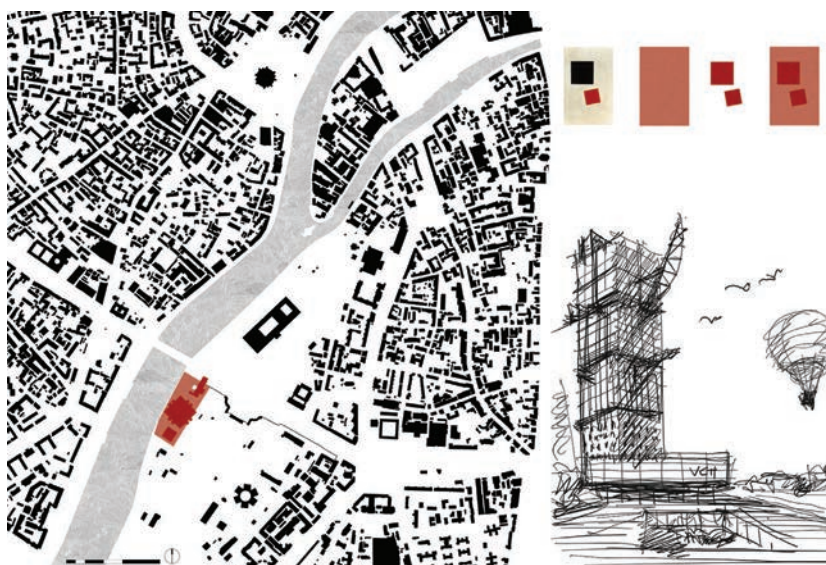


**Figure 1.** The shape and space of the city of Moscow. Schwartzplan and Rotblauplan.

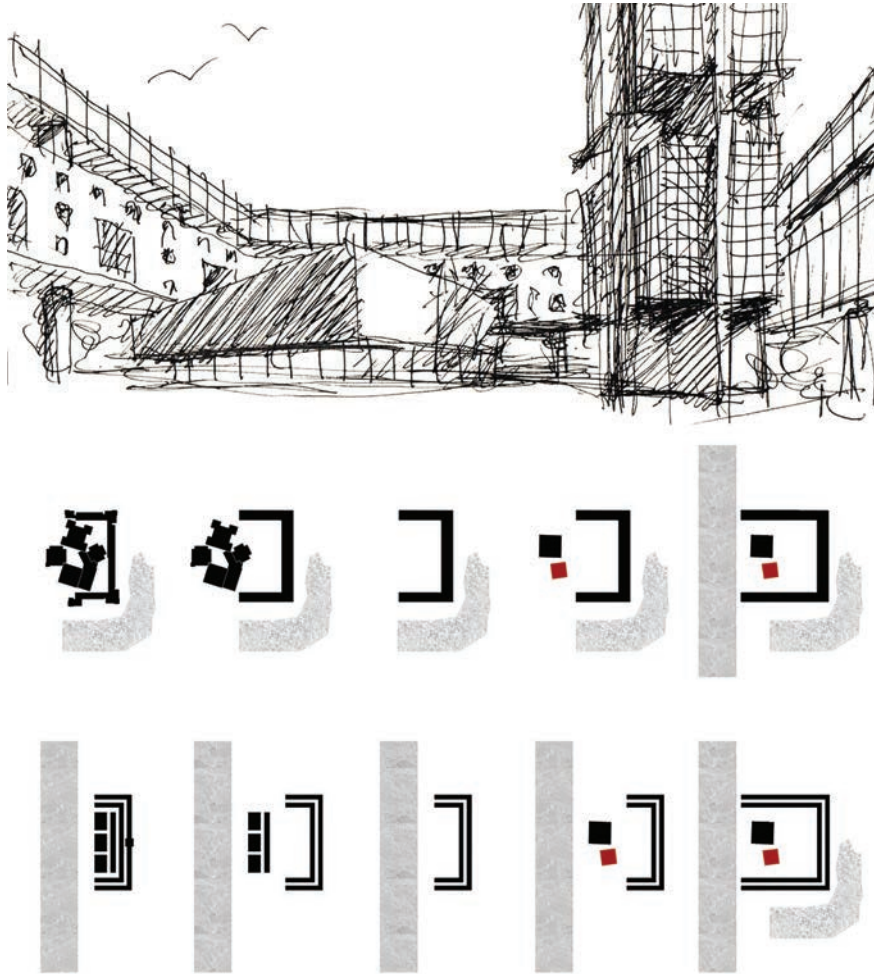




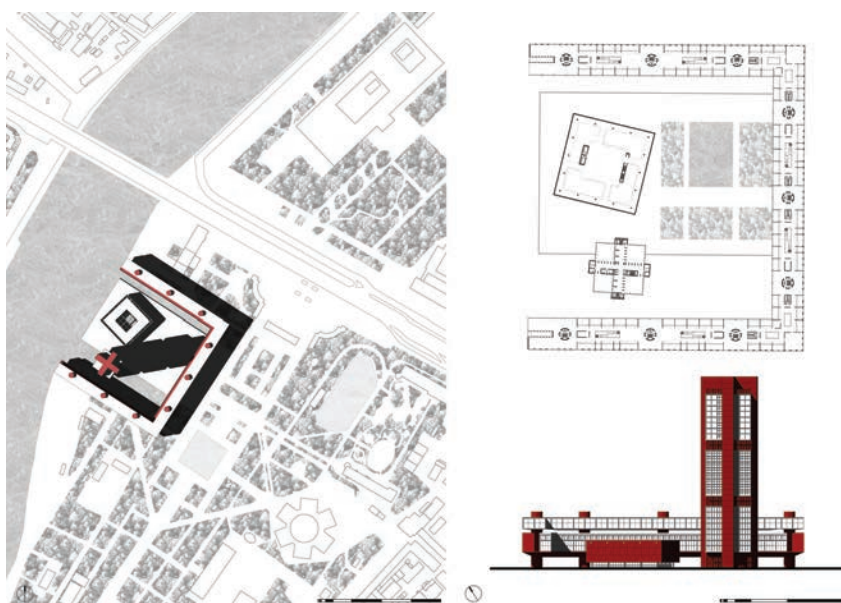
**Figure 2.** 'From Form to Figure'. Exercise of measurement and analogical translation process of the Directional Center in Turin Locomotiva 2 by Gianugo Polesello, Aldo Rossi and Luca Meda.



**Figure 3.** 'From Figure to Form'. Exercise of measurement, analogical translation process of the painting Red Square and Black Square by Kazimir Malevič and sketch of the project.

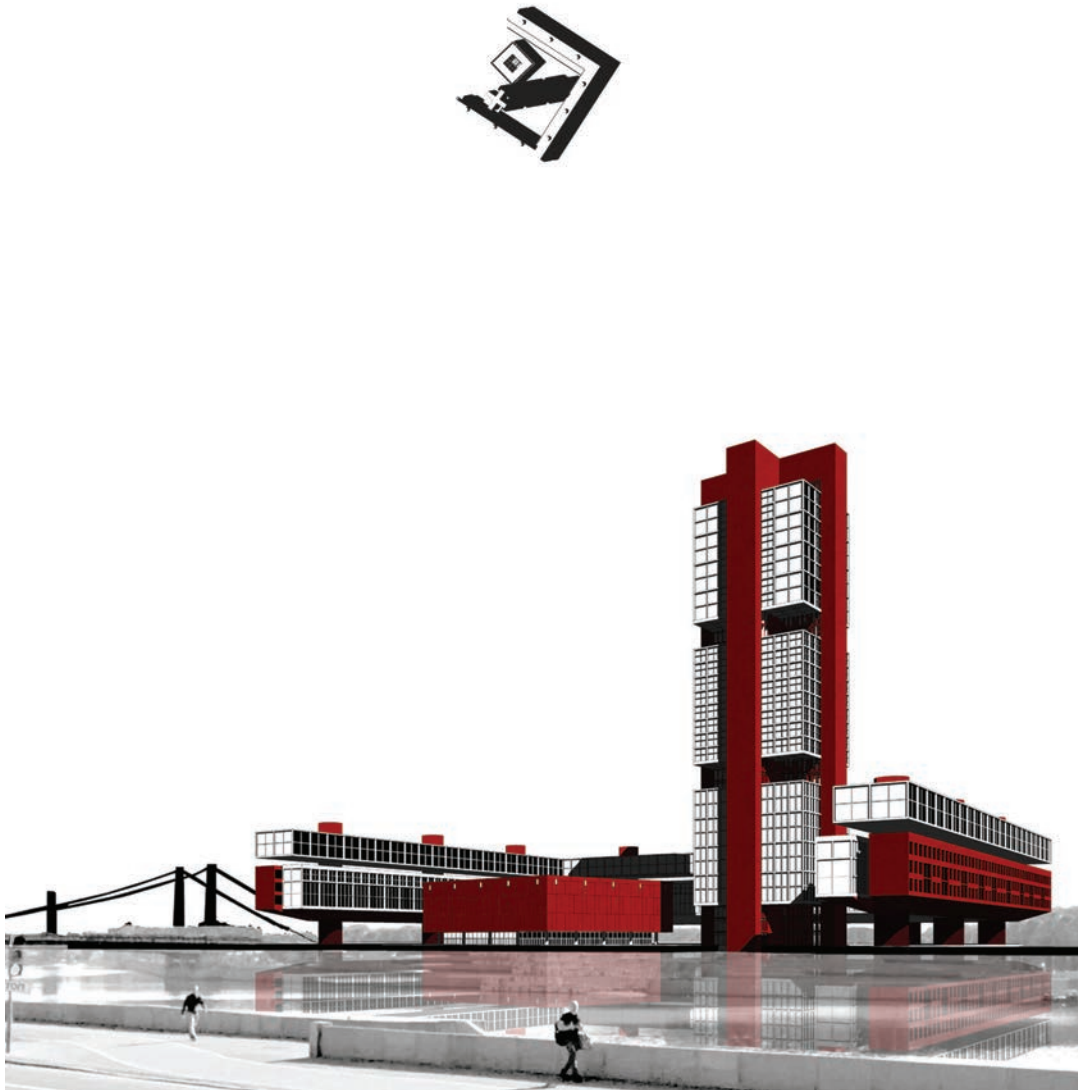


**Figure 4.** 'Figure in Form'. Project sketch, analogical translation process of Louis Kahn's Dominican Motherhouse in Philadelphia and the Admiralty in St. Petersburg



**Figure 5.** Left, volumetric plan. Right, ground floor plan and elevation of the Ideal Museum of the Vkhutemas.





**Figure 6.** On the right, volumetric plan, on the left, ground floor plan and elevation of the Ideal Museum of the Vkhutemas.



## The Typology of the “Sandal Bedestan” in the Grand Bazaar, Istanbul

Irem Ezgi Çiftçi<sup>1</sup>, Alessandro Camiz<sup>2</sup>,

<sup>1,2</sup>Department of Architecture. Özyeğin University. Çekmeköy Campus Nişantepe District, Orman Street, 34794 Çekmeköy Istanbul

E-mail: <sup>1</sup>ezgi.ciftci@ozu.edu.tr, <sup>2</sup>alessandro.camiz@ozyegin.edu.tr

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**Abstract.** Throughout history, trade areas and bazaars have been located in the centre of Ottoman cities. Trade places in the Ottoman city were shaped by culture and developed together with social life. This study focuses on the Sandal Bedestan located in the Grand Bazaar of Istanbul. Bedestans, which are closed structures, are usually stone structures with a rectangular plan. They were built for the sale of valuables such as jewellery and fabrics. Bedestan, which appeared as a type of structure for the first time in the Ottoman period, constitute the core of the commercial fabric of Ottoman cities. In general, the formations of Ottoman cities were realized according to the commercial areas located in the centre. In order to understand the settlement of Ottoman cities, it is first necessary to study the settlements, shapes and relationships of trade areas with landforms. The aim of this research is to present a study on the architecture and history of Sandal Bedestan. Sandal bedestan is one of the two bedestans located in the Grand Bazaar. Sandal Bedestan, built in 1472, is called by this name because a type of fabric called sandal was sold in it. In this article, the reasons why the bedestan has this shape, why it has different characters from other bedestans built during the Ottoman period, why it is located in the Grand Bazaar, why the structure of the fabric and jewellery trade area was built as a bedestan, why it is located in the core of the Ottoman city are discussed and examined by referring to historical sources. The relationship of the Sandal bedestan with the surrounding structures and topography will be examined by looking at maps, drawings, and pictures. Bedestan typologies will be examined and evaluated in the context of plan diagrams. It will be compared with other bedestans built during the Ottoman period, and the similarities and differences between them will be examined. In this study, it will be explained that Sandal bedestan has a strong relationship with urban texture and landforms from an architectural point of view, and that it is a key residential point in the city as an important commercial point in the Grand Bazaar.

## **Introduction**

Istanbul has been an important commercial city throughout history. This city, which was the capital of the Roman, Byzantine and Ottoman Empires, continues to be one of the important shopping points due to its location (Özkan Özbek, M. (2018).

With the conquest of Istanbul by the Ottoman Empire, efforts were started to revive the commercial life. These commercial areas determined the layout of the Ottoman cities and the urban texture. Bedestans, which appeared as a type of structure for the first time in the Ottoman period, constitute the core of the commercial fabric of Ottoman cities. In this study, the effect of bedestan on the settlement of the city will be examined by focusing on the structure of bedestan. The typology of the bedestan will be investigated and the relationship of the Sandal Bedestan with the urban texture will be focused on (Fig.1).

## **Methodology**

In this research, which will be focused on Sandal bedestan a survey of commercial centres in Istanbul and all geographical, historical, socio-economic and political factors that may be related to it is carried out by referring to historical sources. During the research, a general-to-private framework is presented, starting from Istanbul and ending with the explanation of the importance of Sandal bedestan in the city. The main topics studied to understand the Sandal bedestan are the city of Istanbul, Istanbul during the Ottoman Empire, Istanbul during the Byzantine Empire, Ottoman commercial buildings, Grand Bazaar, Sandal Bedestan and Apadana structure are the main subjects studied. The commercial, economic and social structure of the period after the conquest of Istanbul by the Ottoman Empire will be investigated. Going a little further back, the trade areas in Istanbul belonging to the Byzantine Empire period before the Ottoman Empire period will be investigated in Istanbul. The relationship between the geography and the commercial centre of Istanbul will be examined. Ottoman trade structures will be investigated in the context of plan diagrams by referring to technical drawings. The historical and architectural structure of the covered bazaar will be investigated. Sandal bedestan will be compared with different bedestan typologies made during the Ottoman period in the context of plan diagrams on the chart. The Grand Bazaar will be compared with the bazaar typologies made during the Ottoman period. In order to investigate the source of the typology of the bedestan structure, the Apadana structure, which is similar to the bedestan in terms of structure and function in the past, will be investigated from an architectural and historical point of view. To access this information, historical sources, images, maps will be consulted. Thus, in this research, the architecture of the Sandal bedestan, its relationship with the topography and the reasons for its construction will be explained and how it plays a role in the settlement of the city of Istanbul will be explained.

## **About Istanbul, the Ottoman Empire and its commercial structures**

When Istanbul was conquered by the Ottoman Empire in 1453, it was about to lose its commercial position because control of the Bosphorus was about to be lost. This was due to the fact that the Black Sea and Aegean regions came under the rule of the Venetians and Genoese in the last periods of the Byzantine Period (Özçakı, 2021: 93 as cited in Toprak, Eldem, Baydar, Koraltürk, Güvenç, 2008, 106). The historical peninsula region of Istanbul was a geographically dependent region. Geographically, this region, which has a promontory feature, is surrounded by a castle for security purposes. Istanbul, which meets its needs with sea and land trade, has always needed commercial space and commercial roads. The Ottoman Empire attached importance to the commercial development of the conquered territories. After the conquest of Istanbul, a

shopping area was created around the Fatih Complex to revive the commercial life of the city. The commercial function of the area between the port district and Divanyolu street that used to be preserved and this area has continued to be a commercial district (Ozcaki, 2021:93 as cited in Kuban 1996,210-211). The settlement in the Ottoman cities was developing around the commercial area (Fig.2). 15. and 16. the increase in population in the centuries and the increase in commercial activities with the development of cities have been instrumental in changing the urban structure of the city. During this period, many inns, bazaars and bedestans were built in Bursa, Edirne and Istanbul, which were the capitals of the Ottoman Empire, thus important commercial centres were created. Some cities of the Ottoman Empire were located on important trade routes. That is why bedestan structures are found in cities located on the trade route. Because the bedestans showed a feature where the caravans could pause and make their preparations. It is even said that Evliya Celebi divided the Ottoman cities into two parts with and without a bedestan. Bedestans can be found one in developed cities, and two or three in cities with significant commercial networks. Since Istanbul is a city located on the Silk Road, it has been an important stopping point for merchants throughout history. For this reason, there are three bedestans in Istanbul. Galata Bedestan is located in Galata District. Cevahir Bedestan and Sandal bedestan are located in Grand Bazaar. Galata district is a port city located on the banks of the Golden Horn. Galata was a trade stop because it was a port city. Galata port is located opposite the port of the historical peninsula, which means that the bedestans are connected to each other, there is a commercial relationship between the bedestans. Ottoman commercial buildings consist of a bazaar, inn, bedestan, caravanserai, arasta and shops. These structures are similar in function, and there are a number of differences between these structures. Shops are the smallest unit of commercial structures. They can be found in bedestans, bazaars or open-top streets. These buildings, which usually have a quadrangular plan, have one floor and are smaller than 10 m<sup>2</sup>, have a single facade and open to the street (Rostamzadehshabestari, D. (2017): 27). Arastas are usually formed by the fact that shops belonging to a group of artisans who trade in the same goods are sorted mutually or side by side on a street. They are usually one-story structures built on a busy road. Commercial inns were also called bedestan. Bazaars were constantly frequented and lively places by the public. Bazaars, which make up a large trading unit, usually consist of a combination of bedestan, khan and arasta (Bal & Taşdemir, 2020:8). here are also mosques and public baths in bazaars. For this reason, these regions also show the characteristics of places where social and religious needs are met.

### About the Grand Bazaar

Grand Bazaar is located on the Historical Peninsula of Istanbul, in the Eminonu district of the Fatih district. The Grand Bazaar was built by Fatih Sultan Mehmet in order to bring income to the foundation established for Hagia Sophia. It was founded in 1455 with two stone bedestans which form the core of the bazaar, made by Architect Hayreddin as Cevahir bedestan and Sandal bedestan. There are 2 bedestans and 16 inns. The Grand Bazaar consists of new bazaars built over time and their unification. After the construction of two bedestans, the first wooden buildings were built around them, and then rebuilt shops were built with stone materials, and open bazaars were established. In the process of 250 years, the Grand Bazaar has emerged as a complex structure (Bal & Taşdemir, 2020:8) (Fig.3). The Grand Bazaar is a place where the mixed structure of the Ottoman Empire was intertwined with Muslims, non-Muslims. There are three commercial districts on the Historical Peninsula. These are: The Port District, the Inns District and the Grand Bazaar. Port district is located on the coast of Eminonu-Sirkeci district. Commercial

Building District that starts from the port area and goes towards the Beyazit side. Grand Bazaar is located in the middle of Beyazit and Nuruosmaniye districts. (Kurt, 2020:54) The Grand Bazaar is a commercial centre that forms the commercial district of Istanbul as of its location. So why is the Grand Bazaar built on this territory? Throughout history, Ottoman cities have developed around bazaars, mosques and castles. Especially the central areas where transportation is easy are preferred as the place where bazaars were established, and the city is growing around this centre. Usually, bazaars located near the castle wall were built adjacent to the walls and spread on both sides of the street (Fig.4) (Oncel, 2014: 56). In this sense, the Grand Bazaar is a structure that has led to the formation of a city that has developed over time. That is why it was built in a central location, close to both the sea and the land side of the city. But in order to understand the reasons why the Grand Bazaar was built in this area, it is necessary to look at what this area was used as before the Ottoman era. The empire that ruled Istanbul before the Ottoman Period was the Byzantine Empire. When we look at the area, before the conquest of Istanbul, we see that the Grand Bazaar is located at the intersection of two important Byzantine roads. One of these highways is Mese. The Mese (Greek: "Middle Street") is the main road of the city of Constantinople (today Istanbul, Turkey) and the protocol road used in the Byzantine Empire. This road is known as Divanyolu Street in the Ottoman Empire and today. In the middle of the axis, the street continues to the Theodosius Forum, a long market road called Makros Embolos merges into the Mese Road (Shirley, 2021: 8). Byzantium pass through the middle of the historical peninsula and have a connection with the port indicates that these regions are favourable for trade. The line of these road routes in Istanbul can be reached by following the route where important monuments of the Byzantine and Ottoman periods are located. It is seen that these two commercial roads, which intersect each other perpendicularly, have a west-east and north-south axis due to the topography of Istanbul. The connection between the sea and the land could only be achieved by these roads. Makros Embolos road, known as Uzunçarşı street, is a commercial road that provides the connection between Mese and the port. The fact that this road is a portico road means that shops are located and porticoes are built to protect them from rain. The fact that the Makros Embolos road goes towards the Port area indicates that there is a commercial transportation network to the Galata region. Important trade areas and important commercial routes in the Byzantine period are described. In the light of this information, the Grand Bazaar was built on the important routes of the commercial area of the period before the conquest of Istanbul. These commercial roads indicate the possibility that there was a bazaar in this area before the construction of the covered bazaar. In addition, when we look at the history of the Byzantine State, it is known that the vicinity of the Forum of Constantine is the most lively and busy area of the city. There are 4 bazaars that are thought to be built at the Mese Road level. The reason why the bedestans were built in these trade zones is that these areas are on the transit route and are located in the centre of trade. In addition, the fact that this region is also a shopping district in Byzantine Empire is an important factor. The Ottoman Empire protected this region as a commercial region and continued to maintain the same function. In this sense, topography was taken into account first in the settlement of commercial areas in Istanbul and the city developed accordingly. According to this topography, roads and a commercial area have been determined. Then, the same functions were continued during the Ottoman period and have reached the present day.

## About bedestan

Bedestans, which appeared as a type of structure for the first time in the Ottoman period, constitute the core of the commercial fabric of Ottoman cities. The word bedestan comes from the Arabic word “bezzaziye, bezistan”, which means the place where the fabric is sold (Oncel, 2014: 56). bedestan is the name given to closed commercial structures where jewellery, valuables, valuable fabrics and goods are sold. Bedestan was used as a warehouse during the time of the Turkish principalities and turned into a commercial structure during the Ottoman period. Its architecture and function have an importance that will form the centre of trade. Bedestans that are the property of the Foundation have rarely been built as personal property in history. The Ottoman bazaar and the Ottoman Empire, the city first developed around the central structures formed by the bedestan, the castle or the great mosque. For this reason, in the Ottoman Empire, the bedestans were located in the city centre. According to the value of the traded goods, the proximity of the structures to be built to the bedestan is determined. Jewellery or precious fabrics are located in the centre. If the value of the goods sold is high, then these shops are built near the bedestan. Thanks to this, a street pattern has been formed consisting of shops based in bedestan and near which commercial activities are carried out. Thus, the Ottoman bazaar system emerged. Bedestan was located in the largest and most important cities of the Ottoman Empire due to the fact that it was a structure that opened the door to international trade. Bedestans were places where valuables were sold and stored. The safes, documents and notebooks of artisans and merchants were kept in the bedestan. The people used to entrust their valuable property for protection in the bedestan. This can also be understood from the architecture of the bedestan. The bedestans are solid structures with thick stone walls. It has a rectangular or square plan and has a lead-lined cover ranging from 3 to 20 domes, depending on the size of the structure. The windows, which are opened for lighting and ventilation, are small and covered with iron bars. The reason for this is to ensure the safety of valuables in the bedestan. In most bedestans, there is a door on each wall that opens to the bazaar or other commercial units. These doors made of iron or ebony wood increase accessibility in the bazaar. Some bedestans have small shops called cells, while some bedestans have sales stalls called closets in the open area. Bedestans can usually be single-storey or double-storey buildings. In two-story structures, the upper floor has a gallery space overlooking the central courtyard. This is due to the fact that the crime rate is low in places that are open and have a wide viewing angle. Therefore, the architecture of the bedestan is such due to its function (Fig.5).

Bedestans have six obvious functions.

- \* It is the place where fabrics and valuable imported goods are stored and sold,
- \* It is the place where merchants trade and prepare their trade caravans.
  - It is the place where people entrust things and jewellery and where these goods are stored.
  - This is where the price of the goods is determined. They show the peculiarity of being the stock exchange of that era.
- \* This is where the taxation of that period was carried out.
- \* It works as an Auction Hall, which is the place where precious items are offered for sale on certain days (Oncel, 2014: 57).

There are many bedestans in Turkey. These bedestans have different typologies. Bedestan typologies vary according to their plans and technical characteristics. Bedestans built in commercially active areas can have organic plan types due to the fact that the settlement is



crowded and dense. The size of the bedestan varies according to the intensity and capacity of the commercial activities of the city where it is located.

Bedestan typologies are classified into 9 types according to plan types.

- Type 1: Square-Plan, One-Legged, Two-naves, Four-Dome Type
- Type 2: Rectangular Plan, Two-Legged, Two-naves, Six-Dome Type
- Type 3: Rectangular Plan, Three-Legged, Two-naves, Eight-Dome Type
- Type 4: Square Plan, Four-Legged, Three-naves, Nine-Dome Type
- Type 5: Rectangular Plan, Four-Legged, Two-naves, Ten-Dome Type
- Type 6: Rectangular Plan, Six-Legged, Two-naves, Fourteen-Domed Type
- Type 7: Rectangular Plan, Eight-Legged, Three-naves, Fifteen-Dome Type
- Type 8: Rectangular Plan, Twelve-Legged, Four-naves, Twenty-Dome Type
- Type 9: Individual Types (Aygör, E. (2021):177).

This classification helps us to see the technical characteristics of bedestans. It can be understood from the diversity in the classification that the architectural features of the bedestans have a relationship with their functionality. If we classify bedestans not in terms of shape, but in terms of their relationship with commercial structures, bedestan typologies:

**Bedestans with cells:** These bedestans are the oldest bedestans built in commercially intensive cities. In these bedestans, the interior space was divided into rooms (cells). Cevahir Bedesteni belongs to this typology.

**Bedestans with shop outside:** There are outdoor shops of this type, and the inner middle space of the bedestan is empty. The interior of this structure functions as a bedestan. Shops are lined up along the outer wall. Sandal Bedestan belongs to this typology.

**Arasta-bedestan:** The plan of these bedestans is similar to arasta. There are shops on both walls.

**Bedestan with Arasta:** Part of the bedestan is a type planned as arasta. Bedestan is surrounded by arasta. Sometimes inns can also be added to these structures.

**Floor bedestan:** This type of bedestan is a type that is located inside another structure, not as a separate structure. It has an area, a floor, which is used as a bedestan inside another structure.

**Plain and single space bedestan:** This type, which is called simple, has divided areas in the interior, and there are no shops outside (Fig.6) (Cezar, 1983 as cited in Taghizahvahed, 2018:32).

Non-repetition of some examples in Ottoman bedestan typology is a situation related to functionality. Istanbul Cevahir Type 7 is designed as a single example, Istanbul Sandal Type 8 is designed as a single example.

### **Sandal bedestan**

The Sandal bedestan was made between 1472 and 1478. The first structure of the Grand Bazaar, built in 1455, is located southeast of Cevahir bedestan. Bedestan is named after this name because it sells a fabric called sandal. In the foundation of 1477-1478, the Sandal bedestan was mentioned as a four-walled structure with 265 shops (Ayverdi, 1989 as cited in Rostamzadehshabestari, D. (2017):126). Sandal Bedestan in this classification belongs to the plain and single-volume type of bedestan. The sandal bedestan, which is a rectangular structure, has legs made of cut stone, walls made of rubble, arches and domes made of brick. Red crushed stone and rarely brick were used in its walls. It has a roof covering of 20 domes. Its outer walls are 1.30 m thick, have two floors and have an area of 2400 m<sup>2</sup> (Kurt, G. (2020):59). Why is it built on the eastern side of the Grand Bazaar? This area, which was chosen close to the port, is located on the east-west main trade axis. The delivery of fabrics can be by the port or by land. Sandal bedestan may have the purpose of being close to the city centre, being in

the movement on the eastern side, where the population is more dense, close to the city centre. Then, the Nur-u Osmaniye mosque, located to the east of the Sandal bedestan, and shops were built around it, and the Sandal bedestan influenced the settlement of the city. We see that the east-west axis and the north-south axis are emphasized in the grand Bazaar structure. It can be understood from the shape of the covered bazaar that the structure is expanding in the east-west direction. Sandal bedestan has an architecture that expands in a north-south direction. Its four gates are located in the middle of the facades. The axles passing through the Grand Bazaar were forced to pass through the sandal bedestan. This may be an attempt to ensure the use of each area by increasing accessibility within the commercial area and thus encouraging trade.

### About Apadana structure

When we look at the origin of the bedestan, the existence of apadanas, the antecedent types of which are found in Iran, attracts attention. Apadanas are structures with a meeting or reception hall feature, the roof of which is carried by columns. Apadana, a word of Iranian origin, means multi-pole tent (Öztürk, S.(2018):75). Apadana; these structures, which are found in 7 regions in Anatolia, which are called by various names such as reception hall, ceremonial hall, columnar hall, are usually square in plan and thick-walled. The architecture and function of these structures belonging to the Iranian culture, which are known to have been built in Iran in the seventh century BC, are similar to the Ottoman bedestan structures. Both the similarity in the use of columns and similar architectural elements and the similarity in function indicate that these structures are the origin of the bedestan.

### Conclusion

Since its inception, the Grand Bazaar has managed to keep different cultures, beliefs and professions in it. It is a building where people have been selling their products, learning professions, communicating with each other and living together for many years. It is a historical document with the changes it has undergone, historical events, disasters. The reasons for the location of the bedestan, which were the first buildings of the grand bazaar, can be answered by looking at the urban development of the history of the Byzantine Empire, the topography of Istanbul, the architectural identity of the Ottoman Empire. The topography of Istanbul is effective in finding commercial centres, political and religious buildings, squares and ports in Constantinople and Istanbul in similar places. Two important perpendicular trade axes formed by the landforms of Istanbul during the Byzantine period have survived to the present day due to the influence of topography. The role of these axles in determining the location of the bedestans is great. Thus, the bedestans formed the centre of urban trade. When we look at the region where today is located the Grand Bazaar, architectural, commercial networks, transportation, housing and the reconstruction of the Grand Bazaar and the bazaar when it comes to the layout of the city is still largely involved, we can see that. Along with the fact that all these areas are shaped according to the bazaar and bedestans, our culture and history are changing and developing around the bedestan structure. As a result of the research, it was concluded that the first reason affecting the form of bedestan was the Apadana structure, the second reason was the commercial importance of the region, and the third reason was the function of the building. It is possible that the origin of the form of Sandal bedestan, which was built in the Ottoman period, is the apadana structure of Iran, it was influenced by this culture and therefore took this form. It is understood that the area where the Grand Bazaar is located was a large commercial area during the Byzantine period and the commercial identity of this area was inherited from the Byzantine Empire to the Ottomans. Located in the center of the

city, the building was established as a bedestan, which functions as a center for the country's economy in terms of its commercial identity and location. Due to its functional features, the building needed a sheltered architecture in terms of protection and security. Thus, it was built in a form that is closed to the outside but also contains the Ottoman architectural identity. Thus, it was built in a way that is closed to the outside, but at the same time accommodates the Ottoman architectural identity. With this study, we have seen that bedestan actually carry a very intense cultural accumulation. As long as these structures stand, their contribution to both the environment and cultural history will be permanent and they will develop the urban area with the accumulation of stones.

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**Figure 1.** (Map showing the commercial area of Historical Peninsula in Istanbul (the map prepared from the Snazzymaps application has been processed))

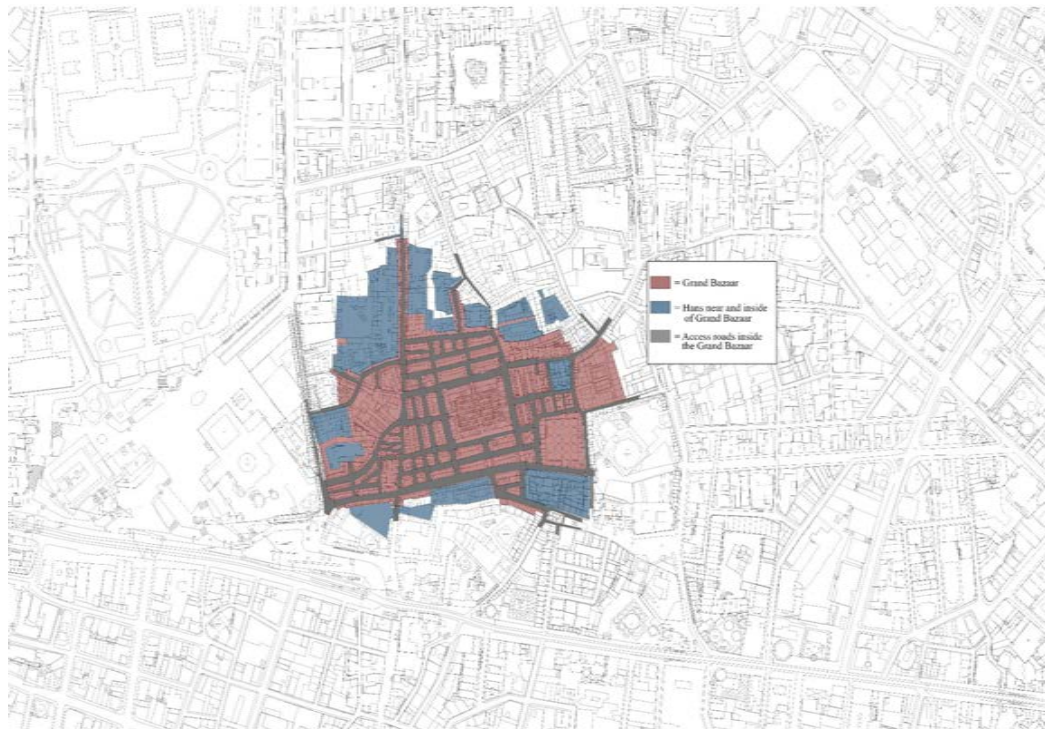


**Figure 2.** (Map showing the commercial districts of Historical Peninsula in Istanbul (the map prepared from the Snazzymaps application has been processed. Re-derived using the source Kurt, G. (2020))





**Figure 3.** Cadastral plan of Istanbul



**Figure 4.** (Routes and hans(inns) of Grand Bazaar  
(Prepared by working on the cadastral plan.))



<b>Square, one-legged, two-nave, four-domed</b>	Bayburt Bedestan (15th century)	
<b>Rectangular, two-legged, two-nave, six-domed</b>	Beysheir Bedestan (13th century)	
<b>Rectangular, three-legged, two-nave, eight-domed</b>	Tire Bedestan (15th century)	
<b>Square, four-legged, three-nave, nine-domed</b>	Merzifon Bedestan (15th century)	
<b>Rectangular, four-legged, two-nave, ten-domed</b>	Ankara Mahmut-Paşa Bedestan (15th century)	
<b>Rectangular, six-legged, two-nave, fourteen-domed</b>	Edirne Bedestan (15th century)	
<b>Rectangular, eight-legged, three-nave, fifteen-domed</b>	Cevahir Bedestan (15th century)	
<b>Rectangular, twelve-legged, four-nave, twenty-domed</b>	Sandal Bedestan (15th century)	

**Figure 5.** (Typology of Bedestan according to their architectural features  
(Re-derived using the source Rostamzadehshabestari, D. (2017))

1. Bedestans with cells :	<ul style="list-style-type: none"> <li>• Oldest bedestan types.</li> <li>• The interior space is divided into numbers of rooms similar to cells</li> </ul>	Edirne Bedestan 
2. Bedestans with shops outside	<ul style="list-style-type: none"> <li>• It has an empty inner space and shops outside.</li> </ul>	Serez Bedestan 
3. Arasta – Bedestan	<ul style="list-style-type: none"> <li>• two rows of shops stand face to face on both sides of street, they could be called arastes if they were not used as bedestans.</li> </ul>	Gedik Ahmet Pasha Bedestan 
4. Bedestans with Arastas	<ul style="list-style-type: none"> <li>• It is surrounded completely by arasta or an arasta occupies one or two sides of the bedesten</li> </ul>	Vezirköprü Bedestan 
5. Floor Bedestans (Bedestans occupying a floor in another building)	<ul style="list-style-type: none"> <li>• They were not built as independent buildings, but they have a floor for use as a bedestan.</li> </ul>	Rustem pasha caravanserai 
6. Plain and single space Bedestan	<ul style="list-style-type: none"> <li>• It does not have any divided plan in its interior. They neither have cells nor any shops in the outside.</li> </ul>	Bayburt Bedestan 

**Figure 6.** (Typology of Bedestans according to relationship with commercial structures  
(Re-derived using the source Oncel, F. (2014))



## The dissent city's urban form The in-tra-visible Cupa Perillo's case

Maria Fierro

Department of Architecture. University of Naples "Federico II"; via Forno Vecchio 36, 80134, Napoli

E-mail: maria.fierro@uninal.it

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**Abstract.** *This abstract investigates the potential of dissent city's urban form for architectural research in the context of the open city and informal urbanism. According to UN -Habitat, the world's population is becoming more urban and by 2030 one third of the population will live in slums, including in the Northern Hemisphere. From the point of view of urban form, the city grows until it loses its size...the city of urban facts is reconfigured as generic, it produces an urban landscape dominated by junkyards, residual areas that sometimes host informal settlements inhabited by vulnerable populations. This paper aims to explore a type of European informal settlements, and the proposed view considers them as urban complex morphologies, adaptable assemblies and an infectious phenomenon capable of humanizing contemporary cities. Where many urban projects have failed, the anarchic nature of these settlements emerges as an urban vital part of the city. Starting from some case studies of gypsy settlements around Naples, the project will explore their informal morphologies based on the hypothesis that informal settlements have a design logic that needs to be revealed. The research methods are a combination of urban mapping, description, physical analysis [etc] to create complex images and eclectic reading: an urban exercise of learning through informal urban forms to respond to contemporary challenges of evolving cities. This issue is part of an incipient research that aims to verify if and how the architectural project as a spatial tool can learn from informal urban configurations to act on other spaces that welcome other people, that informally transform non-places into places.*

## Introduction

«What is the city for us today? [...] Invisible cities are fragmented, contradictory, difficult to represent, they are exploded fragments of a world of which we possess waste» I. Calvino

This paper is part of an ongoing doctoral research that explores, in the context of sustainable urban regeneration and the idea of the open and multicultural city, the possibility of the architectural project to learn from the informal city in order to intervene, on the one hand, in precise contemporary urban spaces in the European city where we observe illegal and informal housing practises [...] of the recodification of human habitation (Staid, 2017); and on the other hand, to interrogate the role of the project - as device/infrastructure - in the broader questions of the right to the city, of the discrepancy between project and reality.

This paper explores those spaces - fringes, wastes, terrain vague, friches, junk spaces etc. - that harbour forms of the architecture of survival. - that harbour forms of the architecture of survival and that form that interstitial landscape through which difference can be accepted. The architecture of survival (Friedman, 2009) is spatialised in the forms of shantytowns, which no longer belong only to the countries of the global South, but whose unforeseen development we can observe in the spaces of European cities. The latter are not immune to the effects of globalisation and the configurations that Augé already defined in 2007 as world city and cosmopolitan city.

The article - which suspends value and moral judgements in relation to the phenomena studied, between legality and illegality - reflects part of what is called in research an observatory for the construction of an "atlas" of wandering cities. The exploration of these urban morphologies, halfway between the visible and the invisible, is presented starting from a reading of the metropolitan area of Naples, with the identification of urban transects within which to intercept spaces where communities, particularly Romani communities, have settled. The study of these settlements aims to fit into the disciplinary gap where these studies tend to be applied to the XXL-sized informal city in the Global South, and fits into the theoretical framework that increasingly sees informal settlements as organised and able to offer solutions to problems and issues disregarded by formal institutions (Ferroni and Ruocco, 2021).

The title - Urban Forms of the City of Dissent - attempts to hold together two concepts that seem to be an oxymoron: on the one hand, urban form, which refers to an image of order; on the other hand, dissent, which instead evokes ideas that change that order. These two realities coexist within the complex contemporary urban system, as J. Miller's photographic project, *Unequal Scenes*, makes clear. The photographs make visible the configurations of the city of the rich and the poor that form the oxymoron in the title, City. The project is about cities in the Global South, but morphological and phenomenological similarities are traced across the world at different scales [Fig.1]. We want to show how a seemingly (un)regulated form is subject to a - complicated - order and develops as an urban morphological configuration that persists in the city and, in the words of A. Brillembourg, could become the urban form of the future if the trend of global slumming continues and complex contemporary phenomena such as migration and multiculturalism intertwine material and immaterial aspects.

## Methodology

These spatial configurations pose a challenge to architecture and are relatively unexplored by it compared to the findings of other disciplines (Brillembourg, 2010). They are the result of extremely complex processes that are part of the panorama of great urban and human transformations that considers the disruption of the city and the form of the modern city as

parallel to that of urban life and suffering (Ricoeur, 2013). From a spatial perspective, the city of urban facts reconfigures itself as “unexpected, generic [...] multicultural and multiracial” (Koolhaas, 2006), dispersing across the territory, growing until it loses its scale, fraying at the edges, multiplying centres and leaving parts behind. It is precisely this splitting up from within that creates (in)tra/visible, shapeless parts that can be compared to slums, defined by UN-Habitat as urban areas lacking one or more elements: access to drinking water, access to sanitation, structural quality of housing, adequate housing and certainty of property rights. It is estimated that 32% of the world’s population lives in informal settlements and this trend is increasing and also affects the northern part of the world, as evidenced by the inclusion of the city of Naples in the 2003 UN -Habitat report, as well as anthropological studies that confirm that the phenomenon of contemporary slums is still little analysed in the West, although it is constantly growing. In 1978, Y. Friedman: “The Athens Charter is gradually being replaced by the Charter of Survival [...] when in town you go, slums you find”; Friedman had succeeded in recognising the signs of global transformations, anticipating contemporary literature that considers informal settlements as a “vital part of the urban ecosystem” (McGuirk, 2015). From this point of view, Lotus 143 - Favelas, learning from - is paradigmatic; it contains several contributions that guide the reading of the project in relation to informality; the slum is defined as a complex urbanist manifestation, “an eclectic and composite object, both material and imaginary, with important theoretical implications [...] that makes marginality and centrality [...] a problem par excellence for design and research” (Raio, 2010). In the same issue, the U-TT group tries to systematise the possible definitions of informality from a human point of view, from a theoretical point of view by considering informality as a complex system, and from a design point of view by considering the spaces of informality as an urban laboratory for experimenting with a form of socially oriented design. In-form is a term used to distinguish the spontaneous city from the planned one, but it is a word that includes form, the formless and the act of bringing into form; the opposition to planned forms does not coincide with a lack of form, but with the configuration of a form-other that is a “rich source of learning” (Lehman, 2020) that invites research in terms of the tools and approaches used to read and work the territory. Starting from these premises, the hypotheses on which this paper is based are the following: the recognition of a system of alternative rules and governance in urban informality that can ensure the functioning of a part of the city (Ostanel, 2017) and the capacity of a community to transform a space into a place in the anthropological sense (La Cecla, 2005). In line with the strand of informal urbanism, the proposed view seeks to construct/verify a third hypothesis that understands informal systems as complex urban identities (Saunders, 2008) and adaptive assemblages (Dovey, 2012), thus unstable, open and unpredictable urban morphologies.

In the 1980s, we realised that reality is not a structure that obeys universal rules, but a dynamically changing territory. And while a certain disciplinary tradition measured itself by “going beyond the surface of forms and inhabited spaces to describe the laws and deep structures of our cities” in order to find a new logical discipline of architecture (Boeri, 2016) paradoxically did not recognise the mutations that were taking place and that would result. The projects that were supposed to guide the development of cities are now flanked by a reality that goes in a different direction and often organises itself. USE Research focuses attention on these aspects in Italy and examines some urban phenomena that are unplanned and hardly controllable. “In the article that introduces the research, Boeri reinterprets the terms of urban analysis to explain the change of meaning that contemporaneity produces in a set of tools that must be updated if it is to have any relation to reality” (Scala, 2021).



We therefore present a case study that fits into this system of urban readings in order to understand a dense and heterogeneous social and spatial morphology. The methodology used does not rely on ethnographic experience, which, to be understood in this way, would require a prolonged stay on the ground, but is enriched by preparatory and continuous bibliographic research and exploration, phases of direct observation, visual recording and critical mapping, as well as phases of dialogue with some inhabitants, narratives, research in relation to news reports and exploration through satellite surveys with the final phase of mapping and reconstruction of the settlement, photographs and manipulations... which give an eclectic reading of the case, presented here partly in relation to the morphological aspects.

A clarification must be made: The state described today is, of course, improvable and could change as this paper is being written, because in informal morphologies there is a strong temporal dimension to the processes of small-scale gradual adaptation.

This paper refers specifically to informal settlements in the global North inhabited by Romani communities. This is because in Europe - but also in some cities in the Balkans - RSC minorities are discriminated against and displaced, both because of structural problems in the reception system and because in some Balkan countries they are sometimes still seen as undesirable subjects and therefore excluded from the urban system.

"From Naples to Bucharest, Romani communities are victims of a systematic violation of human rights, starting with the denial of the right to life. Despite the difficulties, they plan and implement survival strategies that, overcoming internal differences, represent the paradigm of those who want to preserve their specificity and autonomy without renouncing a place in the public discourse" (EU-ROMA, 2010).

According to the latest Associazione 21 Luglio report, there are about 180,000 Romani in Italy - estimates without supporting sources - of whom about 25,000 live between formal and informal settlements. It should be clarified that in relation to the phenomenon of encampment, also in Italy and in relation to the Romani communities, two types of spatiality can be distinguished: camps- institutions (rest camps, equipped camps, solidarity villages) - political devices - and informal settlements that structure themselves through self-organisation and build political-proxemics patterns (Piasere, 2004). Out-of-place (Fuori-luogo) settlements (Agier, 2020), despite the diversity and specificity of groups, are flexible, open systems that are never final and can change. The decision to investigate informal settlements is based on the fact that they bear witness to the emergence of a planetary phenomenon in Europe, that of the excluded and their shantytowns (Stalker, 2016); outposts that express the ability to use marginal spaces, at the limits of the achieved, the established, the ordered and the dominant order (Agier, 2020).

As outlined in the National Strategy for the Inclusion of RSC 2010-2020, the major metropolitan areas - Rome, Milan, Turin, Naples - are in a difficult situation due to the presence of a large number of diverse RSC communities alongside other marginalised groups. The case study - one of several in Naples - aims to better understand informal urban morphologies and was selected based on the criteria of accessibility and access to information and data, and the fact that it is one of the most 'urbanised' settlements. The invisible Cupa Perillo is a settlement in the northern suburbs of Naples, in Scampia, a part of the public city made famous by the Sails affair and the Gomorrah narratives. It is a relatively young part of the city, built since the 1960s as part of public housing. On the one hand, it is a symbol of the urban problems that affect the public periphery - with its intersecting social, environmental and economic problems - and on the other hand, it is a good example of intangible relationships that take the form of networks of associations working to change the image of this part of the city, starting from its main problems, including the Cupa Perillo settlement. Here, more or less since the 1980s, several Romani

communities have found their place. The identified urban transect has the only legal camp in the city and the informal settlement at its top. Between these two poles, different and diverse conditions of marginality, spaces of exclusion, enclosures, brownfields and enclaves follow one another, forming wastescape of varying depths [Fig.2].

When the urban categories of waste and marginality meet the human categories, complex entities emerge, as in the case of Cupa Perillo, which reveals “a void in which the poorest of the poor sometimes entrench themselves” (Augè, 2004).

The Cupa Perillo settlement was developed in an area that is itself an in-between space among discarded states that encompass a broader taxonomy of dross: a disused building, an ecological island, open dumping spaces that function as the inhospitable edge of the settlement, infrastructure bundles, urban and rural edges, and third landscape states... configuring this ‘third space’ in a very close relationship to an elevated road [Fig.3]. Cupa Perillo has developed through the repopulation of a space created by an infrastructure, the elevated road, which dominates the scenario and becomes a reference for the morphological development of the informal settlement. Originally, a few dozen people lived there, in the 2000s there were 700-800, today there are more or less 400, but there is no certain data to reconstruct it accurately.

It is inhabited by (former?) Romani refugees from Macedonia, Kosovo, Croatia and Serbia. It is likely that the first groups settled under the viaduct, where they could enjoy a state of total invisibility; as their presence increased, they then occupied the opposite areas, where there are now some inhabited areas and ‘ruins’ of the dwellings that were there before a large fire in the summer of 2017; the latter is indicative of the deteriorating state of the area and has brought this part of the city back into the press attention [Fig.4].

Y. Friedman argued that the morphology of the slum required a new way of understanding the underlying logic, as the informal logics were complex but coherent and the result of small individual decisions and a critical group; taking these principles into account, an attempt is therefore made to construct a reading of the settlement. Starting from a free space, the settlement develops along the causeway in a linear evolution, detaching itself from the Viale della Resistenza and spatialising - through various neighbourhood relations - family relationships and dynamics. It nestles closely to the urban edges, knows how to read their characteristics and exploit their contingent conditions. Even from above, one can follow the groups of extended families that are separated from the others by physical dividing elements. The view from above is sufficient to reconstruct the family tree of the families present and also the progressive increases due to family events such as marriages, the birth of new groups or the independence of some family members. The result is an extremely changeable and ‘speaking’ form that could be described as open. The clues are found in the informal toponymy introduced by the inhabitants and in their narratives when they describe the place where they live by identifying three parts with relative micro-enclaves in it: the right, the left and the Macedonian part. The reference point for identification is once again an existing and common material of the city, a roundabout under the elevated railway, above which is an emblematic mural with the inscription: Can I come in?!

Cupa Perillo is in.tra. visible, and walking along Viale della Resistenza one does not notice it except for a few hints. The edges of the settlement, which vary in thickness, can be classified as “strong” - that is, not only visually salient, but also continuous in form and impenetrable in crossing (Lynch, 1960); it is the lack of relationship and perception of the elements of the settlement from the street and vice versa that leads us to define them in this way, even if they are of different types. The full perception of the dwellings only occurs when one is at a point

that is already within the settlement. Even from the dwelling cores, one does not perceive what is happening outside and what is happening in the other parts, either because of the grouping by fences or because of the existing piles and the morphology of the micro-enclaves themselves. The edge as a device is configured at different scales and assumes different roles in the development of the settlement. The accesses along the edges regulate the mechanisms of exchange from the inside to the outside. The Viale della Resistenza becomes the main artery from which other capillary routes branch off to supply the individual clusters. The only area that has more direct and visible access is the Macedonian area, while the areas to the right and left have more capillary branches that become denser as the morphological system of the settlement becomes denser; a system that organises itself and seems to spatialise Smithson's diagrams. Beyond the urban edges and thresholds, the informal configuration develops with two types of grouping, one linear and one clustered [Fig. 5]. The former is more present in the left part of the settlement below the viaduct, the latter is more visible in the more open areas, in the Muslim part, which is a large family cluster, and in the right part, which is obviously more numerous. The relationships between the fixed and empty spaces have changed a lot in recent years, but the residential density is still high in relation to the number of inhabitants per dwelling, the fixed spaces are essentially the dwellings, while the open spaces are distinguished by 'degrees of collectivity' into public and semi-public. This form of morphology is spatialised according to family ties and the desire for openness/closure to the other communities present and is composed of the following elements [Fig.6]:

- The enclosure: a linear element that separates the space of households from each other and from the actual collective connecting space. Fences are erected on an area - in the slum - the part of the land outside is considered public and the fences themselves can be public or private (Friedman, 1978) - and this is exactly what can be observed in the settlement. The fence is an archetype that defines the act of settling in a place and building a shelter, but it is also a visual and relational means of regulation; it is the true threshold to the space in between, which is not yet private, but not yet collective either.

- The space in between. As an intermediate space between the collective and domestic dimensions, it takes on the character of a courtyard when it is a single house and the character of an urban void that structures the layout of the houses when they are in the form of a cluster. It is an open relational space and the actual collective space where a critical group decides to share and inhabit the space. It is usually furnished with objects that convey an image of conviviality and togetherness; it is also the space where the family gathers and where they all stay together; it is interwoven into the verandas and spaces in front of the homes and holds all the entrances together. Especially in the "pink houses" one senses its collective value. When you cross the threshold, you find yourself in an intermediate space with a tree and a statue of the Madonna in the middle, around which guests are welcomed. It is the place of conviviality and exchange, it is the space of ritual, celebration, community and where other communities are welcomed, it is the construction of a void full of meaning.

- Dwelling. The dwellings in this settlement are all single-storey, their entrances always mediated by the intervening space; even when grouped together in a row, they almost never face the access road - which is therefore dominated by the linear boundary elements. The houses, the bodies of the settlement, are made of recycled materials, often building rubble, which are creatively reassembled and seem to recall the experiments of L. Kroll in their appearance. The houses are expandable, changeable... they are open, in the double sense of constant change and relationship to open space. Never complete, imperfect, expandable and adaptable. They create additional spaces by constantly evolving on an architectural level and in close

relationship with family dynamics. One important element - the domestic hearth - is the space immediately outside the house, configured as an additional in-between space among the shared interstitial space and the interior space. Sometimes it is marked only by a different floor covering, an eaves, the positioning of the kitchen, or even just by elements such as a table, a sofa or a settee. The interior is organised around a living area that is in continuity with the exterior, while the enclosed spaces are the very private spaces, such as the bedrooms;

- Traces. In the settlement the traces of what was there before remain. When a family moves out, the traces of the previous settlement remain, unless there is a need to reoccupy the space. Some parts of the settlement that are empty today do indeed give an impression of what it was like at the time of the largest settlement, sometimes they are ruins of what is left, abandoned houses, elements of passageways.

- The street. Paths are the meeting space between different communities, which is the case in large settlements that take on the dimensions of a city. The cross-section of internal paths varies according to the conditions they intercept. The human dimension is reconstructed with heaps, but orientation is lost due to the absence of recognisable elements, especially in the sections that connect different parts of the settlement. As a space of interaction, it can also become a space of friction, but in any case, it is a space of interaction between smaller and the primary space where one meets others before having access to the intervening and more 'private' open space. They are not equipped with pathways, but are dominated by visual barriers and fences that essentially configure them, allowing glimpses here and there of what is happening near the dwellings. They are capillaries that go out at night, allowing only the islands of the individual extended families to emerge.

Within the settlement areas, these elements, unstable devices, assemble to construct this seemingly (un)regulated morphology. As in the case study presented, the element of time becomes a design material that configures the variations and changes of the informal morphology. The continuous reconfigurations are legible at the architectural level, while the urban reconfigurations become visible over the years, where the form adapts, changes, as the people who live there change. This mechanism makes the interconnected variations of the Cité and the villas extremely visible. As for the urban dimension of the settlement and thus its relationship to the neighbourhood, the first spaces of interaction between Romani and Gagé, between the inhabitants of the settlement and the inhabitants of the rest of the neighbourhood, are immediately outside and dispersed; the interior remains a totalising space.

## Conclusion

Knowledge of these settlement patterns - grammars of the re-signification of certain spaces in the city - makes it possible to identify new possible architectural means that shift the aim of the project from a purely formal result to an open strategy that emerges from a reading of contexts and situational potentials. These changeable, heterogeneous and unstable places - with constantly shifting balances - are the kind of spaces that challenge architectural design and research. They need to be explored with a lateral thinking oriented towards the capacity of urban informality to 'produce' space and address unexplored challenges in housing design. The aim of this paper is not to propose operational design categories, but to begin a reading of an informal morphology that changes with society and exists for socio-economic change. Questions remain: How do we translate these unstable forms into architecture, that is, how do we 'inhabit' the short circuit between formal and informal? Our aim is to continually focus on how these settlements function, to explore and investigate invariants, to understand what design themes emerge, what architectural means of interaction and resettlement; but also, to

be able to read the spaces in between as potential activators of new virtuous urban processes. What is the role of architects in these contexts? The project, the design observation that asks these questions, testifies to the discipline's ability to question itself in relation to real problems. An opportunity to move between informality and formality, between the public and the private, between the standard and the non-standard.

One possibility is suggested in research that considers informality as a method; learning from informal architectural devices to think of the project as infrastructure or catalysing refinement by working on hardware and software logics that can take root from time to time. Both approaches seem to have a common matrix: Le Corbusier's urban planning proposals for the Plan Obus for Algiers, which is an example of architecture as the infrastructure of space, looking at the areas left to those who use them (Marini, 2010).

The elsewhere has disappeared from the horizon of a world that has become a global village, to reappear in the hidden and often messy folds of our here, which claims to be everywhere (Romito, 2021).

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Figure 1. author's elaboration – Collage about informal settlements of South e North World

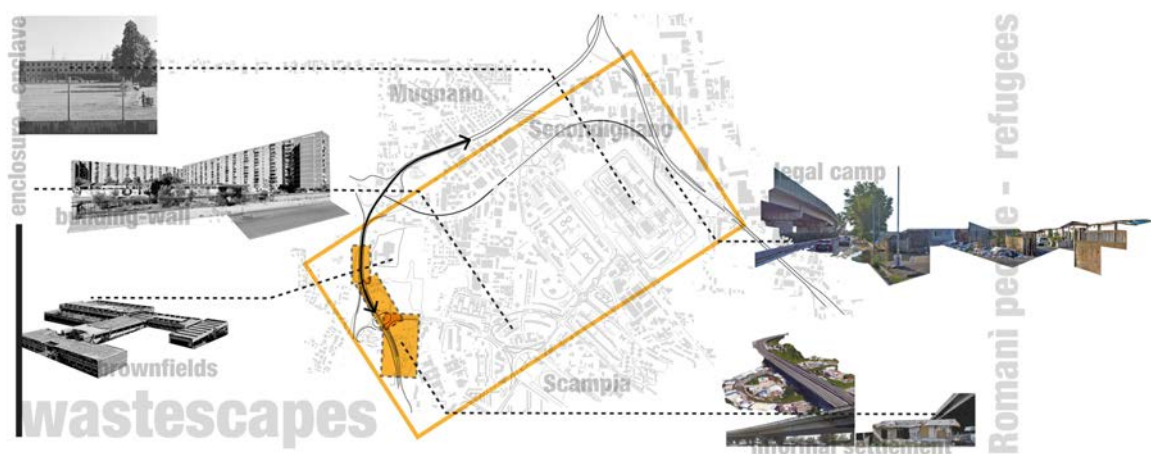


Figure 2. author's elaboration - Urban transect diagram

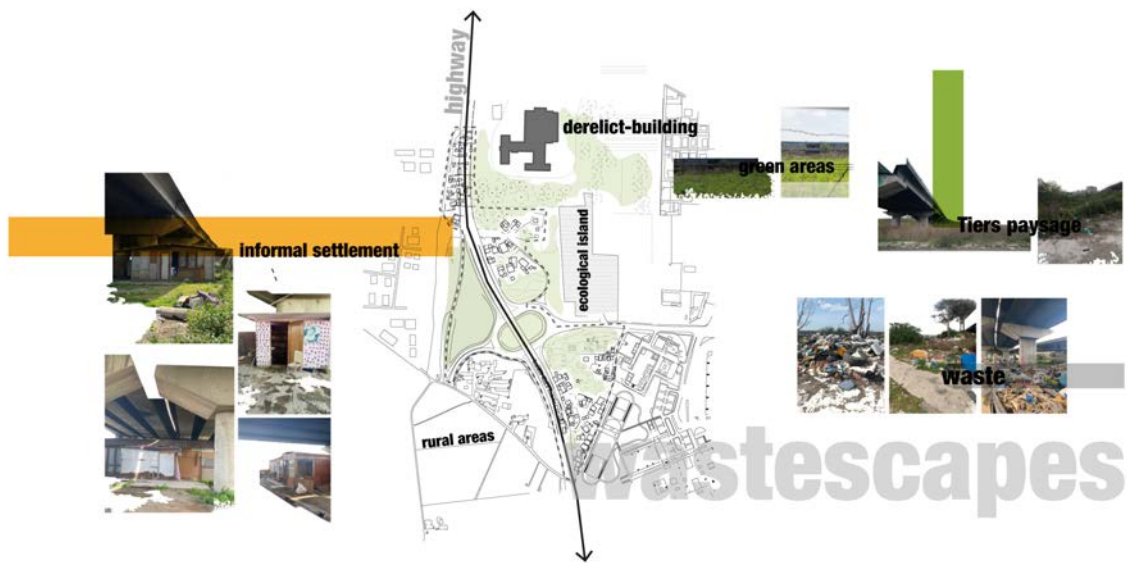


Figure 3. author's elaboration - Taxonomy of the Cupa Perillos's drosses

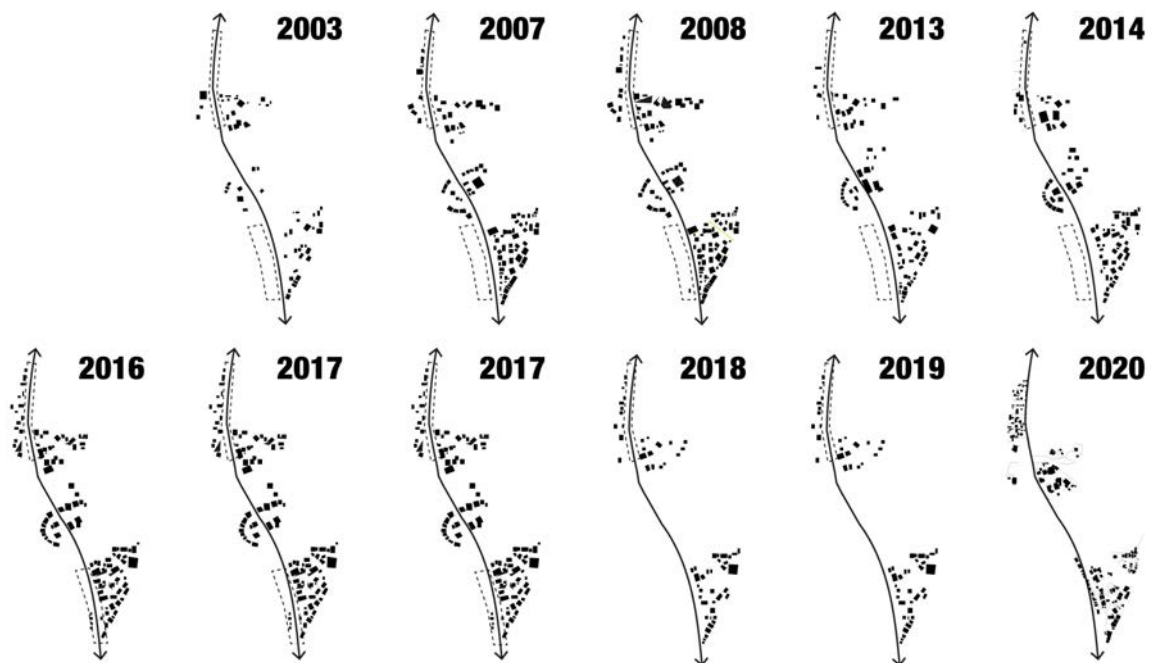
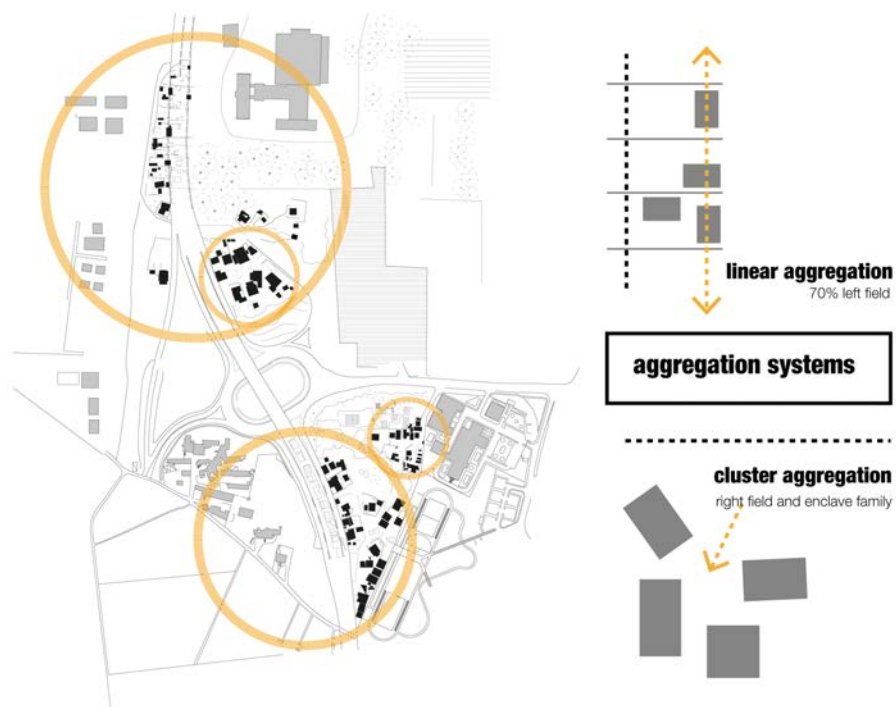


Figure 4. author's elaboration - Evolution of informal settlement. Diagrammatic reconstruction based on information recorded with Google Earth





## Programmatic and paradigmatic components. Iconology in the relationship between Architecture and Urban Morphology

Tommaso Lolli

Dipartimento di Architettura e Progetto. Università La Sapienza. Via Flaminia, 353. 00196 Roma.

E-mail: [tommaso.lolli@uniroma1.it](mailto:tommaso.lolli@uniroma1.it)

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**Abstract.** Contemporary architecture implies the increasing rarity to work on a context devoid of human transformations, even beyond the simple anthropization of territories. Instead, it is much more common to manipulate built environments, layering new levels of functionality and meaning in a continuous process of rewriting the city. Whether it originates from the natural modification of the historical heritage or from emergencies – such as post-war destruction – the question is to identify what the point of contact between respect for certain morphological constants and design experimentation might be. The reflection concerns more specifically what relationships may exist between the urban fabric and the building, taking as a pretext the distinction that Rowe (1999) makes between some programmatic and other paradigmatic components of some architectures, implying in fact the possibility of reading parts of the building as representative and others as instrumental. This interpretation, originating from a western architectural practice, is also found by Bianca (2000) on the monumental and residential Islamic fabric, thus allowing an abstraction from the specific case to the investigation of a compositional mode, which tries to absorb the form of the city while maintaining a strong autonomy. The final attempt would be to balance these theoretical experiences to outline a hypothetical moment of overlap between field and form, which allows architecture to actively participate in urban morphology and to become part of it, assuming an operational value in the definition of a substantial synecdoche between architecture and the city.



## Introduction

It is increasingly common for contemporary architecture to face an environment rich in history and pre-existences, meaning a built heritage that goes far beyond the mere anthropization of land and landscape. The context of application of a large part of the architectural discipline – at least if one considers the so-called Western world – is in fact a deeply urbanized territory, of which the architectural project must often select, reveal, accentuate, or modify certain parts. If already since the post-World War II period the precarious condition of the built heritage has led to the realization of many new architectural insertions to supplement and/or modify the existing heritage, it is since the 1960s that reflection and studies on the city and urban phenomena have increased considerably: the city is no longer understood only as an element in natural growth, but one that presents specific formal characteristics due to equally specific modes of growth. And just as attempts are being made to dissect the nature of such modes, attempts are also being made to identify design protocols, practices and methods that take into account the urban identity of the context without giving up on design figurative autonomy, thus implying a continuous process of rewriting, modifying and re-signifying the city. And if nowadays the preciousness of such studies seems evident – acknowledged the need for specific expertise to support the manipulation of the built environment – and a disciplinary maturation is deemed desirable on how it is possible to balance design strategies that deal with “both [del]the validation of permanent emergencies and [del]the energy of mutations” (Rogers, 1958, p. 22), how to intervene in morphologically and typologically defined contexts is still a matter of debate.

This is not the place for a complete examination of the theories and design approaches that refer to this topic; instead, the reflection that we want to propose concerns a specific way of reading some case studies, which seems to prelude the possibility of breaking down some components of the project, highlighting different urban roles of these parts in an attempt to combine together both the energy of mutation and the validation of some permanencies.

Program and paradigm in Colin Rowe

The possibility of isolating certain parts of projects to make them respond to different roles is inspired by Colin Rowe's essay *Program versus Paradigm* (1999), in which the author – having already initially placed architectural and urban planning practice under the same lens – defines two tendencies that, believing themselves mutually exclusive, relate in opposite ways to the subject of the architectural project.

First to be introduced is the program-prone tendency, the tendency from apocryphal descent from the Modern Movement – in those years also referred to as naive functionalism due to the gradual discoloration of its original value system – which identifies the adequacy of design project from the moment it is responsive to the needs and contingencies whose resolution was indicated as a prerequisite. On the other hand, there is the paradigm, that procedural tendency that is based on the recurrence of the typical and the typological – with some yielding toward Platonism – that finds its ancestry in the figurative datum. However, these two tendencies are not introduced with a reconnaissance purpose only, but as dialectical extremes that, alone, are incapable of providing a satisfactory answer: “in both cases the possibility of intrinsic novelty is implicitly denied. In the former case, the future is nothing but an extension of the present (surely intolerable), while in the latter both the present and the future are nothing but a continuation of the past (surely no better)”. (Rowe, 1999, p. 10)

The city of Austin (fig. 1) is used as an example of a paradigm that we could call a genre paradigm (if the term of comparison were an author's project): a city “with a surveyor's grid in which certain symbolic gestures have been inserted quite conventionally”, such as the four-

partition layout, the presence of a central square, one in the middle of each quadrant, and an orthogonal grid that regulates the composition, to be understood as symbols of a simple and explicit value system. The limitation of this layout, however, goes back to its ideality, understood as its inability to absorb variations and contingencies: in this plan without a program, “reality can only gradually invade the ideal”, and – as it happened – present an eccentric growth or a diagonal railroad section that breaks the initial orthogonality. But if form already struggles to contain reality, a program without a plan can only, paradoxically, suffer the same fate: with urban history unfolding during centuries or millennia, it is indeed unlikely that the hypothetical founding program of any city, such as Austin may be, can foresee all the unpredictable complexities that history introduces – practically impossible considering the speed and compression of historical changes that take place nowadays.

But it is Colin Rowe himself who highlights the virtue of this otherwise winless clash: “when confronted with two theories that are both incomplete, a conscious humanity – when it thinks – will begin to consider the possibilities of their dialectical interanimation”. (Rowe, 1999, p. 32) The recourse to dialectical argumentation allows Colin Rowe to determinate an operational perimeter, within which to experiment with a different combination of solutions in order to find the one that comes closest to a possible balance; it is by abstracting the two categories of program and paradigm that one can in fact consciously choose a field of action, moving in architecture’s sempiternal tension between technique and art, between compliance with utilitarian criteria and symbolic representativeness. If the identification of a latent theoretical substratum in Rowe’s bibliography is considered possible and legitimate, the perimeter can be further enriched by other dialectical oppositions pertaining to the same tension: for example, the opposition between talent and idea – which pits skill against intuition, tradition against revolution – that between figure and ground, archetypal and accidental, representational and circumstantial, grid and object... Specifically, these latter oppositions are of extreme interest in determining a possible avenue of inquiry that deepens the relationship between architecture and the city, seeking to nurture an overall vision that does not simplistically consider architecture as object and the city as structure, but provides for a twofold reciprocal overlay that gradually leads to blurring the role of the building not only to form (and thus object), but also to field.

Architecture and the city. Components in transparency

From this point of view, we want to continue the discussion, highlighting the recurrent emphasis on the study of some cases that sufficiently but not necessarily abstract a possible relationship between architecture and the city.

*But it is perhaps on the question of the urban significance assumed by certain architectural objects that Collage City touches its most interesting points. [...] What is being asserted, in essence, is that certain projects or buildings express particular qualities not so much from an architectural or stylistic point of view as from the point of view of the relationship they establish with the cities in which they are located, that is, they are to be judged with respect to the effects induced or that would have been intended to be induced on the urban context surrounding them.*

(Furlong, 2010, p. 176)

Alberto Furlong refers specifically to the chapter The Crisis of the Object and the Unstable Surface contained in Collage City, in which Colin Rowe proposes to “reconsider the object and to evaluate it not so much as form as field” (Rowe and Koetter, 1981, p. 113), weaving a

system of relationships between the architectural work and the urban context. Redolent of an essentially gestalt-like inversion of contemporary urbanity – through the juxtapositions between Le Corbusier's San Diè project and a portion of the city of Parma, and Vasari's Uffizi with the Unitè d'Habitation in Marseille – Colin Rowe presents two projects resilient to the supremacy of the object, represented by Auguste Perret's competition design for the Palace of the Soviets and Asplund's Chancellery Building, which, in addition to their own value as primary elements, add a heteronomous representational level with respect to the city by reading, reinterpreting, and conforming the urban morphology and its voids.

*But if functionalism proposed the end of typologies in the name of logical induction on concrete facts, it is precisely because it was unwilling to consider iconic meaning as a concrete fact, because it was unwilling to represent particular physical configurations as instruments of communication, that it has very little to say about the deformation of ideal models.*  
(Rowe and Koetter, 1981, p. 120)

The allusion is to the typological deformation that Sant' Agnese in Rome applies to the reference of Santa Maria della Conciliazione in Todi: Sant' Agnese maintains the representative features of the reference model as an isolated building, but at the same time it also entertains a relationship with the profile of the nearby buildings and with the limit of the void of Piazza Navona, in fact exercising a dowry of representativeness and at the same time a function of containing margin in the design of the open space; in other words, it also becomes field as well as form and therefore a co-participating element – and not opposed – of the urban morphology. Again from history emerges perhaps the most representative case of this double tension – Palazzo Borghese in Rome (fig. 2) – which externally panders to a totally irregular lot, at the same time not renouncing a representative internal system, in the perfectly regular façade and courtyard – in fact declining the theme of program to the deference of urban alignments and that of paradigm to the structuring of a symbolic space of its own and autonomous: “with its ‘perfect’ courtyard inserted in a volume with a very ‘imperfect’ and elastic perimeter, with the building conceived with the dual awareness of the archetypal and the accidental, it produces with its duplicity of evaluation an internal situation of great richness and freedom”. (Rowe and Koetter, 1981, p. 121) It is inevitable to note how the duplicity between archetypal and accidental can merge with that between paradigm and program, recognizing the ability of some architectural works to act on a double register and a double scale, the architectural and the urban: paradigm and archetypal as a representative and autonomous register, program and accidental as a compromise and heteronomy toward urban morphology. An issue attributable not only to architecture from the Western world, in the Islamic context the overlapping of these two registers is also more common, probably reflecting the habitus and those social patterns that so strongly characterize the introversion of that culture. Just think of the Great Mosque of Isfahan (fig. 3), the geometric rigor of its courtyard with four iwans and the gradual, hazy fading of its peripheral margins – actually adhering to the morphological structure of the city; and whose image perfectly fits what Ferlenga writes:

*It is affirmed, through these examples, the existence of a complexity that [...] leads some works to assume specific characteristics whose implications can be understood only by considering the relationship with that particular city that determined its existence and appearance and with the general tradition of the city. [...] The city is, in short, the field of action that generates the techniques, the culture, the models suitable for its own transformation; it is, in a way, the*

*main material of itself, and the projects considered by Rowe express this characteristic of urban development by analysing in particular the potentialities related to the condition of fragment through which they express themselves. (Furlong, 2010, p. 177)*

The assumption that the city contains its own genetic patrimony and is material to itself is a derivation of André Corboz's hypothesis of city and territory as palimpsest (1985); what is instead of extreme interest is to note how, within a palimpsest, a synecdotal relationship between architecture and city, between fragment and whole, can occasionally be found. A fragment that, as Tafuri (1984) writes, does not carry within itself the nostalgia of the whole, but instead contains its genetic trace and opens to all possibilities of reconfiguration, to new modes of fulfilment.

The legitimacy of such an analysis seems to take its cue from another Roweian definition, that of phenomenal transparency, defined as the precise transparency that allows the understanding of multiple overlapping figures – and perhaps even co-present meanings – simultaneously, without losing the recognizability of each individual figure. It could be called overlapping levels, all of which are legitimate and plausible, and which together share the complexity of a true reading of the project.

The main instance in the Islamic world is that this possibility of transparent reading – or juxtaposition between a soft, heteronomous margin and a representative, autonomous internal system – is common, mainly, to representative buildings (kahns, madrasas, mosques, maristan, and so on), but also to the residential and connective fabric of the city:

*The hollow volume of the courtyard shapes the building, as if it were the imprint of a powerful invisible matrix in a soft mass of clay. [...] The house plan thus shows an interesting architectural dialectic between the mostly irregular contours of the lot and the perfectly geometric incision of the courtyard, which is the determining factor in the development of the built form. The main rooms follow the geometric pattern of the courtyard, while the smaller rooms are used as "filler material" to absorb the change in direction and mediate between the chosen geometric structure and the irregular shape of the lot. [...] Symbolically speaking, the symmetrical and totally balanced order of the courtyard can be interpreted as the timeless centre of gravity of the house, while the periphery responds to the circumstances and pressures of the earth's environment.*

(Bianca, 2000, pp. 81–82)

Although in the Islamic world even housing itself plays a widespread spiritual role, it is interesting to note that even in the – theoretically – filler and neutral fabric of the urban structure, such a marked dialectical tension between a representational and a circumstantial component – using Rowe's own words – can be found. As can be seen in the two examples given (taken from opposite sides of Dar al-Islam – fig. 4), an almost sprawling settlement attitude can be identified, which welds the edges of the project to the context (whatever it may be) while articulating within it a central and ordered system of high representative content.

In the Islamic world – in which form sharply supersedes function and courtyard building turns out to be the main and most common settlement solution for both residential and public – what changes between buildings with different destinations is substantially the dimensional and proportional datum, while the compositional dialectics that characterize their form, however, remain unchanged. It is not intended here to provide a comprehensive overview of typological solutions throughout the Islamic world, but to point out how, at different functions – and in

different places – the same settlement attitude can be found, represented by the scalar and dialectical relationship between architecture and the city previously defined through synecdoche.

Just as the Grand Mosque in Isfahan was briefly introduced earlier, the same procedure could be used for the description of other case studies. For example, the Madrasa of the Sultan Hassan Mosque in Cairo features a square inner courtyard with an iwan on each of the four sides – symbolic of the four Koranic schools – and in the resulting corners adapts and compresses residential units for students in accordance with the urban morphology. “The building shows the typical aptitude in the composition of a totally balanced and autonomous interior space, while the more flexible residential units for students are used to fill the intermediate spaces between the perfect courtyard shape and the irregular outer perimeter of the area”. (Bianca, 2000, p. 113) Even more didactic might be the reading of the souks, the markets, in which the geometric instances are proper to the structures of stowage (the kahns) and protection of goods (the qissariyas) while the insertion and rootedness in the urban context occurs with the binder represented by the sales cells, the actual stores (fig. 5).

Iconology and the relationship between architecture and urban morphology

While this may not be the most appropriate venue for an in-depth discussion of the symbolic meaning of such constructions, a brief comparison with Erwin Panofsky’s theory of meaning can only paint a more specific picture on some issues. Panofsky – like, moreover, Rowe himself – shares as a hypothesis Cassirer’s assertion that it is difficult to identify a human gesture that is completely without meaning; and from this observation various levels of signification are identified. At an initial level are the primary (or natural) meanings, which allow the recognition of forms and their expressive qualities – in our case it could correspond to the distributive and volumetric features of a building, the recognition of its composition; recognized primary meanings, these can be combined with themes, to form images (or allegories): to the formal datum, an allegorical quality is added that allows for an iconographic interpretation – for example, the general typological layout of the Madrasas with the four Iwan courtyard as a representation of the four schools of Islamic law – and these are the secondary (or conventional) meanings. Both meanings – grouped under the epithet of phenomenal – indicate a level of analysis that is reconnaissance and descriptive, anchored in the object of inquiry.

The relationship between program and paradigm, on the other hand, seems to insist on the level of content (or intrinsic meaning), or that meaning which “is learned by identifying those underlying principles that reveal the fundamental attitude of a nation, a period, a class, a religious or philosophical conception, qualified by a personality and condensed in a work”. (Panofsky, 1955, p. 35)

In fact, an iconological reading allows that synthetic and non-analytical effort (an attitude derived from the suffix -logy instead of -graphy) useful to consider such a relationship as a symptom of the structure of the social and cultural context from which it was produced, in a mutual and reciprocal influence that elevates architecture from its physical body to a structural element of society as a symbolic element. In this context it comes moreover natural to extend what is defined as society into an overall conception of the city: in fact, it is believed that the relationship, in fact iconological, insists on the relationship between the architectural element and the city, understood, however, in its being a unique and therefore unrepeatable artifact. What we want to show is how, while having their own representational autonomy, the buildings discussed also have a formal apparatus, tending to be peripheral, which, on the other hand, is the contextualization of representational instances in the context of the city’s form, ultimately resulting in the interpretation and reflection on the urban phenomenon as a whole – both from



a historical and morphological point of view – as a reworking of a morphogenetic and implicit heritage in the context of construction. In other words, thus plausibly admitting the identification of (at least) two components of the project, a scenario is defined in which the following are co-present: a hierarchically central core, autonomous and representative of the complex, a guarantee of the possibility of modification and implementation a priori of the built; a peripheral and irregular body that borrows and selects from the context the modes of rootedness – a portion that thanks to the datum of its accidentality is a guarantor of the a posteriori, unique and biunivocal relationship between the architecture and the city of reference. In the diagrams that have been proposed, a central core is highlighted in black – in these cases we have written mostly of voids, but it is extendable to solids as well – which is given the role of centrality, autonomous and representative of the building. Surrounding this is a band of friction, relating the geometrically pure centre to instead a peripheral margin that panders to the permanencies of the city. And as much as this component endowment is detectable on the Palazzo Borghese as it is on the Grand Mosque in Isfahan, and on a number of other buildings of such diverse extraction that it seems to be able to allude to a compositional *modus* regardless of context. This phenomenon may be ascribable to the deformation of type, as pointed out for example by Siola (1966, pp. 38–40), who finds that in the medieval period the deformation concerned the building as a whole – thus also involving the courtyard – while in the Renaissance period the deformation concerned more the edge of the building, keeping its main characters unchanged. Rowe's merit lies, in this context, in extending the problem to the question of relationship to the city: no longer considering the individual building in its isolated presence as an object, but also in its role as an urban device. Such a distinction poses a question to the discipline of extreme topicality, returning to the permissions drawn up in the opening, both with regard to reconstruction in destroyed contexts and with regard to the natural evolutionary change of the historic city: how to balance the needs to maintain certain permanencies to guarantee the transmissibility of the urban identity of a place – think of open spaces, street layouts, hierarchical relationships, the height of frontages, etc. – with the culture and disciplinary freedom of the admission – and probably the very necessity – of modifiability as a quality and characteristic proper to the city. It is perhaps in these abstract collages of historical images that one can look for a possible way that mediates between the monumentality of the temple and the soft and anonymous structure of the city, highlighting the compositional virtues of certain buildings that simultaneously express their uniqueness and a responsiveness to the context: an induction to the dialogue between architectural element and city that could stand in *medias res* between the assertion and the deduction of form, elevating both to a building as part of the city and to a city recognizable through the building.

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## Illustrations and Tables

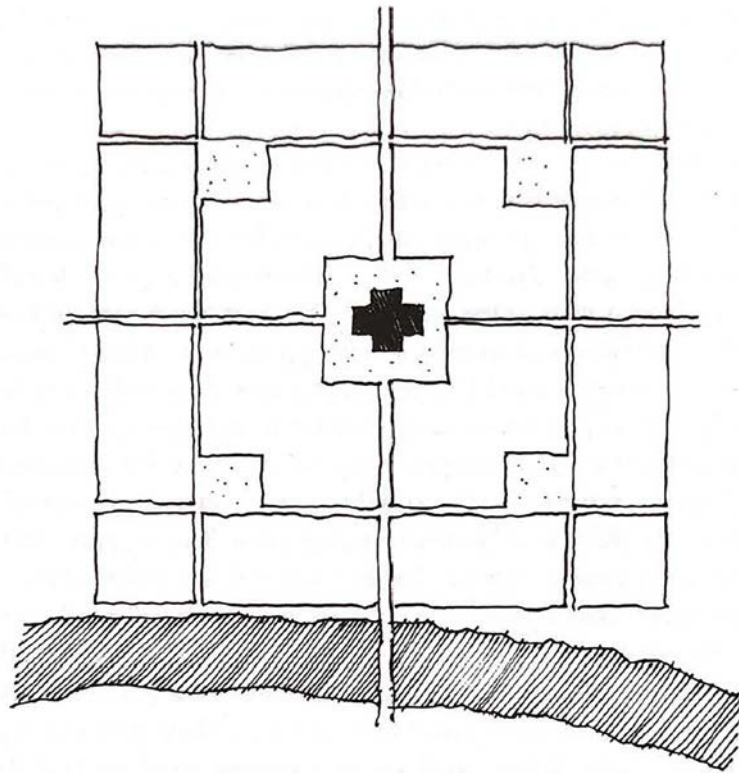


Figure 1. Diagram of Austin by Colin Rowe

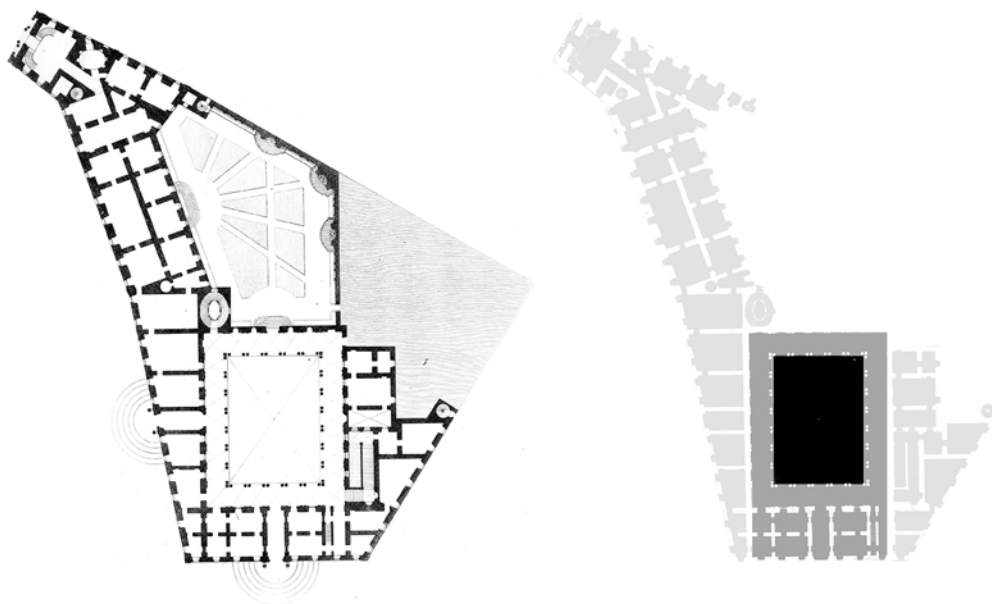


Figure 2. Palazzo Borghese in Rome and its structure layering

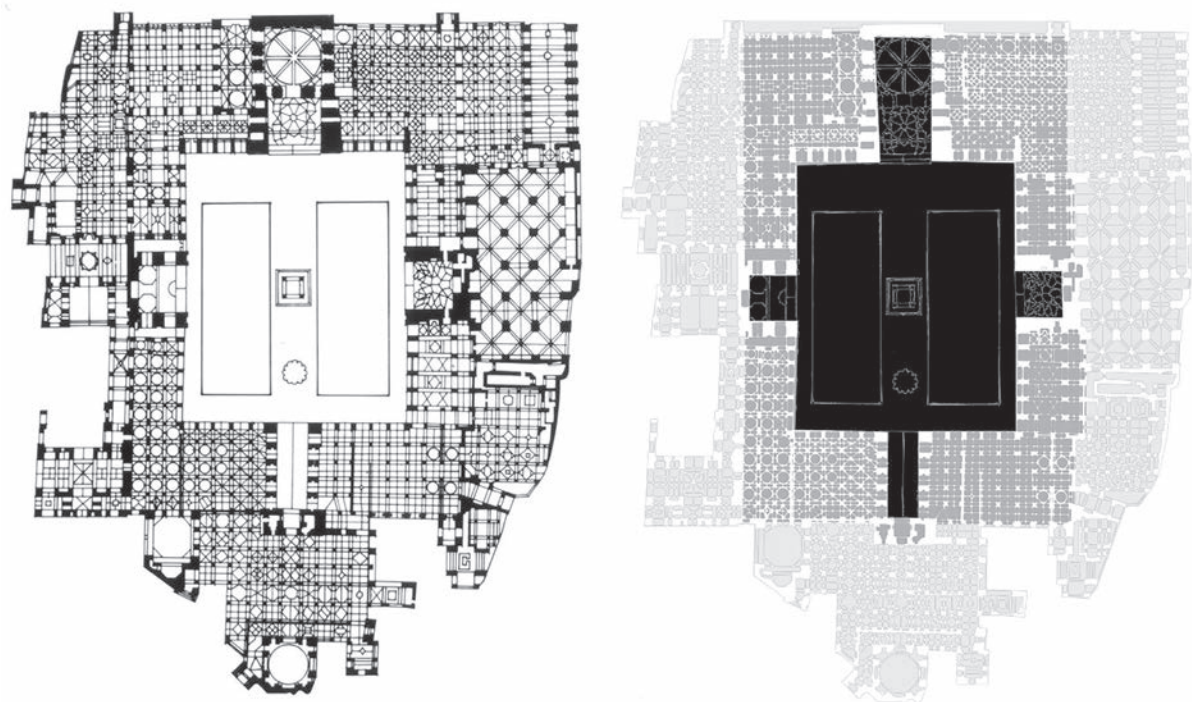


Figure 3. The Great Mosque of Isfahan, Iran

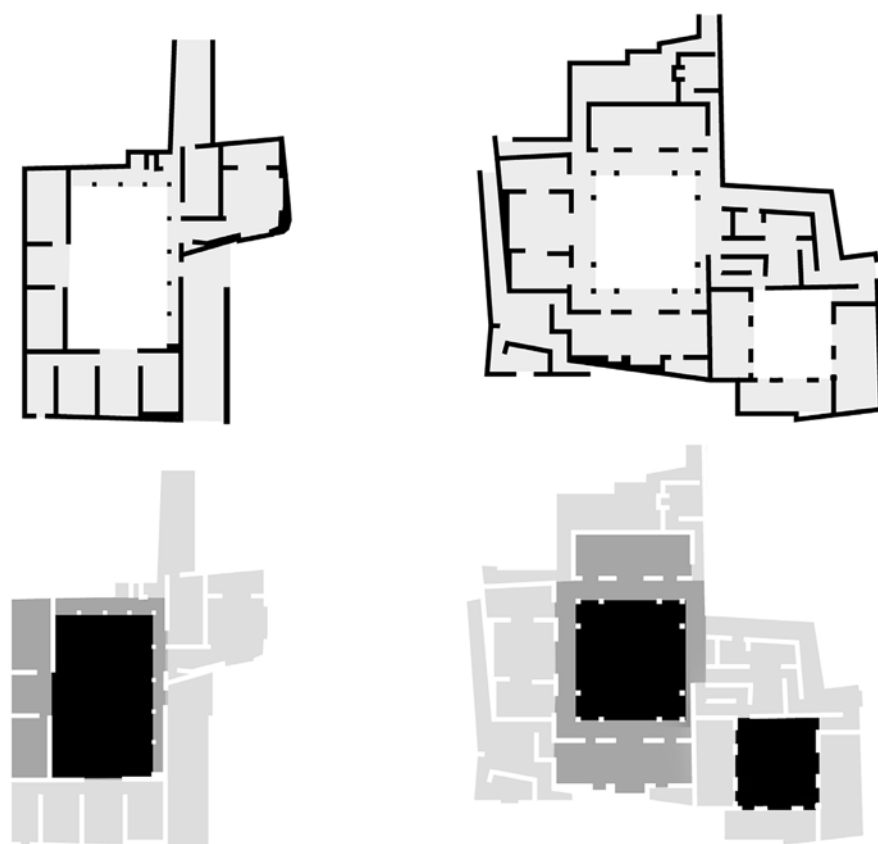
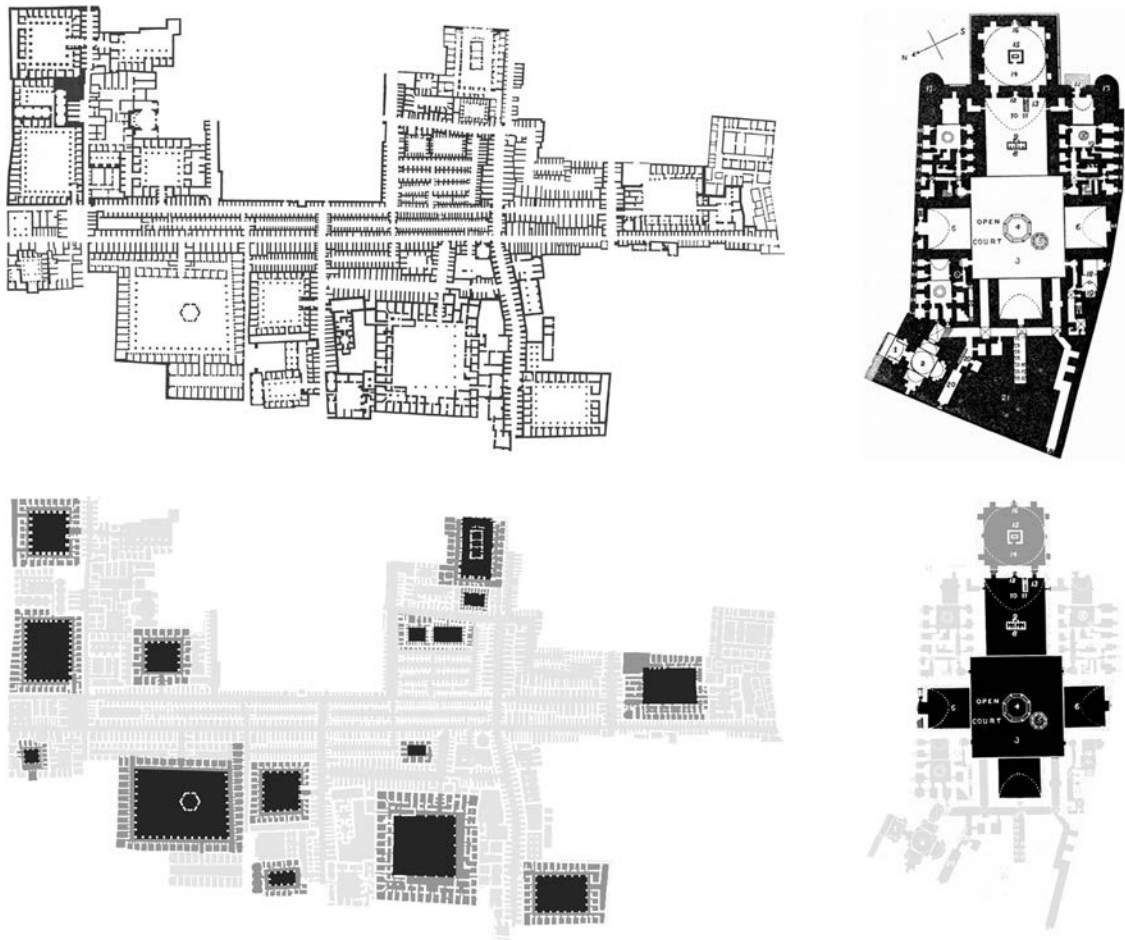


Figure 4. Two islamic residential units. Left, a unit from Fez (Morocco). Right, a unit from Aleppo (Syria)



**Figure 5.** The Souk of Aleppo (Syria) and the Madrasa of Sultan Hassan in Cairo (Egypt)

## Reading the ancient city: projects for the archaeological area of Tyndaris.

### The form of the nature, the form of the city, the value of the monument

Oreste Lubrano

DIAP, Department of Architecture and Design. DRACo\_PhD in Architecture and Construction. Sapienza University of Rome.

E-mail: oreste.lubrano@uniroma1.it

*Keywords:* Tindari, ancient city, urban form, natural form, monument

*Conference theme:* Reading the Changing Urban Form

**Abstract.** *In the Mediterranean, perhaps more than elsewhere, it is possible to recognise a close network of relationships between man-made spaces, which are manifested through their form, and the territory, understood in its broadest interpretative extensions as a complex system of geographical signs and historical traces. The result is a morphological and spatial richness in which it is possible to trace multiple archaeological entities that, dotting the territory in very different landscape settings, can represent a resource and an opportunity for the redefinition of relationship between space and form, between architecture, archaeology and nature. In the perspective of a balanced construction of the inhabited spaces and the territory that hosts them, it seems useful to investigate the value content – historical and formal – of the archaeological findings as signs of the collective will, guardians of tradition and shared memory, which aspire to free themselves from the condition of “alienated fragment” to reintroduce themselves within the urban and territorial dynamics, becoming architectural elements able to determine new forms and new meanings.*

*The paper aims to examine some of the design solutions proposed in the competition for the enhancement of the archaeological area of Tindari: a comparison that would make possible to identify some analogies in the different approaches related to the theme and the meaning of the place. The case of Tindari is of particular interest with respect to the themes proposed by the Call because the ancient city presents an urban structure that is still readable and can be made more intelligible through the project. Landscape, archaeology and urban forms, thus, constitute the poles around which the discourse could be articulated, investigating the relationship that has been lost, but which has to be re-established, between the extraordinary landscape of Messina and the archaeological presence to which is recognised the value of monumèntum.*



## Introduction

Although the theoretical research offered by some scholars on the inherent characteristics of generality and transmissibility of the ancient-new dialectic has been a widely debated topic, it continues to cyclically animate cultural disputes in the Italian architectural scene and beyond. A relationship widely experienced in properly stratified urban fabrics - with reference to the so-called "urban archaeologies" - that for several decades has been attempted to be extended to the broader territorial conditions in which archaeological cities are often immersed in nature. To measure oneself today with ancient ruins means first of all to understand their spatial conditions, their syntactic reasons, their geometries and formal orders coming from the past, to be researched and represented once again through an exquisitely compositional operation: that is, investigating a dense web of relations that moves on a dual condition of belonging, memory and interpretation. As is well known, the architectural discipline, as an artistic practice oriented towards the transformation of things, observes archaeological ruins as a "monument" (Le Goff, 1978), attempting to recognise the ancient formal orders in order to re-propose them in the present time and offer them to future generations. Therefore, we could argue that archaeological testimonies, as "monuments", are by their very nature linked to memory. The term "monument", etymologically refers to 'memory-testimony': the Latin root of *monumentum* derives from the verb *mōnere*, 'to remember' precisely. Evidently, no architecture is born as a monument - in the sense of the term proposed by Aldo Rossi, i.e. described as something that 'persists' in the development processes of the city - but it becomes so a-posteriori, following the attribution of values by the community that recalls its memories to open spaces of reinterpretation and transformation of the present time. In this sense, the reflections of Alois Riegl (Riegl, 1903), according to whom the "value" ascribable to the monument is linked to an essentially modern interpretation, come back to the fore. By differentiating the value of antiquity - *Alterswert* - from the value of memory - *Erinnerungswert* - he asserts a subtle difference of meanings, or "values as memory", introducing a new system of recognition, a-posteriori, that a given cultural context attributes to the monument. Evidently, the aspect of memory that is of most interest for the purposes of reflection is, as codified by Maurice Halbwachs, intimately linked to the social group to which it belongs, since: «Groups draw their own form on the ground and find their collective memories [...]» (Halbwachs, 2001 p. 215), proposing a continuous critical action in which memory resurfaces in the form of remembrance. The memory of past forms is thus investigated as the product of a social action called upon to interrogate the past according to the needs of today, with the aim of transforming "lost time", to paraphrase Marcel Proust, into "rediscovered time": not so much as an "involuntary" act, rather as a conscious expression of the present society. This induces the need for a continuous construction, "reconstruction", of the memory that takes form through an interpretative action, by the architect, implemented in the present condition: «in the places of the ancient, the aim of the project shifts from a foundational tension to an interpretative tension of the sense of forms» (Moccia, 2020 p. 107), fundamental so that the 'inventive' act called to 'find' - the etymon of the word 'invention' derives from *inventio* and means precisely 'to find' - in the sedimented meaning of the forms we find in the world the very motivations of the architectural project can be triggered. It is a hermeneutic "fusion of horizons" (Gadamer, 1960) in which the role of the 'interpreter' is as necessary as ever to relate past and future. Interpretation, as delineated by Gadamer, offers itself as an instrument of mediation between past and present: proposing itself as a critical-interpretive 'translation' of the forms of history, in order to construct a new structure of order that restores its present sense. An interpretative dimension that finds confirmation a little later in the assertions of Ernesto Nathan Rogers: «the creative

operation is influenced by two actions of memory, or rather by the dialectical relationship of two opposing tensions: the first action turns to the past, it draws conscious or subconscious nourishment from experiences already consumed in order to create new ones. [...] To admonish and to remember (*moneo et memini*) have the same semantic root, and from it the word monument and the symbolic concept it encompasses acquire value. [...] Here is the other action of memory, not that which moves from us to things, but from things to us and beyond us» (Rogers, 1961, p. 73). The “revolutionary intuition”, advanced by Rogers, is therefore placed between memory and invention, inevitably placing the relationship between authorship and the reality of forms in a particular condition : the architect, from being a great *voleur* - “a thief of architecture stolen during his travels”, as Le Corbusier liked to call himself - becomes a «practical artist maker of forms [capable of transforming] history into memory. On this memory he works with imagination producing metamorphoses. His skill consists each time in transfiguring what is or what has already been. There is an intuition that makes him able to transfigure reality, that makes him tend towards that idea». (Collotti, 2017, p. 46). These two tensions, memory and interpretation-ideation, are thus recognised as two polarities of the same act of design, necessary to understand the profound meaning of ancient forms.

The critical-comparative selection of some exemplary interventions deriving from the International Design Competition for the requalification and valorisation of the Archaeological Area of the Antiquarium of Tindari<sup>1</sup> represents an opportunity to prefigure and test, through the inventive action of architectural action, multiple responses to the different solicitations posed by the memory of ancient places: in terms of accessibility, usability, and protection of the ancient remains, but even more so to focus on strategies and intervention techniques capable of reinterpreting an urban form that no longer exists, to make intelligible through the construction of the architectural project for archaeological sites on a geographical scale.

### **Methodology and urban analysis for Tindari: form of city and form of geography**

The uniqueness of the archaeological site of Tindari, as in many other archaeological sites found in the Mediterranean basin, lies in its extraordinary geographical location, a gently sloping plateau on the summit of the promontory of Capo Tindari jutting out towards the sea and close to the archipel of the Aeolian islands, which suggest a millennial presence of the stretch of sea between the Tyrrhenian coast and the Sicilian hinterland extremely rich in culture. Overlooking the Tyrrhenian slope of the Peloritani Mountains, withdrawn within the large loop of the Gulf of Milazzo, it enjoys enviable views that made it the site preferred by the Greeks for the settlement of ancient Týndaris, founded by Dionysius the Elder of Syracuse around 396 B.C. as an outpost on the Tyrrhenian Sea to control the entire northeast coast of Messina. Therefore, it is a significant place on the northern Sicilian coast that the ancient city of the Dioscuri was able to interpret and exalt through its *forma urbis* but even more so through the meditated location of its monuments in the territory, capable of expressing and recalling the character of “theatricality” (Turri, 2001) of the most famous Hellenistic cities.

In the writer’s opinion, the reinterpretation of an urban form from the past cannot take place

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<sup>1</sup>The requests made by the superintendence concern the possibility of bringing to light the ancient structures of the city. The redevelopment works are concentrated along the upper *decumanus*, i.e. in the south-eastern sector of the ancient city of Tindari. The works involve the construction of new architectural artefacts - an antiquarium and a multifunctional centre - and light roofing to protect the important mosaics and decorative fragments of *insula IV* - circumscribed between the upper *decumanus* to the north and the central *decumanus* and *cardines D* and *E* on the south-east and north-west slopes respectively - which is to be restored to its original state. East and North-West - which organised the spaces of private living - House B and House C - and the places of public-collective character - the Roman baths and *tabernae* - on 4 stepped terraces measuring the difference in height.

without first triggering a comparative type of investigation between the different historical cartographies, with the hope of unravelling the complex genealogy of the city's formation. A preliminary operation to the transformative action that is as necessary as ever to interpret and describe the founding structure of the city in relation to the type-morphological evolutions made by men of the past to renew and redefine the sense of a place from time to time. From the info-graphic elaborations, it was possible to deduce how the settlement origin of the urban system of Greek foundation was motivated by the progressive possession of the ridge and the subsequent anthropisation of the natural promontory: distributing the residential quarters between two centralities, the natural high ground to the west and the sanctuary of the Madonna del Tindaro to the east. Of particular relevance is the presence of the sanctuary, a tetrastich building that testifies to the geographical and cultural "long duration", as outlined by Fernand Braudel (2008), of Mediterranean places. The morphological course of the Greek city follows the topographical layout of the sites (Fig. 1) by means of a series of gentle slopes, in turn measured by the extension of three large plateiai - decumans - that cross the plateau from east to west and meet a constant series of stenopoi - hinges - that regiment the city's design by distributing themselves over the moderate orographic reliefs: the presence of slight natural shelves makes it possible to accommodate the archetypal forms of domestic habitation - the house - and the probable principle of progressive saturation of the blocks - insulae - determining a housing model, and urban, based on a system of inter-scalar relations capable of accommodating the public singularities of the Gymnasium and the agora (whose actual positions have not yet been ascertained). The Roman urban fabric (Fig. 2), for its part, is regulated by the repetition of the insula, as a measuring element of the territory capable of ordering the city's extension by recognisable parts. From the Roman settlement strategy emerges a regular structure that, by clearly restoring the relationship between building typology and urban morphology, defines a large compact mass polarised close to the forum, the first sub-acropolis agora, and close to the public activities stretching out towards the landscape. The (primary) mediating elements between the natural elevation and the rigid geometric system are the great public monuments: through which the city and the entire community can recognise itself. It is no coincidence, as we said, that one can imagine the presence to the east of a ritual point representative of religious life, the acropolis, contrasting with a system of agora, representative of public life, organised around the "arched building", or "monument with great arches" - as described by travellers of the time - identified now with the Hellenistic Gymnasium, now with the Roman basilica.

As anticipated, the archaeological fragments found today in the area under investigation interpret the morphology of the territory as an inseparable datum for the genesis of the architectural form. But if, on the one hand, the critical-interpretive redrawing of the historical phases is proposed as a valid investigation tool to describe the foundation and evolution of the archaeological site, on the other hand, urban analyses (spatial and formal) are relied upon to describe the profound identity condition of this place. The architectural and spatial characteristics of the archaeological structures are revealed in the dialectic between the forms of the city and the forms of the Earth. A relationship endowed with a topological sense that is made manifest through the drafting of analytical drawings (Fig. 3) which, re-proposing a consolidated methodology in the disciplinary field of urban morphology, are proposed as a privileged tool for compositional practice aimed at the unveiling of correlative syntaxes on a formal basis. The rootedness of anthropic forms on the ground is confirmed by the comparison between the urban structure, Straßenbau - the paths - and the formal values, Schwarzplan - or "figure-background plan" to use the words of Colin Rowe and Fred Koetter - to which a further

exploration of a phenomenological type has been added, which tends to make the spatial characters of the city intelligible: in relation to their degree of 'internality' or 'externality'. Figural analyses are combined with spatialist ones, advocated by Uwe Schröder (Schröder, 2015), thus exploring the applicative possibilities of the Rotblauplan – in German, 'red-blue plan' – even in archaeological sites that no longer tell of their strictly inclusive 'dedication'. The powerful natural condition (represented in light or dark blue according to the greater or lesser relationship that the spaces assume in relation to the landscape) bursts overbearingly into the drawing, projecting the current archaeological traces towards the 'externality' of the Messina territory. Through the cognitive technique derived from the 'mapping' of the city's urban spaces, and the formal investigations mentioned above, it was possible to detect the almost exclusive relationship that the Hellenistic-Roman city established with nature.

This methodological approach, if on the one hand confirm the value of the topos as a principle for formal design – a thesis further validated by Jean Houël's 'arid' pictorial representations reproduced in his *Voyage pittoresque* – at the same time it reveals the urgent need to intervene on the stratified system of signs in order to recognise and enhance the now veiled order of the Greek city. The objective is, therefore, to produce new spatial syntaxes capable of restoring to the monument «an exterior form and an interior space» (Segarra Lagunes, 2017, p. 15) so that it can once again be confronted with the extraordinary geography that hosts it.

### **The construction of new soil<sup>2</sup>**

The project proposed by the working group coordinated by Luigi Franciosini studio attempts to carry out a profound operation of rewriting natural forms with the aspiration of recognising and reconstructing, the original topological dimension of the site: now 'betrayed' by the planting of improper tree species in contrast with the site's primordial vegetation.

The codification of the ancient connections that topographical traces established with the architectural forms left by man takes place through compositional design in which formal, geographical and cultural instances are introduced: «the ancient builders must have had a sensitivity and a feeling for these qualities; at the moment when they founded their cities, built their temples, it seems that what guided their choice of places was the determination that these should possess the strength to provoke a feeling, the strength to elevate the soil to a sign, the topography to a city, the architecture to a rite, to explain through the composition of the organism the interdependence between geography, city and soil» (Franciosini, 2021, p. 82). From these premises, the project proposal (Fig. 4) emerges, which is substantiated through the realisation of a series of interventions, in anticipation of further future interventions, concentrated mostly along the ridge, so as to reassign the road its ancient, founding role in the development of the city. The ridge road is thus moved to the fringe between the walls, which surround the city to the west, and the public polarities – the amphitheatre and the basilica – found in the archaeological site, through the construction of a platform, from which originate the altimetric limits that fix the new goals to the surrounding landscape. This platform, described in the western part of the amphitheatre by sloping terracing typology, is configured as a comb, defining a central spine from which a succession of unevennesses are distributed, following the orographic trend and concretising the sense of the territory.

The platform is entrusted with the task of re-establishing physical and topological continuity with the rocky promontory overlooking the Gulf of Patti, placing the fundamental elements for

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<sup>2</sup>Luigi Franciosini, Cristina Casadei with Luca Argentieri, Alessandro Bergami, Maria Faienza, Alessandro Reggiani, Angelica Zizzi.

describing the landscape at the summit. A crossing system is constructed that unveils new horizons and sets of goals underlined by the forms of architecture in archaeology: a device to relate different heights and to recount the original features of the Tindaritan landscape linked to the beauty of the horizon open to the sea.

### **The lapidarium as an element in the reconstruction of ancient spatiality<sup>3</sup>**

The project by the Bari group attempts to restore, through forms appropriate to its time, the original identity condition of the city of Tindari. This is achieved through the construction of a lapidarium wall (Fig. 5) capable of bringing into tension the archaeological features included between the two public polarities: the Basilica and the remains of the scaenae frons, overlooking the koilon, which later became cavea for the Romans. This involves the construction of a large suspended beam - a stadia - which, assuming the direction of the upper decumanus, is a candidate as a new element of order for the archaeological fragments and a measure for the current orography. The great wall-beam, suspended over the archaeological remains, is supported by three transversal beams, which take up the layout of the old streets of the city of Tindari, allowing the orographic accidentality of the terrain to be governed by determining three dromos «conceived as spatial bays -contained between 'stereotomic' massive walls, arranged following the contour lines and configured to recall the -site's substructures» (Mannino, 2022, p. 194).

The partially underground building, mirroring the position of the amphitheatre and taking advantage of the approximately 10-metre difference in height, is proposed as a new vantage point capable of recapturing the high elevation of the ancient city. The masonry character of the 'combined' building is realised through the modelling of podiums, which become vantage points towards the archaeological city capable of dialoguing with the stretch of defensive fortifications not far from the intervention area.

The constraint imposed by the competition, that is, to operate within the archaeological perimeter, becomes an opportunity to enhance the original layout of the archaeological city by aiming to determine a new system of relations between the ancient presences and the coastal landscape onto which they project. In other words, it is a question of reflecting not so much on the value of the individual archaeological find, but on the recognition of it as an integral part of the entire territory, laying the foundations for a new dialogue between architecture, archaeology and the fragments of the landscapes in which they are oriented.

### **A modern stoa as measuring architecture of the ancient structure<sup>4</sup>**

As in the previous project, briefly described, the more general intention that has animated the design solution finds its "reasons" (Monestirolì, 2010) in the attempt to interpret the settlement identity of the archaeological city of Tindari: starting from the reconstruction of ancient Tindari proposed by Corni and later reworked by Cassanelli (Gulletta, 2012, p. 316). In the perspective representation, what is of most interest, in the writer's opinion, is the presence of a stoa, as a measuring and ordering element of the city capable of marking the upper limit of the reiterated city with respect to the upper decumanus. The ambition of the solution devised with the Neapolitan research group lies precisely in the desire to restore, with new forms, the profound sense of this physical limit: making the ancient formal structures that originally founded this part

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<sup>3</sup>Francesco Defilippis, Marco Mannino, Carlo Moccia, Antonio Nitti with Domenico Cristoforo.

<sup>4</sup>Salvatore Solaro, Renato Capozzi, Camillo Orfeo, Federica Visconti with Manuela Antoniciello, Nicola Campanile, Ermelinda Di Chiara, Gennaro Di Costanzo, Roberta Esposito, Oreste Lubrano



of Sicilian territory intelligible once again. Specifically, the idea put forward (Fig. 6) alluding to the relationships of structure previously defined by the ancient stoa, attempts to re-establish the relations lost between the two previously mentioned public polarities, through the construction of a suspended artefact contaminated by the powerful presence of the ancient structure and the forms of geography. Therefore, the composition realises four separate blocks, arranged parallel to the upper decumanus, in the areas indicated by the announcement, raised from the ground on 'feet' that follow the lay of the hinges, establishing a profound 'osmosis' with the ancient city. Thus, at the raised level, two autonomous bodies destined for the different activities are determined, one of which is characterised by a large 'suspended' courtyard, designed to accommodate the cultural and exhibition activities of the antiquarium. The second major intervention is the service building in a parallelogram-shaped area, on the opposite side of the theatre, where the shape of the ground suggested the possibility of constructing a building embedded in the ground, triangular in shape, consisting of two 'shoulders' against the ground containing the service spaces and a central hall with a loggia-ambulatory open to the outside<sup>5</sup>.

A project that ultimately aspires to make the morphological structure of the archaeological settlement recognisable again: attempting to restore unity, of sense rather than form, to the archaeological fragments in the landscape. This is achieved through the realisation of a continuous, yet suspended architecture, capable of putting the theatre and the basilica back into tension (the original one), reinterpreting the urban forms of the ancient city and establishing a profound relationship with the forms of the land and the surrounding territory.

## Conclusions

Beyond the formal outcomes expressed by the different solutions analysed, the experience provides an opportunity to reflect on the role of architectural design in the relationship between archaeology and geography. If it is true that the three proposals examined offer heterogeneous solutions to the same problem, it is also true that they propose certain recurring themes: they look at the sites of archaeology from an eminently architectural point of view. The architect's eye does not observe ancient traces with a romantic sentiment - which sees the ruin as having a "value in itself" - but on the contrary, as Giorgio Grassi lucidly reminds us, it assumes the indeterminacy of the ruin as an opportunity, or «virtuality [...] not only with respect to the past or only with respect to the present/future, but always simultaneously with respect to both» (Grassi, 2000, pp. 295-296) in which it is the evocation of the original form that triggers the production of other forms. It is a position that addresses the ancient as a material still capable of teaching, searching in history and in the sedimentation of its traces the very reasons for the compositional process. We could argue that Grassi's thought, evidently shared by the three case studies proposed here, addresses the places of archaeology from an architectural point of view, as it aspires to establish a new order between the parts, assuming the quality of these spaces as a value for the project, in an attempt to define a collective place -within the complex territorial condition in which archaeological sites are inserted into the landscape.

The ancient ties between the shape of the city, the shape of the land and the geography of places are thus investigated through the role of architecture, which imposes a necessary confrontation with reality: rediscovering dialectics and relationships that still belong to our time. The operational tool for recognising this system of relations is therefore the architectural design and the need to place it within the «binomial architecture and archaeology, at the two levels

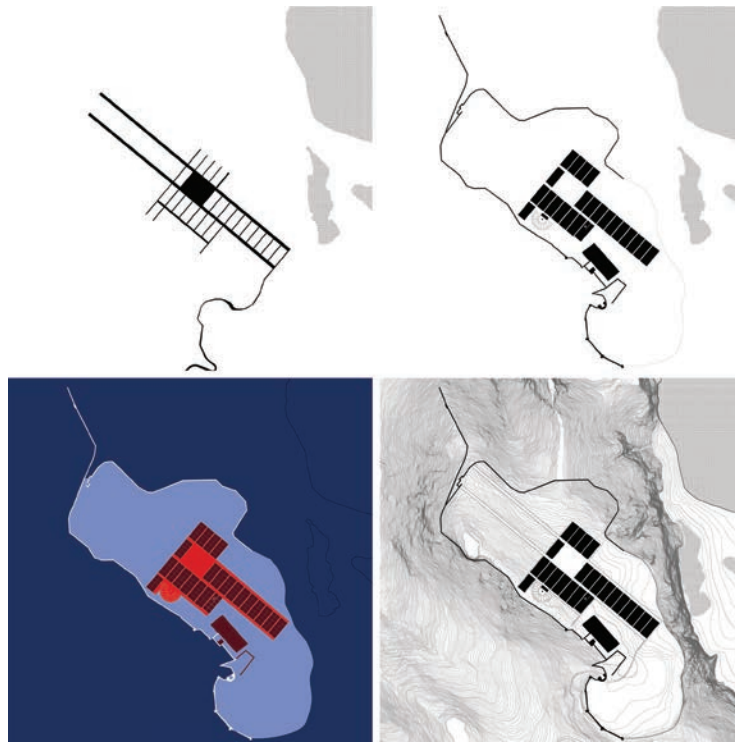
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<sup>5</sup>Thus the description in the project report.

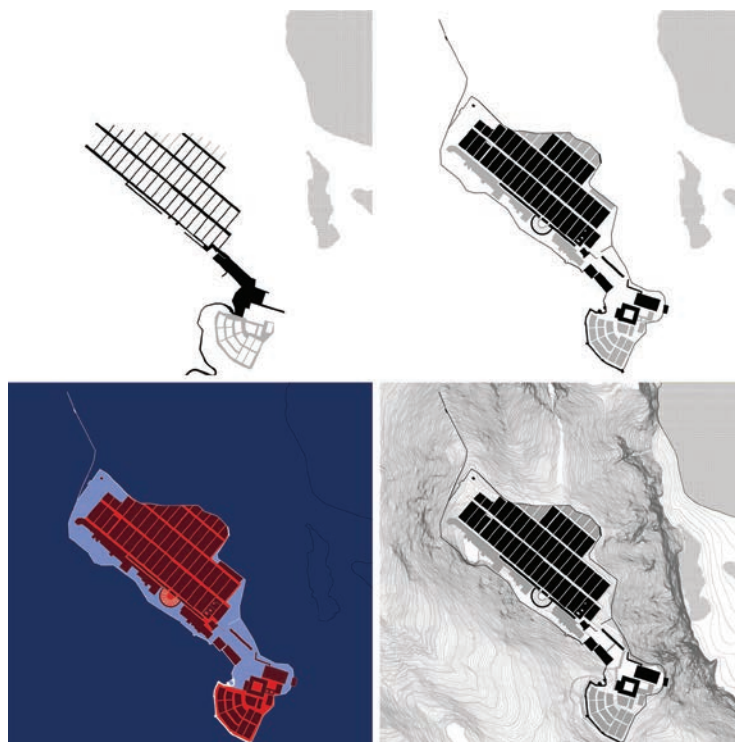
at which it has always been. The first level, relating to the interpretation of the past, is the one in which the project takes on the role of an engine of research that applies its methodology to the understanding of architectural remains [...] The other level is that which refers to architectural creation in relation to the architectures of the past and, in particular, to the material remains that make up our archaeological heritage, in order to be able to coexist with them, to increase their understanding and evaluation and, finally, to consolidate them in their new role as testimony of our past, especially in the particular case of those that, due to their limited, residual materiality, are no longer able to adequately represent it for society» (de la Iglesia Santamaría, 2021, pp. 12-13).

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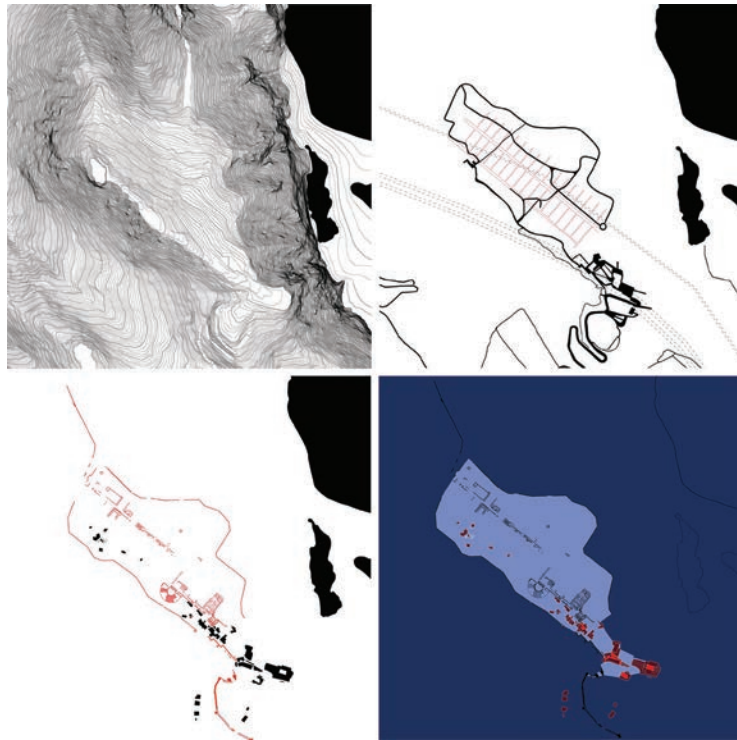
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**Figure 1.** Urban and spatial analysis: foundation of the Greek colony. From left to right, from top to bottom: Straßenbau, Schwarzplan, Rot-blau plan and relationship between the Greek fabric and the orography of the site.



**Figure 2.** Urban and spatial analysis: representation of the city in the Roman Imperial Age. From left to right, top to bottom: Straßenbau, Schwarzplan, Rot-blau plan and relationship between the Roman fabric and the orography of the site.



**Figure 3.** Urban and spatial analysis: representation of the city's current condition. From left to right, from top to bottom: landform, Straßenbau (in red the Greco-Roman layout), Schwarzplan (in red the archaeological remains) and Rot-blau plan.



**Figure 4.** The construction of a new ground: planivolumetric of the settlement idea and bird's eye perspective 'mounted' on a pictorial representation by Jean Houël.





**Figure 5.** The lapidarium as a building element of the ancient city: planivolumetric of the settlement idea and bird's eye perspective 'mounted' on a pictorial representation by Jean Houël.



**Figure 6.** A modern stoa as measuring architecture of the ancient structure: planivolumetric of the settlement idea and bird's eye perspective 'mounted' on a pictorial representation by Jean Houël.





## A lesson about the form.

# Dissonances and complementarities in Luisa Anversa Ferretti's and Giuseppe Samonà's projects for the extension of the University of Cagliari

Andrea Manca<sup>1</sup>, Giovanni Battista Cocco<sup>2</sup>

<sup>1,2</sup>University of Cagliari, DICAAR (Department of Civil, Environmental Engineering and Architecture)

Via Marengo 2, 09123 Cagliari Italy.

E-mail: <sup>1</sup>amanca@unica.it; <sup>2</sup>gbcocco@unica.it

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*Conference theme:* Reading the Changing Urban Form

**Abstract.** At the end of the 1960s theoretical reflection on the relationship between urban form and territory, of which Giuseppe Samonà and Vittorio Gregotti were the major exponents in Italy, found an active field of design experimentation when the legislative measures to modify the Italian university system were implemented. This led to the need to expand the real estate of many universities, which promoted various international design competitions, encouraging reflection on how to relate parts of the extended city, in which the design of open spaces took on a unifying role.

The project coordinated by Luisa Anversa Ferretti won the competition for the extension of the University of Cagliari, but for this study, the proposal put forward by the group led by Giuseppe Samonà is just as interesting. The two projects, in fact, are based on different registers of interpretation and qualification of open spaces: for the former, the measure is that of the territory, of the relationship between the great landscape systems; for the latter, the relationship is limited to the architectural dimension.

The realisation of the project, which only partially translated the results of the competition, led to the current 'Cittadella Universitaria di Monserrato': a monad still disconnected from its context, made up of non-homogeneous architectures which enclose open spaces that are difficult to interpret.

To make up for this condition of incompleteness, the design work carried out in recent years is based on the hypothesis that by combining and complementing the lessons learned from both projects, which are still extraordinarily topical, it is possible to achieve that reconciliation between different natures of form, places and uses necessary for the contemporary needs of this metropolitan element.

## Introduction

At the beginning of the 1960s, the progressive increase in demand for academic education caused a demand for new university buildings or the adaptation of existing ones as an urgent issue to be addressed in the European and North American architectural debate.

In this context, various architects expressed their views on the theoretical and practical levels, through innovative approaches capable of understanding the educational instances and urban role of new settlements. If in the European sphere, Price, Candilis, Josic & Woods are the most active players in this transition, in the Italian context there emerges the prolific activity of Giancarlo De Carlo and Guido Canella, addressed to the dialectic between university and city, and that of Vittorio Gregotti and Giuseppe Samonà, interpreters of the theme through theoretical and design reflection on the relationship between urban form and territory.

The many visions found common ground and implementation by promoting various international design contests, which triggered a profound reflection aimed at connecting parts of the extended city, in which the design of open spaces took on a unifying role. Among these competitions, in 1972 the contest for the extension of the University of Cagliari was announced, of which the winner was the team coordinated by Luisa Anversa Ferretti. In the same competition, the proposal by Giuseppe Samonà's group, different in scale and settlement principle, is also interesting.

The two projects, in fact, start from different registers of interpretation and qualification of open spaces: for the former, the measure is that of the territory, of the relationship between landscape systems; for the latter, on the other hand, the relationship is limited to the architectural dimension. The development of the project, only partly in line with the results of the competition, now results in what is today the 'Cittadella Universitaria di Monserrato': a monad still disconnected from its context, composed of heterogeneous 'architectural bodies', which in turn enclose open spaces that are difficult to interpret.

In order to compensate for this condition of incompleteness, the project action put forward in recent years moves from the hypothesis that by combining and integrating the lessons from both of the projects mentioned, which are still extraordinarily topical, a reconciliation between the different needs of the place can be achieved.

The first part of the study - The Architectural Debate in Europe and Italy - outlines a genealogy of design topics and responses in the European context, analysing their reception in the Italian cultural milieu. The second part - Two Proposals, one Realisation - examines the design events surrounding the extension of the University of Cagliari. The section describes and relates the proposals of Anversa Ferretti and Samonà and highlights the criticalities of the current implementation, which only partly reflects the visions developed in the competition. Finally, the last part - A lesson about the form - identifies a possible methodological trajectory that, by interpreting and introjecting the themes of the two competition projects analysed, can become an effective tool for subsequent modifications on an architectural, urban and territorial scale.

## The architectural debate in Europe and Italy

In 1962, the well-known statement 'And now - the education explosion...', in the editorial of Architectural Forum No. 116, introduced the architectural community to the great quantitative and qualitative leap in mass education. The first point would result in an innovative impulse within the broader planning practices, treating campus planning in a similar way to urban management techniques, proposing to control the university issue by its reduction to numerical standards and parameters (Puddu, Tattara, and Zuddas, 2017). On the second, the theme is linked to the possibilities offered by the new demand for academic spaces, showing itself as a

field of experimentation for new ideas of the city. The design competitions for universities announced in various European countries thus offer an opportunity for participants in the architectural debate to put their theories on urban space in action. In this sense, the university emerges as a renewed opportunity to keep the utopian hope of architecture alive, capable of concretely influencing people's lives on a large scale.

In this regard, the Anglo-Saxon context is the most interesting. The new theme of the democratic university and changes in teaching practices require the future academic building to be different from the 'Oxford model'. The Report of the Academic System commissioned by the British government and published in 1963 - known as the Robbins Report - called for the implementation of a new project model. Seven new universities - the British Seven - were founded with the intention of overcoming the archaisms of tradition, moving the typological layouts and spatial organisation to the idea of a mass university and architecture's ability to define an ideal living community. Most of the new complexes, however, still presented the logic of decentralisation, outside urban areas, and reproduced urbanity through obsolete strategies that densify the built environment and incorporate traditional urban elements.

In the same years, some counter-projects for the university appeared, which did not limit their action to the formal and linguistic articulation of the architectural scale. Among these, the most relevant were the Freie Universität designed by Candilis, Josic & Woods in Berlin in 1963 and Cedric Price's Potteries Thinkbelt proposal of 1966. Price's project, in particular, was explicitly a critical reaction to the voluntary exile within ideal mini-communities proposed by the seven new British universities. His aim was that the processes of knowledge creation and exchange could be part of a more complicated mechanism, spatially diffuse and therefore not reducible in unity-of-place terms.

If the Potteries Thinkbelt represented an alternative definition of academia and started from the critique of a specific local condition, in the same years, the Italian debate developed from similar visions, although tracing autonomous cultural paths. These trajectories started from the limits of a still elitist institution and, on the other hand, from the progressive increase in university enrolments, which tripled in little more than twenty years. From this point of view, the recognition of the issue and the proposals to adapt to the new instances, became a national problem of primary importance, both on a political and a disciplinary level of the project. In fact, the strong demand for academic education reflected the emergence of new forms of production, especially immaterial, showing how the cultural revolution of the 1960s and 1970s is a key moment for understanding the current urban condition and its relationship with the university. The importance of the topic emerged through the various researches promoted by academic institutions. Among these, the study conducted in Venice by Giancarlo De Carlo shows one of the most complete analyses of the state of the art. De Carlo was in favour of the institution of departments, foreseeing the building expansion of universities also by constructing new complexes to be located outside historical centres, since he argued that "a university of the masses must transform its spatial structure by showing itself capable of adapting to the changing needs and fluctuations of a society in continuous evolution" (De Carlo, 1968). From this change in pedagogical and political perspective, the theme of the university took root in the national debate, determining some orientations that, through the project of the new institution, defined a theory of the city starting from architecture. After the neighbourhood and the business centre, the university became the possible instrument for reorganising the urbanised territory.

In fact, it moves towards a model of a 'disaggregated' university, subdivided by faculties within the historic centres of major cities such as Milan, Rome or Naples. This relationship between university and city, opposed to the campus model, gained the theoretical corpus of architecture,

through discussions on the relationship between morphology and typology, the scales of the project and the design of the territory. In an essay published in the April-May 1968 issue of *L'Architecture d'Aujourd'hui*, Guido Canella (Canella, 1968) described the university as an 'anti-city', highlighting the peculiarity of a space that has always been defined as heterotopic with respect to urban space. On the same basis, at the same time, De Carlo - as is well known - assimilating English visions, proposed for Pavia a vision of a university spread throughout the territory.

About a decade later, the first projects appeared in the early 1970s. The most important were the results of competitions: University of Florence (1970), Cagliari (1971), Salerno (1973) and Calabria (1972-1974); other projects were commissioned directly: University of Lecce by Ludovico Quaroni (1975), University of Messina assigned to the BBPR group (1973) and the plan for the University of Pavia by Giancarlo De Carlo (1972). The design competitions in Florence and Cagliari had ambitious hopes for the university's ability to reconfigure the built environment. Therefore, the participants were not only asked for the architectural project of the university complex, but also for an urban plan addressing the metropolitan scale of their respective contexts.

### **Two proposals, one realisation**

In the early seventies, the transformation of the Italian university system could not be completed simply by adapting existing sites. On the one hand, the problem raised questions about the territorial rebalancing of the university population, and on the other it showed how it could be a solution for the development of the Country's most depressed areas. However, of the four competitions held between 1970 and 1973 -Florence, Cagliari, Calabria and Salerno-, only the third, for the new University of Calabria, was realised according to Vittorio Gregotti's winning design in 1972. Polemics and lengthy procedures for realisation produced divergent results from the competition results for the other three proposals.

Referring to the case of Cagliari, two interesting solutions can be identified. The two projects express, with different approaches and results, the close link between architecture and territory that interprets the Italian theme of the large scale (Cocco and Dessi, 2020). Already in the late 1950s, Giuseppe Samonà (1959), dealt with the theme of urban scale in an innovative way. Luisa Anversa Ferretti, for his part, received the teaching of Ludovico Quaroni in Rome, oriented towards a project capable of interpreting and coordinating different scales, up to the territorial scale. For both authors, if, in fact, it is possible to recognise a figure in the territory, it is equally possible to give it a structure capable of integrating and organising physical realities towards a common objective: the form of the territory.

The competition requirements aimed at relocating the whole university corpus in a unitary area outside the city connected to the periphery, and orienting it towards a possible territorial development beyond the mere university programme. The chosen site is an area of 400 ha. located north of the city in which to converge the faculties dispersed until then in Cagliari's historic centre. Another fundamental indication was to respect the qualities of the site, a productive plain located within a landscape bordered by ponds and salt pans.

The solution presented by Anversa Ferretti (1973), morphologically characterised by an orthogonal layout, starts from the interpretation of the large-scale settlement elements related to the connection of the metropolitan area of Cagliari with the wide plain of Campidano. This structure connects the nodes of particular relevance and functionally condenses a system of services on a territorial scale and with potential productive development.

At the next scale, the project proposes an urban matrix supported by a set of perpendicular



axes, with longitudinal development in a north-south direction. Among these, the Cagliari-Decimomannu axis emerges; it hosts the main land, sea and air infrastructures, starting from the most intensively urbanised area of the city and connecting the north-west industrial development system. In addition, the various branches of the Carlo Felice, the main access road to the city, gives an internal limit and articulation to the widespread metropolitan area and the axis connecting the centres of Sestu and Monserrato. The latter linearly organises the main university buildings and traces a linear park culminating in the Molentargius pond, an element of great environmental value shared between the new university and the city of Cagliari.

The impact of transversal axis is visible on a smaller scale. Firstly, the axis south of the towns of Elmas and Sestu is reinforced; it connects the airport with the exhibition centre, new urban services and residential development near the university longitudinal axis. In an intermediate position, the axis corresponding to the new railway station connects an urban service node, the Polyclinic, and the university's general services centre. Finally, the residential axis crosses the centres of Pirri and Monserrato, between Cagliari and Selargius. In the project report, the authors express the desire to recover dispersed urban centres, reintegrating them in a system that includes the university residence, through two complementary operations: the intervention in the smaller urban areas, by restructuring the centres and completing the suburbs, and the new territorial settlements, of which the university is the functional key.

This proposal, by establishing a new order, integrates and completes large-scale signs through a strongly architectural approach to the design of the territory, based on the primary settlement act of rigorous orthogonal tracing. From this perspective, the plan of Anversa is a system that measures, limits and directs discrete urban expansion, rejecting the advance of a continuous urban fabric; a layout that preserves the territory, in all its components, while articulating it and respecting the autonomy and singularity of the existing urban centres, also providing them with new public services on a large scale.

The linear university structure consists of two parts: on the one hand, the Polyclinic and its departments; on the other hand, the humanities and technical-scientific sector. Due to the special requirements of the Polyclinic, the continuity of the spatial layout ends where the university's common services - administration, central library, amphitheatre, lecture hall - are located. Minor links to the major spatial axes connect the teaching areas to each other and to the hospital, both with urban services and residential areas. Finally, centrally located is a pole for experimental agricultural activities that interprets the productive character of the Campidano plain.

The design incorporates the territory within the university-built system, avoiding the adaptation problems typical of mega-structures, such as the conflict between the global form and the surrounding environment. The internal logic of the architectural project is a way to approach the complexity of the new scenarios. In fact, it considers the temporality of architecture in terms of constructive and programmatic evolution.

The definition of the architectural project focuses on the definition of rules-guidelines for future actions through the drawing of a complex axonometric cross-section, which develops along an articulated linear structure, configuring the educational and research sectors. The continuous cross-section "guarantees the organism the possibility of successive phases of construction and growth, without continually undermining the internal characteristics and relationships that are fully formalised from the initial phase" (Anversa Ferretti, 1973). The sequences of this section presents a gradient of privacy with respect to the main communication axis: first, the linear urban centre, a place of exchange between the university and the city; next, the teaching grid, comprising laboratories and classrooms, articulated through patios and hierarchical

circulation systems; finally, the linear scientific-didactic pole of the university, consisting of the laboratories and research institutes and departmental libraries, which compose a laminar building as a front towards the surrounding area.

Samonà's proposal (1973), although similarly characterised as an architectural work on a territorial scale, shows a different nature from the previous project. The 400 ha. area, in the project becomes, in the words of Carlo Doglio (Samonà, 1973), an 'Inverted Monument', a furrow in the land 5 km long - 300 m wide and 13 m deep - redesigning the plain north of Cagliari. The university is, in this case, a great territorial machine, but at the same time it claims its subordination to the landscape form, the only protagonist. Samonà's great excavation represents a sequence of order imploded in the soil, which aims to preserve as much as possible of the existing environmental context, while not renouncing a role in the future settlement evolution of the whole territory. The modelling of the ground appears defined, in the large plaster model, through minimal reliefs from which the project barely emerges; it is a scar in the soil that represents an original settlement hypothesis in which the emergence of its elements increases with the gradual approach to the city.

This furrow is organised, throughout its length, in parallel bands that rhythm the spaces by successive and adjacent courtyards. The space of the courtyards implodes as the ground around it slowly rises, showing a continuous building placed along the natural slope of the land, to which it adapts. The plan shows a repetitive sequence of open spaces that articulates this linear settlement, defining a figure clearly designed to appear in its unity only from above, but, at the same time, defining itself in use in a series of living spaces.

Samonà wants to give the city a clear structure, defined spaces, an ordered concentration in which the relationship with nature is dialectical and sincere. These aspects perfectly interpret the debate that developed in Italy at the turn of the 1960s and 1970s on the form of the territory, embracing more than any other time the research carried out by Vittorio Gregotti (1966), through his writings and works. This is in line with Gregotti's proposal for the University of Calabria and the University of Florence.

Like the latter, the winning project of the competition in Cagliari will not be followed by construction, neither in territorial terms nor in relation to the limited architectural episode of the university system. It is replaced with a new spatial layout, by architects Tommaso Costa and Maurizio Bevivino, whose construction began in 1986 and continues to this day.

This site is today a large built system that hardly interacts with the territory; a monad still disconnected from its context, made up of inhomogeneous 'architectural bodies', which enclose open spaces that are little used and difficult to interpret. It includes the headquarters of faculties and departments related to the bio-medical and scientific disciplines, classrooms and library services, and the University Polyclinic. The backbone of the entire complex is a longitudinal courtyard divided into terraced gardens onto which the classrooms and service buildings face, while the departmental blocks are connected perpendicularly. The latter are comb-shaped on the west side, while the volumes of the hospital are arranged at a lower elevation on the east side. Again, some of the newly constructed buildings do not follow the masterplan and are designed as autonomous objects. The open space is largely characterised by areas used for car circulation and by a fragmented system of interstitial spaces that reduce the continuous and usable areas to only the longitudinal system and the transversal resulting from a recent intervention.

As proof of the difference between the original ambition defined by the competition requirements and its realisation, this complex rather than participating in the definition of the territory by directing its transformation dynamics, seems on the contrary to trigger processes of

urban disintegration. At the same time, it presents a condition of isolation, never compensated by the creation of relational spaces in which the student community can recognise itself, operate and live.

### **A lesson about the form**

In the light of the above, the research identifies in each of the two competition proposals an approach to the project with a maieutic character and their lesson lends itself to be re-actualised and related to the projects that in recent years concern the area under investigation. This leads to the assertion that it is in the divergence of approach and mutual dissonance that their complementarity emerges.

The non-implementation of the project for the University of Cagliari in its declination of large-scale formal configuration has deprived the territory of an architectural device capable of relating to it in terms of extension and, at the same time, of measuring, controlling and guiding its spatial evolution.

Anversa Ferretti's proposal, by the territorial structure, establishes the founding act of a network in which both axes and points assume topical importance in the territory in progress. By the nodes, the landscape is enriched with polarities, laying the foundations for a contemporary evolution of the 'city-territory'; by the axes, which interpret the signs of the palimpsest and trace the layout. A form, therefore, that is at the same time a sense, since it is in moving along these trajectories that the landscape and its components are conquered and introjected.

Samonà, on the other hand, interpreting the relationship with the territory by the soil - matter on which architecture operates -, proposes a project that, through its implosion character, brings out the reciprocal synergy between the architectural gesture and the leading role of the landscape. Samonà does not give up acting strongly on the territory, but does so by giving each component and each action rules and principles whose implementation determines a rich and fruitful synthesis.

Both aspects discussed, that of an organic design of the territory and that of the affirmation of the form of the territory, are, fifty years later, unresolved points in the metropolitan discourse.

The need to intervene towards the constitution of a physical network, capable of constituting or confirming wide-ranging relations, channelling or correcting possible settlement drifts, as well as defining a territorial structure founded on the centrality of the landscape, lead, in 2022, to the genesis of the Integrated Urban Plan of the Metropolitan City of Cagliari, by the Portuguese João Ferreira Nunes (PROAP). A programme of coordinated visions and actions, aimed at reorganising the settlement and environmental components, while defining the strengthening of the landscape figure, through the construction of a green ring based on the waterways and wetlands of the territory.

The most important of Anversa Ferretti's lessons is in the ability of the proposed project to dominate scale. In this, analogies are identified with the theme of incorporation by Ungers (1984), as well as with the relationship between difference and repetition described by Gilles Deleuze (1971). With regard to the former, in fact, the project upholds the principle of continuity, whereby one element - the landscape - recurs in another object - the project -, describing a continuous sequence of introjection and interpretation of urban forms. This continuity can theoretically continue indefinitely; an uninterrupted process in logical terms, through the extension and superimposition of layers and complex spatial structures, which is recognisable in the different scales of the proposal. With regard to the second relationship, it is through repetition, relative to an unrepeatable singularity, that difference and the affirmation of the multiple are declared. In other words, it is by the repetition and interpretative transposition of

territorial structures that the project manifests its differentiation from them, ensuring its permanence through the mutation of its detailed elements.

The theme of the space in-between, which is at the same time space of relationships, strongly emerges in Samonà's proposal. In it, in fact, it is the sequence of courtyards that accompanies the development of the longitudinal design of the great architectural machine, measuring, rhythmising and describing it. A narrative that is as much typological-morphological as it is human.

The current reading of the morphological characters of the 'Cittadella Universitaria di Monserrato' shows, therefore, a condition of incompleteness, where patchy architectures enclose spaces that are difficult to interpret. With the aim of recomposing a unitary figure of the open spaces, as well as constructing an identity, in 2021 an initial design experimentation was carried out, which gave back to this place a garden, originally planned but never built. A space that can be interpreted as a 'room within a room': a large garden courtyard, contained between buildings, which, operating through the theme of incorporation, hosts in turn a repetition of 'green rooms', constituting a synecdoche of the landscape and its components. The reading of the landscape and the possibility that, through project interpretation, it can permeate the network of open spaces and be incorporated into it, shows how this methodological proposal can potentially spread on a broad scale to reconcile architectural form and open space. In fact, the two above-mentioned lessons constitute useful tools for the construction of a path towards modernity, that is, towards actions that are faithful to the needs of their own time.

In this way, through the combination and complementarity of the lessons from Luisa Anversa Ferretti and Giuseppe Samonà, it is thought that the reconciliation between different natures of the form, between places and uses necessary for the contemporary needs of this metropolitan element can be achieved.

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## Note

The paper was conceived by the authors with unity of purpose. For practical reasons, the part - Introduction - and the final part - A lesson about the form - have been written jointly; - The architectural debate in Europe and Italy - is to be ascribed to A. Manca and - Two proposals, one realisation - to G.B. Cocco. The iconographic apparatus was conceived by G.B. Cocco and A. Manca and realised by the latter.

## The city built on itself. The role of suspended patterns in the construction of new parts of the city

Elisa Maruelli

Dipartimento di Architettura e Progetto. Sapienza Università di Roma, Roma.

E-mail: elisa.maruelli@polimi.it

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**Abstract.** *Today the conditions affecting the transformation of cities are multiple and linked to phenomena of global range. Most of our cities have taken a stable form: since the traditional settlement models can no longer be employed - as they require a consumption of land and resources no longer sustainable - the relationship between the containment of natural soil use and population growth tends to be implemented through the typology of the tower and skyscraper, developing a urban densification that is primarily vertical. The aim of this paper is to verify how, in the design, planning and construction of new urban fabric, it is possible to find credible alternatives to the exclusive scenario of vertical development, considering alternative models of densification in order to accommodate new densities while limiting the land-use. Some experiences of suspended settlements developed in the framework of the Soviet avant-garde, the radical city projects developed after World War II, and some more recent cases that employ the use of suspended structures, represent an alternative and experimental solution to the unlimited growth model.*



### **Urban densification and city growth**

Since the end of the 20th Century, globalisation and the spread of technologies have radically changed the geography of cities. The growth of population in urban centres has led to an increase of pressure on urban planning indices; the progressive depletion of natural resources has focused attention on limiting the land use through energy efficiency and technological innovation. The combination of these factors has promoted the diffused adoption of an urban model developed primarily in vertical, that finds in the typology of tower and skyscraper the solution to most of the settlement issues of urban centres.

The present work is part of a broader doctoral research that deals with the issue of urban densification, and that aims to investigate whether, in the presence of fixed limits such as high density and restrictions in land use, it is possible to imagine alternative solutions for the development of certain parts of cities. This reflection moves from the observation of certain limits in the vertical development, and from the attempt to subtract the topic of urban design from a destiny that seems prescribed in a catalogue of typologies considered the only solutions to the problem of density and land consumption.

It must be considered that the ultimate aim of the work is not to identify a model that would solve all the problems of the contemporary city: this sets its limits. Within these limits, the method that we are going to follow will attempt to define, in renewed terms, the correlation between urban density and urban form, even if it involves the effort to take some distance from the idea that vertical growth represents the only solution to be chosen in response to the needs of the contemporary city to set high densities while limiting the soil consumption.

Within this framework, the aim of this paper is to examine some highly-experimental case studies, considered significant as they investigated the opportunity to suspend the new settlement over the land level. In some cases, this choice allowed to activate an innovative relationship with the soil, in others to re-think the relation with the existing settlements, reactivating sites close to be abandoned.

In the next pages will be considered some experiences of suspended settlement developed in the Soviet avant-garde framework, with particular attention to the experience of Lazar Khidekel; the Neo Avant-garde setting, of which the projects for the Ville Spatiale by Yona Friedman and the project for the expansion of Tokyo into its bay by Kenzo Tange are considered significant examples, and two experimental projects developed on a smaller scale between the end of 1990s and the first decade of 2000 by Guido Canella and Bernard Tschumi.

### **Over the ground, on the water, in the air: radical cases**

The idea of suspending new settlement above the ground level as a procedure for implementing urban densification characterized by an alternative relation with soil, has been extensively investigated in the context of the Soviet avant-garde. The Austrian historian Hans Sedlmayer in *Art in crisis: the Loss Center* defined «la negazione della base terrena» one of the main «symptoms» of the avant-garde contexts, as if the dream of flying realised in this epoch, should have taken the architecture away with it from the earth, and notes that the Soviet experiences deny with particular emphasis the relationship with the ground, looking «to the universe in a way never seen before: not upwards, as in the Baroque-era rooms that, with their illusionistic ceiling paintings, deny the closure of the ceiling, raising the true plane of the construction without shocks and interruptions towards endless airy and luminous environments; instead, it opens laterally, along the large surface of the earth» (Sedlmayer, 1974: 139).

An important example of this attitude are Aleksandr Rodchenko's reflections on the Top Elevation concept, through which he explores the theme of urban development at a level

suspended above ground, revealing an early awareness of the problem of city growth and land consumption, or Lavinsky's City on Springs that suggests to elevate buildings above large steel springs, between which streets and pedestrian areas would have run. In Wolkenbügel Lissitzky proposed two- or three-storey buildings developed along their own horizontal axis, supported by pillars containing the vertical distribution system and suspended above traffic arteries at strategic intersections in the city of Moscow. Among the most radical experiences the Cosmists and Krutikov, who put forward the idea for a Flying City, a mechanised flying city in which all physical connection with the ground was definitively eliminated. Strongly influenced by the seduction of flight on the one hand, and the Suprematist figuration research on the other, Malevich's Cosmic cities were composed of pure horizontal planes levitating above the earth's surface (Kahn-Magomedov, 1987).

In the same context of figurative experimentation is framed the work of Lazar Khidekel, who, between 1917 and 1929, developed various proposals for a «horizontal densification» implemented through the suspension of a linear settlement. Khidekel attempted to filter the figurative ideal of the modern city through the Suprematist principle of essentiality of form: in Aero-Cities he establishes how to subtract the Suprematist forms from their self-representational purpose and return them to an architectural dimension to become concrete structures, characterised by an alternative habitability to the densification and massification of the Soviet city. The Aero-Cities also represent an attempt to contextualise the principles of equality at the basis of the society born after the Revolution: developing an isotropic, non-hierarchical system, the linear structures extended - potentially endless - into the natural environment had the aim of eliminating the physical limits of the neighbourhood (symbol of class stratification) and urbanizing the countryside.

The suspension of settlements is implemented by structure that contains the vertical distribution systems and act as main support elements. They support an interconnected system of linear elements, orthogonally intersected. The character of suspension allows the settlement system and the land system to coexist independently, developing an unconventional relationship between natural and artificial settlement:

*«Modern cities separates man from nature...The construction of a city eventually turns into the destruction of the natural environment. [...] The erection of urban architecture directly on the soil disrupts the natural state of the environment, its topography, vegetation, bodies of water, and other features that defines the uniqueness of the area» (Rosenfeld, 2017: 17).*

Lazar Khidekel's suspended settlements are organised according to the principle of cities on levels. The infrastructural system was planned to be host at the underground level (or in some cases using the presence of rivers or seas as infrastructural elements), connected to the ground only in correspondence of the buildings. The ground level was dedicated exclusively to pedestrian circulation and to the contact with nature. At the first suspended level the tertiary activities, services at the intermediate, and residences at the highest. The flat roofs would have provided an additional reserve of roof gardens and collective spaces.

Combining the character of the suspension of masses, together with the idea of an «horizontal densification» Khidekel addresses some issues of the modern city such as its high density, congestion, need for public and collective spaces, while developing an unconventional idea of relationship between human settlement and nature:

«Construction should not only denote the machine, but also water and wind, living motion, in

order to apprehend and explain the opposition and hidden forces of nonmechanical nature, which are forced to operate in a united collective summarizing the figural-sensation of the vital dynamic...The construction of future creativity leads to the convergence of all creative spheres of the new life, to the path of economy and a vital dynamic. This should master the whole spatial figural-chaotic world, leading to the unification of life-creating construction» (Goriacheva, 2017: 18).

### **Densification through suspension: on the existing city**

The idea of densifying the existing city through the suspension of a new settlement over it, was at the base of Yona Friedman's research and experimentation developed after World War II in Paris. The principles behind Mobile Architecture were linked to the idea of providing an additional living space, through a reversible urban densification. The new buildings would have occupied the soil only for a minimum surface, and they would have been transformed according to its inhabitants' needs (Orazi, 2011). Friedman implemented these characters in the infinite variations of the Ville Spatiale, a modular structure based on a six-metre grid juxtaposed to the fabric of the historic city, capable of increasing its density by about three times:

*«The principle of the Ville Spatiale is that of multiplying the original surface of the town through top-elevated levels. The difference that distinguishes this multiplying from the one of ordinary towns resides in the fact that the multiplying of surfaces does not happen in isolated points or zones [...] but it covers entirely the whole surface of the town on more than one level»* (Friedman, 1970: 134).

One of the generative principles underlying Friedman's research was the idea that the traditional city was too rigid to adapt to a world in constant and inexorable transformation: the two-dimensional grid represented the only principle of order in a city dominated by a «complicated order». Within the grid, at a level suspended above the existing urban fabric, citizens would have had the freedom to experiment the infinite possibilities that three-dimensional extrusion allowed for full and empty modules, granting a flexibility aimed to the spontaneous reproduction of the urban complexity.

The idea of the expansion of the city through the suspension of new settlement has been taken for long time as purely utopian. Manfredo Tafuri described the experiences of the Neo-avantgarde as «Accademia internazionale dell'utopia» (Tafuri, 1976). These experiences have been diffused at an international level: in Japan the Metabolists, in France Yona Friedman, in United Kingdom the group of Archigrams and the environment close to the AA, in Italy Archizoom and Superstudio. Most of these experiences were characterized by a provocative aim since the superimposition became an act of criticism with respect to the existing city and the traditional way of operating in it.

A project that is often considered utopian is the plan for Tokyo Bay by Kenzo Tange, but in fact it represents a concrete attempt to provide an answer to the need for urban densification and the lack of possibility to implement it on its soil. In the pages of the Casabella-continuità the project for Tokyo has been described as an experience with an urgent need «to be known and studied, not just "interpreted"; because we believe in the instrumentality of this plan, because, amidst the sporadic surfacing of enlightening indications, too often guarded by historical verifications, this proposal gives reason to the hopes» (Grassi, 1961: 5).

At the beginning of the 1960s Tokyo was about to reach 10 million inhabitants, its urban structure

was characterized by a radial growth, facing the deep bay on the Pacific Ocean, one of the busiest and most populated bodies of water in the world. Kenzo Tange developed a plan for the expansion of Tokyo that involved the idea to locate a high-density settlement in its bay, moving from a radial to a linear urban structure. The new linear system should have connected the consolidated urban centre of Tokyo to the opposite bank of the Bay, progressively developed in four phases. The main axis of the settlement - the «civic axis» - was characterized by a complex infrastructure network serving the tertiary and representative buildings, linear suspended structures organized on different levels. Orthogonally to this axis the secondary roads that connected the old centre to the new residential part, floating on water and capable of accommodating a total of approximately 5 million inhabitants. The general development of the plan was based on a mixed pilotis - midollar system that would have freed up the plan for public-private interconnection by making it coincide with the vertical grouping of services and densify the bay.

### **Experimental projects: densification by additional typologies**

This section includes two experimental projects that deals with the idea of a densification implemented by additional typologies, superimposed on the industrial pre-existent buildings. In Guido Canella' *Progetto di ridestinazione della fascia industriale centrale che connette Legnano e Castellanza* (1995) an extended site is articulated longitudinally, part of a settlement extended along the north-west axis of Milan and framed by the Olona river, the Sempione axis and the railway track. This historically productive area was characterized by a discontinuous urban fabric and industrial buildings in some case close to be dismissed.

Extending the concept of "function" to the broader of "functional system", the urban strategy was based on a series of contextual vocations linked to its multiple productive articulation, declined with respect to the tertiary sector for instrumental mechanics. The programme envisaged the presence of residences, buildings with civic functions, and an important component of activities linked to highly specialised education of technicians and entrepreneurs and to the training of workers and experts, capable of generating a district of excellence while revitalizing local businesses (Canella, 1995 and Bordogna, 2001).

The densification strategy involved different «additional typologies» superimposed - case by case - on the existing buildings, on the main infrastructural axis, or on the free soil, on the base of their functional program: the additional units destined for research, training, and management were suspended by a mesh of pillars integrated with that of the existing building. They were accessible from the production spaces by a system of vertical distribution, and provided additional spaces for research and development, the civic functions (classrooms, museums, libraries) were hosted in linear bodies suspended through a pilotis system above the main traffic arteries, in order to guarantee maximum accessibility. The residential buildings were suspended on pillar structure and placed at the boundaries of the areas, suspended over the ground level to allow continuity of public spaces and vegetation below them.

In this case, the superpimposition allowed the increase of density while respecting the original condition of rarefaction and the pre-existing morphological-environmental peculiarities.

A similar strategy was applied by Bernard Tschumi in the project for Factory 798 in Beijing, in Dashanzi district, an extensive former industrial complex structured an entire district in the northeast part of the Chinese capital. By the end of the 1990s, one of the most vibrant Chinese art communities started to reuse the spaces of the abandoned factory, spontaneously setting up museum, galleries and ateliers. Instead of following the purchaser's plan to demolish the whole complex to build a residential and commercial tower, Bernard Tschumi's envisaged the

opportunity to preserve the activities of the artistic community by developing the new spaces on a level superimposed to the pre-existing complex. The additional building, made by intersecting linear bodies of four- to ten-storeys suspended 25 metres above ground, would have contained the residences, the commercial and collective spaces. At the ground floor new constructions were limited to the elevation of the vertical distribution nodes and the new structural system.

An experimental realization regarding the suspension of the mass of building and the activation of a non-conventional relation with the ground-floor, is represented by the project for the Vanke Center, built in Shenzhen by Steven Holl in 2006-2009 (Holl, Mc Voy, 2012). The main body of the building is characterized by a linear development, four- to six-storeys height, completely suspended over the level of the ground by a system of eight main vertical elements, containing the vertical distribution. Under the building, the ground floor is designed to host a continuous park that providing a quite wide green space to a district densely urbanized and characterized by a urban structure developed mainly in vertical.

This is a mixed-use building, whose different activities are divided in the different branches of the structure: the offices are located in the western side, the residences occupies the centre, and the hospitality facilities the eastern part.

## **Conclusion**

Why the considered cases should be important within a research on alternative urban densification models? The reasons are different. The interest in the case of Lazar Khidekel lies mainly in the "idea of city" contained in the Aero-cities, that involves a figurative aspect that is related to the attempt to translate the suprematist forms into practicable spaces to realize specific ideals of living the architectures and the world; it relates also to an architectural aspect that involves the idea of outlining a possible solution to the problems of the modern city through specific characters such as the linearity of the settlement, the suspension of its mass, the preservation of the natural environment and its infrastructural character; and a insediative aspect, regarding the different possibilities foreshadowed by horizontal typologies and the alternative model of urban development. Regarding the project for Castellanza-Legnana and Dashanzi, the interest lies in the opportunity of activating a urban regeneration through the superimposition of a system able to preserve the existing building enhancing the contextual condition. Approaching the experimentation of Steven Holl is important in order to understand also the dimensional requirement and characteristics on the tested realizability.

Today, portions of the city susceptible to new development are subject to certain fixed limits: the size of the intervention area, the amount of volume to be settled, the percentage of land to be preserved, etc. Despite these limits, the shape of the city should continue to be an object for alternative scenarios among which vertical densification should be one of the solutions, but not the only one. The effort to imagine an alternative future for the city-growth, able to go beyond what it conventionally considered possible represents a constantly cultivated tendency in the history of cities: a physiological attempt to combine the settlement form with the concrete needs of planning, densification, functional re-organisation, to invert an urban development trend considered problematic from a certain point of view (social, political, economic, technological, etc). The idea of generating new urban spaces through the superimposition of a system of suspended patterns on portions of the city - either natural and free or occupied by pre-existing settlements - would represent an alternative densification model that could settle high densities while limiting land consumption. Defining an urban densification model based on the analysed cases, and testing it on specific urban contexts will be the next step of this



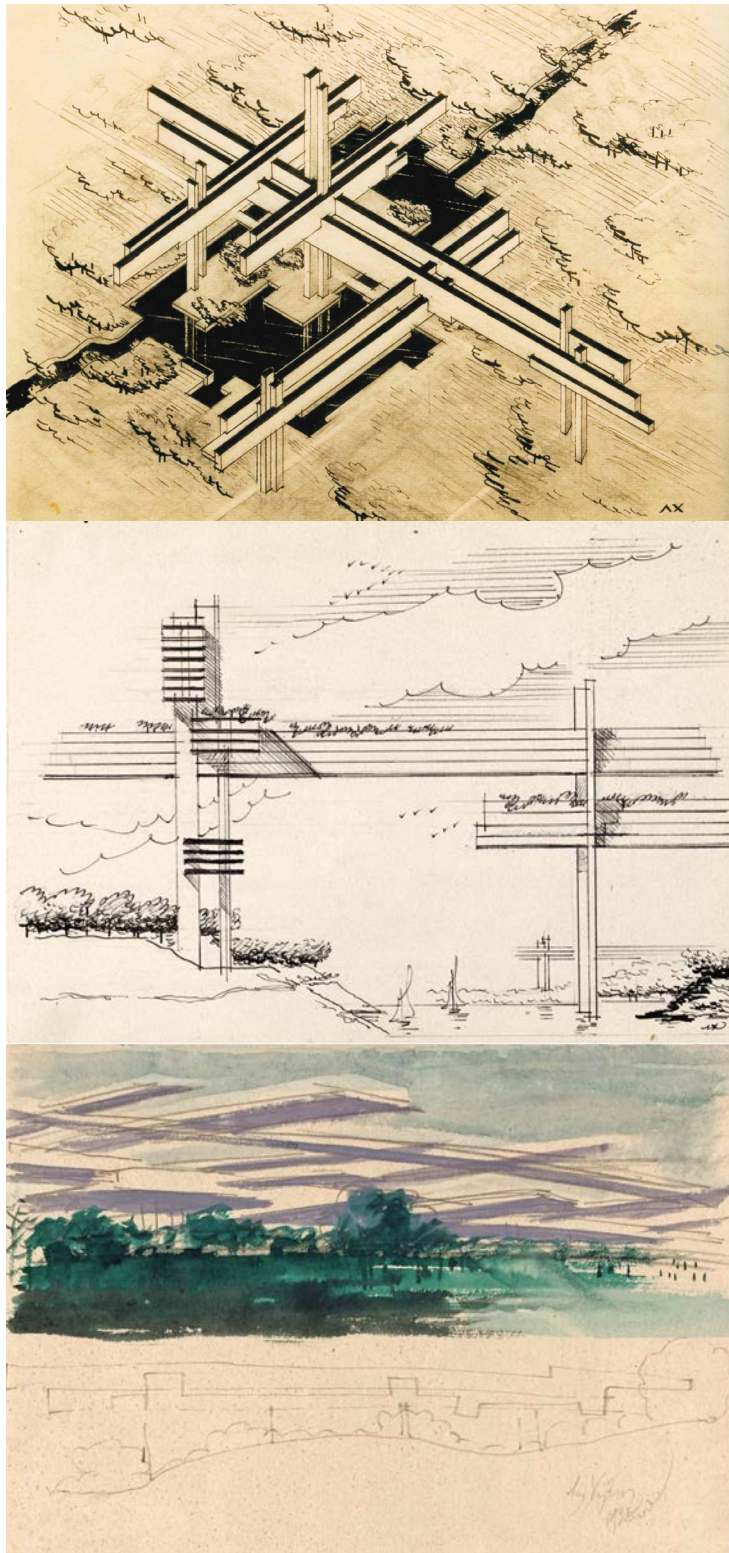
research.

According to this purpose, we have defined two generic categories as fields of application. The first is represented by the "areas in transformation", whose soil is neither free nor natural, such as brownfield sites, industrial archaeological sites, areas occupied by an infrastructure system, etcetera. In this scenario, the densification process of the existing fabric by the superimposition of a suspended pattern, whether supported by an appropriate functional programme, could localise new centralities and enhance the social activation rate, in order to revitalize and allowing to have an enlarged and safe use. The second case is represented by "areas of completion", sites whose soil is free and natural. This might include the decommissioned railway yards that have undergone spontaneous re-naturalisation over the years, or agricultural low-density areas on the edge of urban limits characterized by strategic interest, on which insist high rate of urban densification combined with strong limitations in land use. In these cases, employing the idea of a suspended settlement would ensure and enhance the continuity of the natural system present at ground level, allowing to develop an innovative relationship between artificial and natural settlement.

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## Illustrations and Tables



## The built form and urban morphology in the historic city of Korça, Albania.

Ledita Mezini<sup>1</sup>, Jona Muçollari<sup>2</sup>

<sup>1,2</sup>Polytechnic University of Tirana, Faculty of Architecture and Urbanism, Department of Architecture, St. "Muhamet Gjollësja, No. 54", Tirana, Albania.

E-mail: <sup>1</sup>ledita\_mezini@yahoo.com, <sup>2</sup>jonamucollari@hotmail.com

*Keywords: Urban Morphology, typological design, boulevard, built form*

*Conference theme: Reading the Changing Urban Form*

**Abstract.** *The form of a city is as an organism always changing forced by various factors and historical, political, social events that a country goes through. In this complex and changing reality some settlement struggle to survive and to highlight their values. This research tries to make a description and explanation of the different urban tissues that we can find in a medieval/ ottoman/ communist and now modern city of Korça, Albania in order to identify, evaluate and simply memorize the urban form of this city. The architecture of this multifaced city which is overlapped in layers of different period is analyzed mainly in its historic and centered core and in its main boulevard. Korça was also been called "Little Paris" for its architecture, and modern dwellings of more than 100 years ago. For understanding and reading the built forms, the paths, streets and plots, the study started by gathering contemporary and historical maps, physical surveys, field measurements, photographs, and documentary records. A large number of buildings were investigated in the historical center and then categorized and classified highlighting their elements and their relationship with the street. The data gathered and accumulated was sorted in categories to divide the different morphological elements. This research aimed to highlight the values of the architecture of Korça dwellings by documenting the new typology that were built at the beginning of the 20th century, evidencing the data that will serve for restorative intervention, preservation or simply for evaluating the architectural heritage and its identity.*

## Introduction

"Urban morphology is the study of the physical form of settlements and more precisely, the study of the formation of urban fabric components and the relationship of these components, which describe their compositions and configurations through time." (Chiaradia, 2019) O'Arcy Thompson (1917, 1961) best sums it up when he says: "In short, the form of an object is a 'diagram of forces', and in this sense, the study of form without the processes which give rise to it, is meaningless". (Werritty, 2010)

To read the urban form of a city is a difficult task since the city itself is a living organism which, like an amorphous body, is constantly changing by adapting, transforming and evolving under the effect of several forces and different factors. "cities are complex organisms, evolving and changing according to local rules and conditions which manifest more global order across many scales and times." (Michael Batty, 1994) While Kostoff presumed that the formation of the city is a process 'a repository of cultural meanings', 'unplanned evolution', 'instinctive growth'. (Kostoff, 1991) The main question in the morphological realm is considering the explanatory and descriptive dimensions: How is the urban form built and why? The research tries to understand and to explore the city of Korça, Albania, and the urban form of it, focused mainly in one of its boulevards and mostly explore how the course of history, culture, and social life impacted the morphological dimension.

The city of Korça, as other Albanian cities has passed through several transformation through the course of history from several wars, conquerors, and political-economic and socio-cultural influences. Kostoff (1991) describes the cities "as embodiment of the community it shelters".

However, as Blea (2019) mentions the urban morphology of the city of Korça is clearly identified through the formal reading of the composition of the empty space versus the built form. Understanding these configurations which evolved through centuries and the layers of urban developments along with the socio-cultural and economic phenomena gives a clearly picture of the process of city forming.

The composition of urban geometry, the relationship between the built mass and the empty spaces creates perceptible urban tissues that give us the possibility to classify certain areas of the city as pieces of a puzzle. These expressions of form can distinguish and identify three main characters of urban tissues: the influences of Ottoman Style, the inspirations from Italian neo-rationalism and the imposing city of socialist-realism.

## Methodology

The main theme of the exploration was conducted in the context of a research didactic activity and was concentrated in reading of urban fabric and the collection of the most representative buildings in the city of Korça, Albania. The researcher Pirro Thomo, which focused most of his studies in the analyze of Korça city was also a great point of reference during the research venture.

Initially, the research includes a historical analysis of the city's developments in the course of time, focusing on the period of the beginning of the 20th century as the most significant period where the city took a big developmental leap in the economic, social and construction fields. The project area was elaborated from a wider reading of the city, concentrating mainly on one of its main boulevards, Boulevard "Republika" that also constitutes one of the main arteries of urban development and growth of the city. The area was chosen not only because of its urban footprint but also because it coincides with an important artery that traces from the old city core to the later peripheral surroundings. The explanation of the road system map and the built environment is the main objective of the current study within the framework of heritage

evaluation.

For understanding and reading the built forms, the paths, streets and plots, the study started by gathering contemporary and historical maps, physical surveys, field measurements, photographs, and documentary records. A large number of buildings were investigated in the historical center and mainly in the "Republika" boulevard and then categorized and classified highlighting their architectonic elements and their relationship with the street. The data gathered and accumulated was sorted in categories to divide the different morphological elements.

### **The urban and historical developments of Korça**

The spatial organization and urban morphology of Korça city dates back to the medieval city and the castle as the main core of this urban ensemble, which is scarcely mentioned in a number of evidences and the ottoman registers of 1431-1432. According to the first Ottoman census of 1431-1432, the city had just 26 houses; while in the second census in 1568-1569, it still had only 33 Christian families.

The small number of families, as also agreed by Thomo (Thomo, 2022, p. 43) hosted inside the fortress, proof that the area was already populated before the ottoman conquest and the skeleton of the city was already there before the Ottoman expansion. Till the end of the 15th century the city remained a small bastion on the rule of some small manor house and was formed by the castle, the outside and open city and the bazaar. As for the castle, the traces that shed light on its antiquity, the construction form, dimensions, and characteristics of it, are completely vague. The urban ensemble built outside the castle walls was recorded in the Ottoman registers under the name Varosh (a label given to the dwellings outside the medieval castle's walls) and was founded on the east side of the castle, to the right of the Morava River. The third formative nucleus of the city was the bazaar which firstly was a very chaotic, organic and of extensive character merging till the vicinity of a village nearby and forming the foundation of the city.

As other Ottoman cities, Korça was typically defenseless, with no walls which was characteristic of the Ottoman self-confidence. The castle walls and the buildings inside it lost their importance and the city was concentrated around a mosque and a founder/leader figure, which in the city of Korça was Iliaz Mirahori. Mahallas (small quarter or urban ensemble) were small urban villages, most often inhabited by homogeneous social and religious groups, which exercised strong social controls and strove to preserve law and order. The residential mass was more important than the public space creating strong and important areas for the houses and their courtyard and leaving streets and road system without a precise hierarchical system. During the Ottoman empire, its urban system was chaotic, convoluted and irregular. There were no governmental norms in regulating the urban form but only accepted norms of social behavior. House construction rules were subject to the respect of custom, ownership, and privacy. (Mezini & Pojani, 2014)

The fanaticism expressed in the isolation of women from public life, was a strong reason that brought not only the organization of the house inside (sometimes women and children lived in separated quarters of the house) but influenced also the construction site and therefore the relation to the urban structure of the ensemble. (Thomo, 2022) The house never turned its facade to the street. It was surrounded by high walls which were preceded by large courtyards isolating them almost entirely from the outside world.

Houses appearance towards the street was unimportant, where houses turned their front facade mostly towards the courtyard and the side and empty one, toward the urban vistas.



Blocking neighbours' views with high and empty walls was one of the main characteristics of the ottoman cities where the domestic construction protected the women of the house. Most residential buildings were made of wood and plaster, and occasionally stones or bricks. The dwellings of Korça as in many other Albanian city during the ottoman conquest appeared as introverted blocks with simple compositional features. The main area consisted by a central hall (sofa), which served both as a circulation space (with mainly all bedroom doors opening into it) and a living room, a stable element in house plans. (Baçe, Meksi, Riza, Karaiskaj, & Thomo, 1987) Much of the needs were met within the household. The house also held important social functions as a place of meetings, talks, agreements, alliances and ceremonies.

Some of the Ottoman urban design qualities, which can be found even in nowadays city were: the house introversion, lack of formal planning controls, organic and chaotic street patterns, and the presence of large open or semi-open circulation spaces within houses where the gatherings, economic and social connections were happening. (Mezini & Pojani, 2014) These features which were replicated in the Albanian lands of the Empire, were characteristics of Korça settlement as well.

During the XV to XVIII century craftsmanship and trade took a big leap in the city of Korça. This manner of dominance in the city is linked to a more open building and life style. (Baçe, Meksi, Riza, Karaiskaj, & Thomo, 1987) The composition of the city till the middle of the 19th century may be characterized by three structural units: Orthodox Quarter (Varoshi), Muslim Quarter (Kasabaja) and the Bazaar which was a buffer area of division between these two different quarters in character and physiognomy. The bazaar was also physically divided in two parts by the Morava river where the natural element established the boundary between the two different neighborhoods. During the same period the formation of the fortress begins to disappear as a compositional nucleus. (Thomo, 2022) These two ensembles which were different in composition diverge from each other by the plot area in size (the larger was Kasaba's ensemble) but unite in the common fact of chaotic roads network. The organic structure is described by Kostoff as cities which develop without the benefit of designers, subject to no master plan but the passage of time, the lay of the land, and the daily life of the citizens. The resultant form is irregular, nongeometric, 'organic', with an incidence of crooked and curved streets and randomly defined open spaces. (Kostoff, 1991)

As result of economic and demographic growth, in 1859 Korça had 10,000 inhabitants. The boundaries between the cluster areas were fading, creating a more unified and denser urban structure which was characterized by irregularly shaped buildable plots, contoured by a casual and fluid road network. (Bleta, Qamo, & Burda, 2019) The neighborhoods were densely populated as the market expanded. The new social and economic life during the Ottoman occupation was an important factor that influenced the urban physiognomy of the city.

During the second half of the 19th century and mainly during the years 1860s to 1890s the country was looking towards the western countries and the Albanian National Awakening period found the town of Korça as a very wealthy and lively area, where economic, trade, culture and social life prevail the city.

The great density of population and the new way of life where trade was a primary factor, brought a new physical appearance and urban form to the city. The old districts used the ground floors and the yards for commercial and the upper parts for living, manifesting very dense and compact buildings, connected to each other as continuous bodies. The ground floor were next to the public areas with more open facades, wider windows, bringing customers inside the shops.

The expansion of new urban ensembles, as result of these growths, marks the new stage of

morphological urban developments. It was during this period that two main axes began to be distinguish which took place precisely on the connecting roads where trade was developed with the provinces of the north and the east. Along these axes, regular plots of land began to be developed. These new urban ensembles were developed as regular orthogonal structures mainly in rectangular shapes of 2000-5000 m<sup>2</sup>. These expansion toward the north continued till the beginning of the 20th century. After the independence of Albania in 1912 the city went through a turbulent period of wars, demonstrates and invasions till the military protection of the French army. It was during this period that a new look was given to the buildings.

In 1923 the Korça population reached 25598 inhabitants, becoming the largest city of Albania. Its administrative center and its favorable geographical position amidst a rich basin and at the crossroads of important commercial routes led to the rise of this city as an important commercial, production, social and cultural center. (Figure 1)

It was not till 1930 that the city undergoes the first documented plan designed by the Austrian engineers Kohler and Bertold. The city went through a compacting process of the existing urban fabric and the creations of new urban areas. As Thomo (2022) states "These new districts were traversed by a dense road network, which regardless of the direction of the main arteries, tended to create regular geometric figures. The streets generally meet at right angles creating small rectangular blocks, filled with buildings." (p. 319) It was maybe because the military protection of the French, the Italian protectorate, the Greek invasions from time to time, the influence of Austro- Hungarian, or it was the fact that Albania had been under the Ottoman occupation for almost 500 years, that the population of the city tried to build with a totally different ethos. What was built during the Italian protectorate over part of the territory in 1917 and then by military occupation from 1939 to 1943 had led "to the relation between space, both urban and rural territory arranged by Ottoman Empire, and a western power that wanted to impose new aesthetic codes fabricating distant spatial structures, those derived from a complex blending of Modernism and rhetorical architecture by the regime". (Menghini & Resta, 2017)

The last expansion and urban developments occurred during the communism period, in the peripheral areas of the old structure, where a typical formal composition extremely regular, and standardized was imposed all through the country.

During the period of the 1950s and beyond, the urban developments of the Eastern Block were characterized by blocks apartments, small in size, and totally similar to each other. The city of Korça as other Albania cities adapted a similar housing typology, losing its identity and character, appearing with same physiognomy and morphological form all over the country. A more vertical dimension was introduced and private house with courtyards were no more part of the urban design planning's.

These new areas of developments did not interfere with the old structure of the city leaving nowadays a well perceptible stratification of the urban fabric.

### **Reading the form of the boulevard**

In the book "Architecture: Form, Space, and Order", the word 'Form' can be referred to both the internal structure and external outline, often in the shape of a three-dimensional mass or volume and some of the characteristics of form include: Shape, size, colour, texture, position, orientation (Ching, 2014)

Whyte (1968) as cited by (Batty & Longley, 1994) sums this up when he says: "The word 'form' has many meanings, such as shape, configuration, structure, pattern, organization, and system of relations." Researchers are concerned in these properties and how they are set in space. "In

terms of the study of cities, form will represent the spatial pattern of elements composing the city in terms of its networks, buildings, spaces, defined through its geometry mainly, but not exclusively, in two rather than three dimensions. Yet form can never merely be conceived in terms of these local properties but has a wider significance or gestalt, a more global significance in the way cities grow and change. (Batty & Longley, 1994)

The features of the area chosen in the study are analyzed in relations to the notion of 'form' -meaning, trying to understand also the reasons and the history of this urban structure. The main boulevard reflects a mixture of morphological styles, and the interpretation of the city form's is melted from organic toward pure geometry. The capillaries of the narrow and winding streets of the old city open towards the empty areas, widening and running like veins and arteries.

The boulevard 'Republika' was one of the main economic arteries, which connected the city with the neighboring north areas. It becomes a strong compositional axis of the urban structure, a kind of backbone, from which a dense network of roads emerges and develops. The different direction of the roads on both sides of this axis testifies to the avoidance from strict rules, monotony and uniform development, general characteristics of the orthogonal system. The orthogonal grid plan, characteristic of cities with predominantly flat land was implemented by the Korça builders as a fast, practical and easy construction system which was supported also by the rapid expansion and growth of the city. The German architect and city planner, Krier presented public urban spaces' morphotypes and the term "Long Markets". This type of main street where trade, and craftsmanship function divided the city into two parts and had an elongated shape on the layout. (Krier & Rowe, 1979) (Figure 2)

Being a city where trade, culture and a new social life took place, brought the creation of a strata which generated income and their need for constructing some new structures, which were already opening to the roads and were no longer isolated by side walls. Such typologies as residential, commercial and both intertwined began to create the new silhouette of this boulevard as well as of the city itself. The new boulevard was released from the surrounding high walls giving the passerby the opportunity not only to look at the facade of the buildings but also to experience the green spaces, and gardens almost as parts of the public urban street. The expansion of the urban space was possible through the enclosure of the courtyards to the public surface, with railings as well as with monumental and decorative sculptures on the fences of the dwellings.

The composition of the roads almost perpendicular to the main boulevard are directed towards the free green spaces of the city hills, while the surrounding landscape seems to be scattered between these streets towards the boulevard. The residential blocks are not continuous volumes, but separated dimensions with intervals and varied sequences, sinking between the greenery of the gardens. In contrast to the architecture of the Ottoman period, the new architecture of the city was inclusive of the passer-by, and the buildings from introverted dwelling transformed into extroverted one where they wanted to show off and be exposed as best as possible, with rich architectural and decorative elaboration. The orientation of the main facade is toward the boulevard and rarely in the other directions, giving careful attention to the decoration at eye-level. Gehl argues that because humans look straight ahead most of the time, what's at eye level should catch a pedestrian's interest enough to want to linger longer in a city's public space, hence playing a role in the Lively City. (Gehl, 2010)

The new structures of the city remained at human scale. The buildings are of one, two or maximum three floors high, rising to the top with a sloping roof and rarely with a flat terrace. Their size, the dimensions of the form and the proportions of their features are in harmony not

only within an object but also in synthesis with the surrounding environment. Gardens, courtyards and ornamental facades are the image of the new urban form. Since the main facades of the buildings were already the side facades of the street, this made the decorations, the motifs of the windows and doors reach a high degree of mastery and details. (Thomo, 2022). (Figure 3) Warm, earthy, brick colors combined with white plastic plaster, contrast the green of the gardens and trees, giving the boulevard a relaxing, pleasant and quite attractive appearance for the public. Jan Gehl has stated that a successful road should contain four elements: accessibility, human scale, active program, texture ... These four elements appear to us along the boulevard 'Republika'. (Gehl, 2010)

The street access from the city core and the bazaar to the north peripheral area, touching the architecture and history of the city in every step of this road. Buildings, spaces, and perspectives, all on a human scale, show the developments and life of a city in a way that we can understand its form.

The shapes of the new buildings stick to pure rectangular forms. The outlines are always cubes or cuboids or a mixture of these two geometric forms combined in L-shape, positioned in the middle of the plot parcels or next to the street. The manner of determining the relation of the block on the ground was related to the fact that the building was purely residential or functioned as a workshop or a store for trade. (Figure 4)

This boulevard is an interesting example of the main arteries of the city rich in invigorating elements making it particularly special for several reasons:

- During the route to it, the passer-by does not feel blocked by any uninterrupted series of buildings.
- There is no monotony and uniformity of the geometric regularity of the urban structure.
- Buildings are at human scale but never repeat one the other and are in synchronization with the parcel area and their surroundings.
- Occasionally the horizontal lines are broken by some vertical emphasis. At certain and frequent intervals, the view opens to the surrounding landscape, to the natural background of the city hills.
- The clean plastic processing of the views of the houses, the decorative stone sculptures, the transparent iron railings, the lively and cheerful colors of the flowers in the backyards as well as the free spaces of the public gardens, complete this street.

The four fundamentals which make a city 'perfect', described by (Gehl, 2010), lively, safe, sustainable, healthy, and the notable elements and features which can be understood by the reading of the urban components of the main boulevard, are present and have given true aesthetic values to this promenade. (Figure 5)

## Conclusion

"Cities -like books- can be read" (Rogers, 2010) The central objective of this research was reading and understanding the built environment, in the city of Korça, (east of Albania) focusing mainly in one of the main boulevards, (Boulevard Republika) considering the built setting in relations to the urban space, the architecture, the urban morphology within the framework of documenting and valuating the built heritage. The research passed through an explanation of the historical developments and the main events that shaped the city of Korça, to the key characteristics and the representative architecture of each stage. It showed that urban morphology, and the shape of a city is an evolution of many factors, but mainly of the lifestyle of its inhabitants. The main boulevard and the features of form like shape, size, dimensions, orientations, position, texture, colour, proportions etc., were investigated in manner to

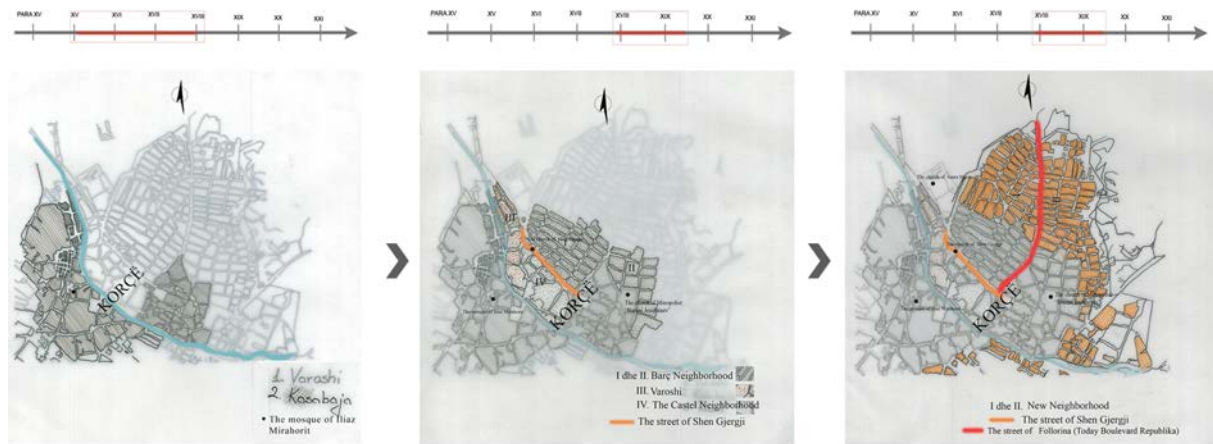
understand the heritage and the values of a this small, human scale city.

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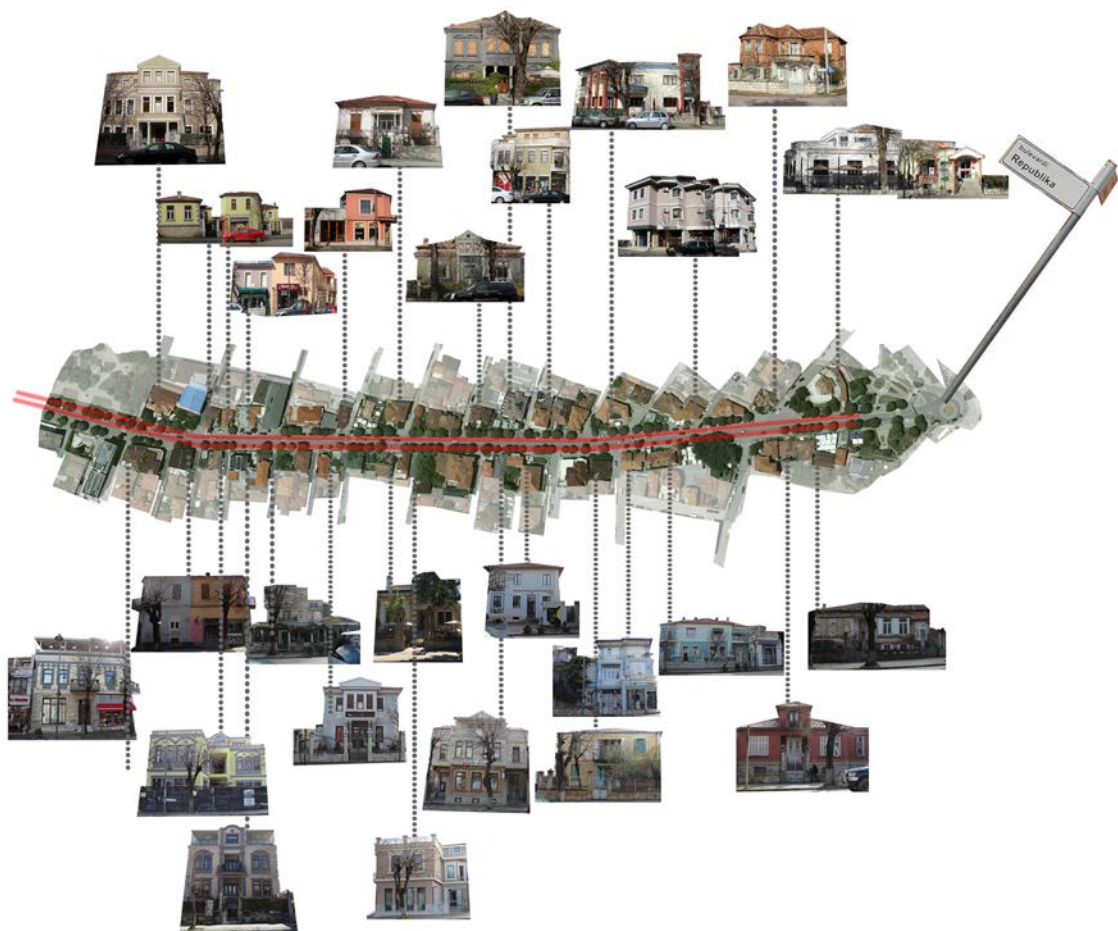
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## Illustrations and Tables

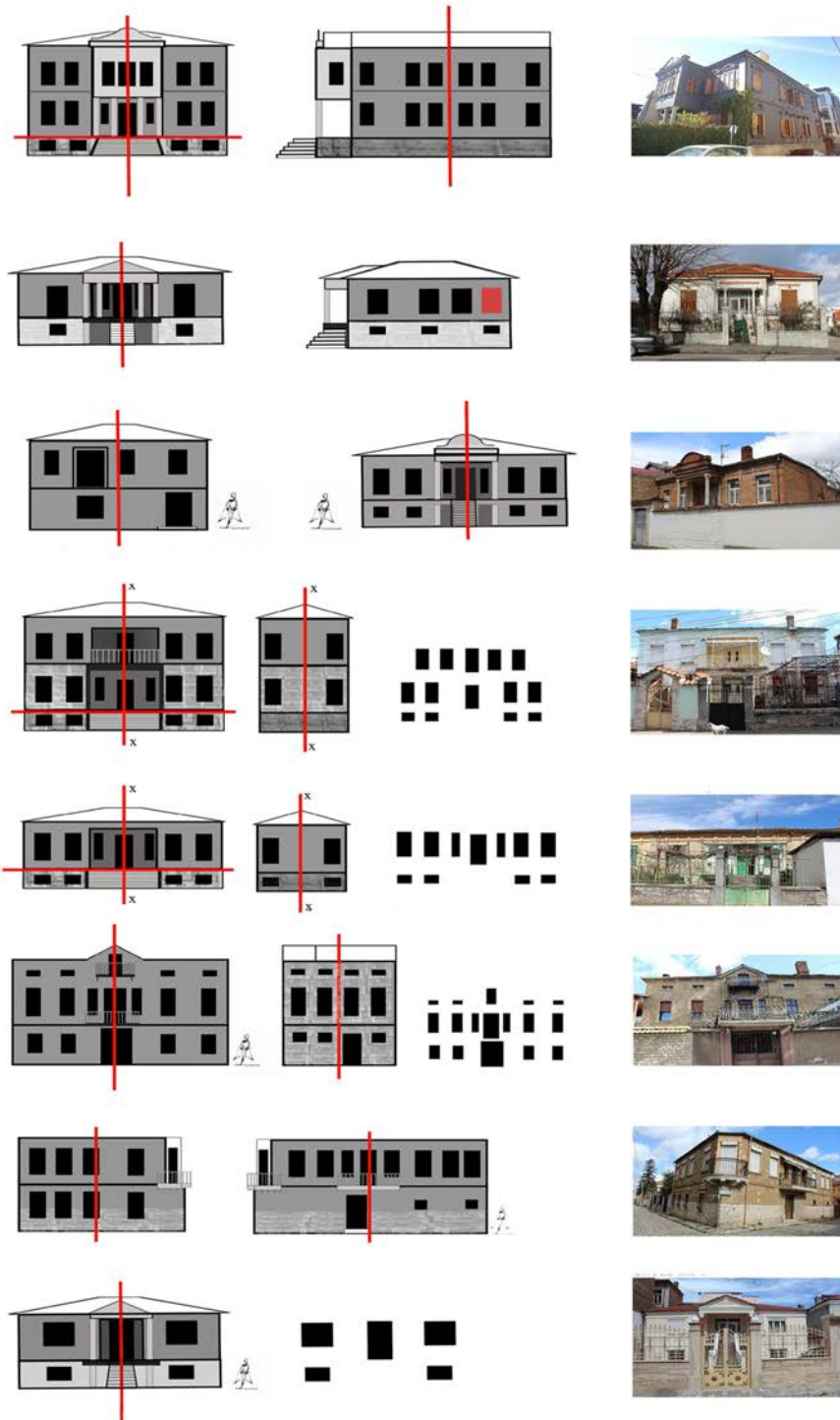


**Figure 1.** Map with the different urban stages of evolutions of Korça city, based also on the research of Pirro Thomo (Thomo, 2022).



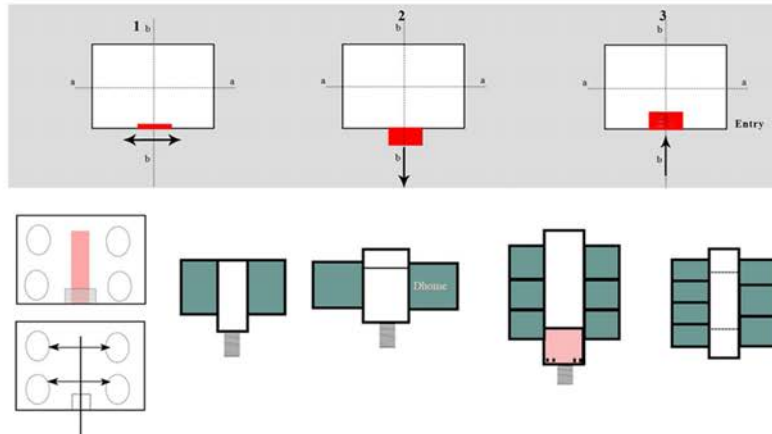
**Figure 2.** Collage with the most important buildings through the boulevard.

### The Facade

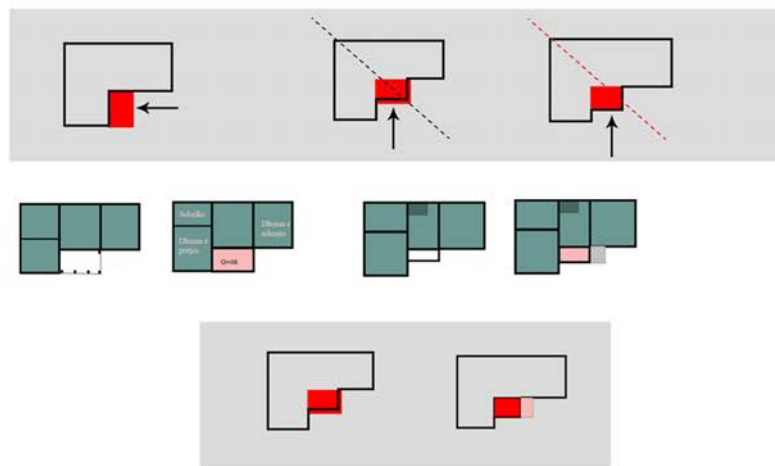


**Figure 3.** Different morphological elements investigated through the boulevard.

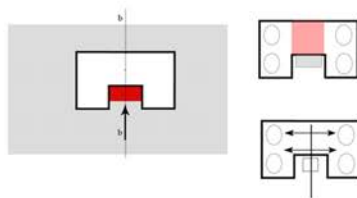
### 1. Rectangular type



### 2. The L-shape type



### 3. The U-shape type



### 4. The complex-shape type

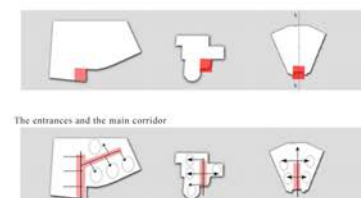


Figure 3. Illustration of architectonic features in Republika boulevard.

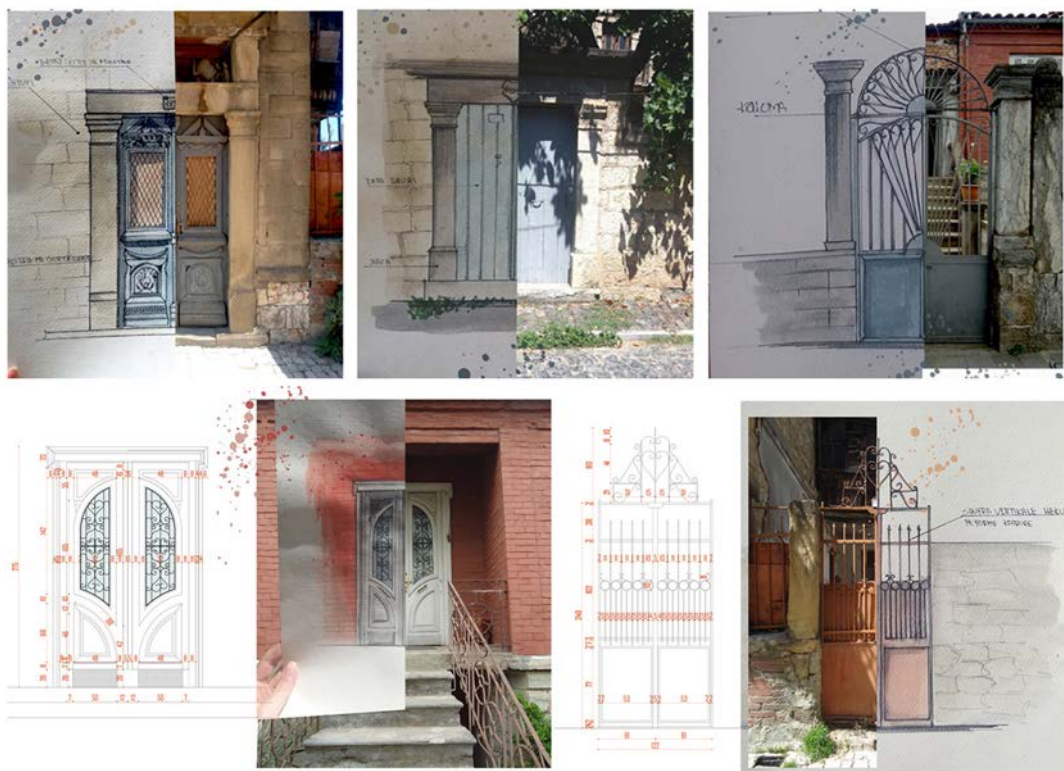


Figure 4. Illustration of entrances in Republika boulevard.

## Historical urban renewal as a preface to current city changes: The case of Ciutat Vella, Valencia

César D. Mifsut García

Town Planning and Urban Management Department - Entitat Valenciana d'Habitatge i Sòl-EVHA 46001 Valencia.

E-mail: cmifsutg@gmail.com

*Keywords:* Valencia, urban renewal, urban form

*Conference theme:* Reading the Changing Urban Form

**Abstract.** *Our cities are changing and also may change rapidly, but history recalls that every single era had its transformations. At least, the city as a product of changing and evolutionary human beings is an alive, changing and evolving organism as well. The closest, as well as the nearest in time historical period changing the city was the time after the extended demolition of the walls in European cities. Such actions transformed the whole idea of the city for every city and, inseparably, produced the transformation of the existing city until the moment to be incorporated to that new global city. From that moment the existing city became "old town" and was the aim of a series of morphological transformations that are the generally accepted idea of the current cities. Valencia city centre, Ciutat Vella as an example, suffered a series of urban interventions to update the existing city to the new 20th century, what included the collapse of a certain number of cultural y social heritage in the name of evolution. Those locations in Ciutat Vella transformed the existing urban fabric in new spaces considering former traces and ways of connection: Barrio de Pescadores, Plaza del Ayuntamiento, Avenida del Oeste among others. A morphological analysis of the transformed areas show the updating urban technics used as well provide examples and the results obtained one century ago to be applied on our changing current city*



## Introduction

Valencia is nowadays the third city in Spain, both in demographic and economic terms, but it reached out to be the first city in the Iberian Peninsula along its known as Golden Century along 14th and 15th centuries. As a part of its surrounding European context, the historical urban growth of Valencia reflects the European history and the Mediterranean background on its streets.

As a reminder, Valencia is a Roman settlement founded in 138 BC as a result of the finest military Roman strategy over new territories. Instead of fighting against the local former Iberian tribes they chose a new, ex novo location different from the existing two main tribal centres in the area. In this way, ancient cities of Arse –current Sagunt– or Leiria –current Llíria– were refused and subjected to the new Roman status quo. A small river island, 7 km far from the coastline, in the middle of a river flood plain and surrounded by marshes was selected to settle the new city. It was also in the half-way stage between Tarraco –current Tarragona– and Carthago Nova –current Cartagena–, both of them capital cities of the biggest Roman province in Hispania, Tarraconensis and Cartagonensis.

All the time since that moment is the story of a continuous growth, especially concentrated along the 20th century. In 1900 Valencia was defined by the mediaeval city walls and some small extensions on the coast. This situation varied until getting the current extension around 200 times bigger, with a 4.000 hectares urban area particularly produced after the 60s in the 20th century.

## Historical growth

As a matter of fact there are two main situations concerning the growth of Valencia old town. The first one covers 15 centuries from the foundation until the Christian wall construction. This urban shape will be almost the existing city until the precinct demolitions in the 19th century when further extensions in the 20th century implied the inner updating and transformation of the historical plot in connection to the rest of the city.

In the first, historical period, the main characteristics of the city were defined, by the consecutive additions of the Muslim and Christian cities embracing the initial Roman area. As shown in the picture, the Roman settlement in the river island was extended in two times, corresponding to Roman Republic and Roman Empire times. Fortunately, the demolition in the 80s of two blocks behind the Cathedral brought to light part of the Roman Forum, and the junction of the Cardo and Decumanus main axis. After a long and successful intervention all the area has become a unique underground archaeological site where the Roman vestiges and part of the Visigoth city rests are shown. The original Roman Republic urban grill was enlarged in Roman Empire times by the addition of a long circus on the West of the city that was served also by a river port on the North, in connection to the sea along the river Turia. The Roman city pattern created a grill of blocks around the Forum and the main axis junction that were completely teared down and approximately rebuild with the Visigoth refounding. However, the current urban pattern reflects the original Roman grill.

After the Roman Empire fall there was a short period of abandon of the urban activity until the Visigoth times, when the city flourished again as one of the Bishop's see of the new Christian Hispania. But in 711 the Muslim troops leaded by Tariq and Muza crossed the Gibraltar strait –renamed as the Mount of Tariq or Yebel Tariq, or Gibraltar in Spanish. In a few centuries the Muslim rule covered the most of Iberian territory and in the 9th century Valentia became Balānsiya. By the 10th century Valencia became the capital city of Sharq-al-Andalus, –West Andalus– as one of the intellectual centres in the peninsula. The Muslim urban precinct

embraced the Roman city towards the South, covering almost the whole river island. The new urban area between both walls, Roman and Muslim, was built with blocks in the way of Muslim cities, with no pattern and creating an urban structure of disordered streets and cul-de-sacs. This part of the city can be found on a city map by the building replacement in the Muslim blocks.

Finally, in 1238 the Christian troops from Aragon Crown entered Valencia and the King James I of Aragon created the Valencian Kingdom around Valencia that two centuries after build a bigger new Christian wall around the Muslim city by drying the southern branch of the river and incorporating new ground for the future city again to the South of the river. SO, two big areas were created South and West of the existing city. These two areas took a kind of urban patterns made of a certain grills in connection to the ways going out of the city that have remained until the present days. In 1738 one of the intellectual protagonist of the local history, Father Tosca, drawn the whole city map as never before in a detailed picture of the existing city that reflected public and inner spaces of all the blocks. This map has come until today as an accurate picture of the 18th century city actually showing those urban traces from Roman and Muslim times as well. [Figure 1]

#### *Inner intervention plans*

In parallel to the wall demolitions in the 19th century the new plans for the city extensions in Spain were projected. The publication of the City Extension Law or Ley de Ensanche in 1864 ordered the way for the cities to grow after those demolitions. But the new extension plans could only have the Royal approval by developing some interventions in the old city centres to update these parts for the whole urban activity. In the case of Valencia some plans were proposed but not approved until finally in 1887, designed by José Calvo, Joaquín M<sup>a</sup> Arnau and Luis Ferreres. Simultaneously an inner renewal interventions had been approved in 1869 in a Hausmannian way: the improvement of Calle de la Paz, by the architects Sorni y Mercadé. This project was initially refused by the population and hardly criticised, but after executed became a mode for further interventions. Another projects were proposed for new avenues crossing completely the old city, like both projects for Main Roads for 25 and 30 meters wide projects by Luis Ferreres in 1891. But the economical impossibility stopped their execution.

In that situation, and while the works of the growing city were being developed throughout the Ensanches, the new 20th century invited to rethink on it. In 1911 the municipal architect Federico Aymamí launched a new global intervention plan for the old town, what was called Plan Aymamí. It consisted in the general approach of two main new avenues to order the traffic flows among other objectives: a new Western avenue crossing the old city from North to South at the West side of the city, and a new Royal avenue to reach the Cathedral area from the East as well. As a trait of modernity the plan was served by a series of pictures showing the final result throughout the presence of vehicles, urban transport vehicles or huge new streetlamps. But once and again the enforcement costs made it unavailable.

There was another attempt in 1929, after a new, young architect from a wealthy European family entered the Town Hall, Javier Goerlich. He would be the real new city maker in Valencia for decades. So, after getting the position of Municipal Architect proposed a new inner Intervention project or the old town, in that year. The project was based on the former 1911 one, but reducing the big intervention to only one –the West side avenue– and a set of several small interventions to soften the traffic circulation within the city. This plan was not implemented completely, but it was the guide for urban interventions in the old town for years. In this case, an as an example of the personal implication of the municipal architect, the plan was served

by many pictures too, with architectural proposals based in the new, expressionist rationalism style that started to work in Europe since the 20s. As even with a series of small interventions the plan was still too expensive, the Municipal Architect proposed to take off separately the West side avenue project, that was approved in 1931. This is a particular case of an urban renewal based in Haussmannian techniques yet, as the final case all over Europe. The outbreak of the civil war in Spain stopped definitively every intervention for some years,

The project for Avenida del Oeste -the Western avenue- in old town was planned in five sections to be developed in the same case as Calle de la Paz project. Just finishing the war in 1939, in 1941 the new building in the avenue started to be built, with in the 3 first out of 5 sections of the plan. Due to the post-war economy new incentive for the private were implemented, and almost no order in the execution was planned. As a result, in 1975, after 34 years since the first construction, the avenue was built in its 3 first sections, when democracy started in Spain after Franco's dictatorship. The new protectionist trends all over Europe on built and urban heritages produced the consideration to stop definitively the execution of the avenue. It was finally voted at the Town Hall in 1975, and the existing avenue became a huge, almost useless cul-de-sac, from South of old town to the central market area.

The interesting in that case is the mastery of its author, Javier Goerlich, who provided a fine delineation of the new blocks, an accurate insertion within the existing medieval urban pattern, and the modern execution of the buildings that, as a whole, make the avenue-piece to represent a real expressionist architecture catalogue. It collects all the architectural streams for 40 years in Spain, through buildings up to 60% in a round corner plot and characterized by their height and slenderness. [Figure 2]

### **Post-war urban renewal and the current city**

The current picture of the Valencia city centre is just that as projected in the plans before the war. It is not due to an obvious example of cause-effect, but it is due to the endeavour and the capability of the master behind the plans, his ideas to build the city, and the pictures he imagined that became the pictures for the architects' collective worldview. There is a huge concordance between the proposals made and the final building project that show how impressive was the influence of the master architect. There are especially some interventions for new public spaces where all this can be easily observed besides the huge case of Avenida del Oeste: Plaza del Ayuntamiento or Plaza de la Reina among others.

#### *Plaza del Ayuntamiento*

One of the biggest interventions in the beginning of the 20th century in Valencia transformed completely the existing city. As there was a need to connect the extension of the city to the old town, a huge operation took place to move the city centre itself. The growth of the city out of the walls towards the South-East extension, together with the location of the main railway station in that area too, produced to move the civic city centre from the oldest Roman epicentre in the city to this renewed area.

Along the 19th century in Spain a series of expropriations took place as a government's measures to sale properties especially from the Catholic Church. Throughout these seizures several huge buildings were the object of poorly-selling and, others, subsequently abandoned. A huge number of buildings suffered robbers and looting, and some of them even disappeared. This was the case of the former Convento de San Francisco, a huge area in the centre-South of Ciutat Vella that was purchased and demolished to create the new, biggest public space in the city. As it was near the train station, and next to the South-Eastern city enlargement, it

became the new civic city centre. This operation left the Roman area around the Cathedral the position of the religious centre.

As show in the picture, the new Plaza de Ayuntamiento, initially Plaza de San Francisco, due to the former convent, was surrounded by old buildings. New public buildings were built, such as the proper Town Hall and the Central Post Office. Subsequently all the buildings were replaced, just in the moment that Javier Goerlich became municipal architect. He gave to the space its new particular image as well as concluded the works started with the century especially in the North of the square, by the location of the private trade athenaeum very active in the city.

The result is a great space with a great scale in its buildings that show the historical periods of its constructions through the architectural styles of the first half of the 20th century.

#### *Plaza de la Reina*

On the other hand, South to the Cathedral a new intervention was developed to give a proper ending to the successful intervention of Calle de la Paz just in the middle of the city centre. In this way, a new activity node was created to articulate North-South and East-West circulations in this point.

An existing Calle de la Reina is the origin of the name and the intervention. It led directly to the Cathedral from the South along a narrow street that it was decided to widen. Initially a small, triangular square was planned at the end of Calle de la Paz to turn left to the new city centre at Plaza del Ayuntamiento. But, again, Javier Goerlich promoted from the Town Hall the possibility to enlarge that small square in connection to the Cathedral, even bigger than the square projected in 1929 plan. From this moment, the biggest building in Ciutat Vella would show a façade never seen before... and never thought as well.

As Javier Goerlich had the possibility to improve, he proposed an architectural contest in a national level to solve this new public space. The winner was Vicente Figuerola who made a proposal in 1950 that, due to the mastery of Goerlich preparing the locations and conditions, produced impressive results related to his drawings.

The result of this intervention is a new space that surprisingly lays south out of the Roman walls, opening a new free space that recalls the city situation in the foundation times. On the other hand, this space remarks the existence of Via Augusta, the main coastal axis from Tarraco to Carthago Nova.[Figure 3]

#### **Conclusion**

Ciutat Vella, which is Valencia old town, is a reflection of its own story in the context of a Western Europe city located on the shores of the Mediterranean. Due to its size and the facts along the history, it represents not only a model on concentric growth throughout historical periods on a peculiar river flood plain but shows a particular characterization through its urban patterns still possible to be found in the current city.

On the other hand, the persistence of a certain number of elements along the history evidence the importance of the locations. Some places, public spaces and historical interventions as urban renewals reinforce the location characteristics. They are continuously adding more value to themselves in the form of updating to serve to the rest of the city life, reinventing themselves as well.

The permanence of certain elements can be read on the maps by the concatenation of concepts such as precinct, pattern, plot, past, nowadays, zoning, scar, reference, and updating that, in its particular overview, provide a connection between the primary moments of the city

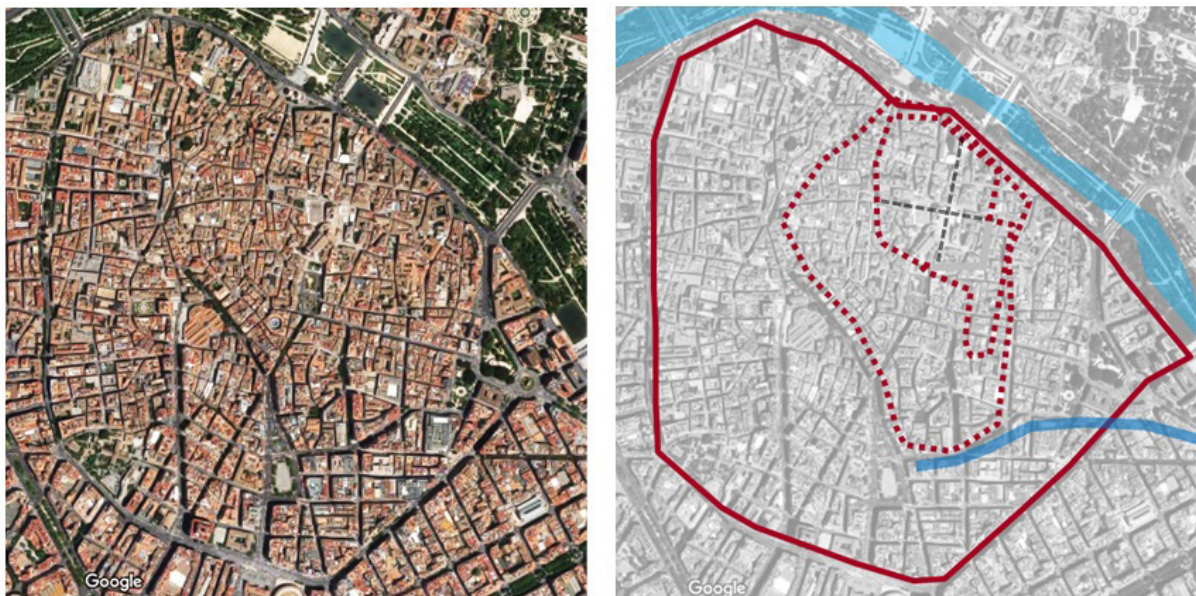


and current situation.

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## Illustrations and tables



**Figure 1.** Roman, Muslim and Christian city wall precincts and aerial view





Figure 2. Avenida del Oeste project picture and aerial view

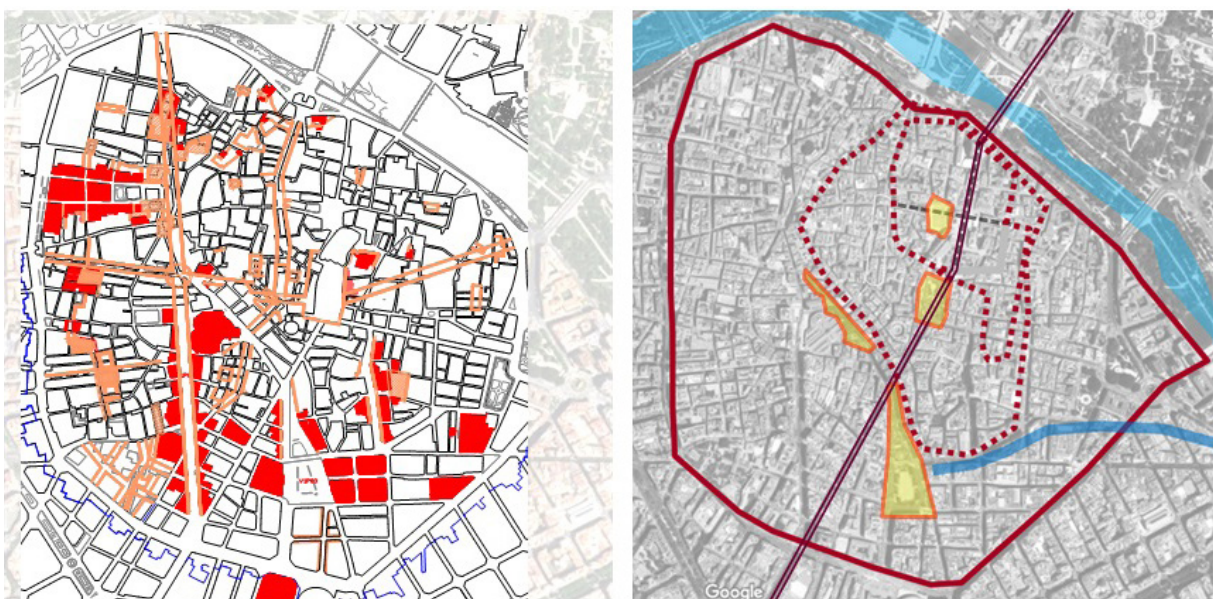


Figure 3. 20th century interventions in Ciutat Vella and study cases by the Roman Via Augusta



## Reading the urban form through the green-grey armature as a tool for spatial regeneration: the case of Piacenza

Federico Mistò<sup>1</sup>, Carles Crosas Armengol<sup>2</sup>, Antonella Contin<sup>3</sup>, Julián Galindo González<sup>4</sup>

<sup>1,3</sup>Dipartimento di Architettura e Studi Urbani. Politecnico di Milano. Milano. Via Bonardi, 3. 20133 Milano.

<sup>2,4</sup>Escuela Técnica Superior de Arquitectura de Barcelona, UPC. Avinguda Diagonal, 649, 08028 Barcelona.

E-mail: <sup>1</sup>federico.misto@polimi.it, <sup>2</sup>carles.crosas@upc.edu, <sup>3</sup>antonella.contin@polimi.it,

<sup>4</sup>julian.galindo@upc.edu

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*Conference theme: Reading the Changing Urban Form*

**Abstract.** Contemporary cities are facing the emerging challenges of spatial fragmentation, due to increasing urban abandonment and infrastructure-driven periurban expansion. Traditional territorial structures founded on a strong urban-rural linkage are transforming into a juxtaposition of patterns related by the grey infrastructure, with no relation to the ecological networks.

Our research is focused on the morphological territorial and urban reading, able to identify the green infrastructure as an operational tool to recompose fragmented elements into a new structure, a morpho-ecological matrix able to give new meaning to the neglected points of the city and to boost processes of urban regeneration where ecological values and habitability of the public space are put into relation by the urban architectural project.

The proposed case-study is the city of Piacenza, as a paradigm of spatial fragmentation due to the presence of abandoned big military fences in the consolidated urban fabric and of new productive compounds, particularly belonging to the logistic sector, grown as bulges of the city linked to fast national and continental infrastructures.

Our research uses an interscalar approach, reading and mapping the green infrastructure with specific focuses, so to define the spatial forms which it can consist of at the different scales, that of the territory, the city, the neighborhood and the urban node. Green-grey armature, urban-rural linkage transects, network of interconnected green enclaves and urban node of public and common spaces are the models that allow to identify suitable points for tactical acupuncture interventions able to redraw a new urban form founded on the ecological territorial structure.



### **Spatial fragmentation, metropolitan borders and the green-grey infrastructure**

In the complexity of contemporary metropolitan landscapes, fragmentation occurs as a frequent phenomenon where densification and concentration lead to a rupture of morphological and ecological continuities and to an interruption of the isotropy of the environmental ecosystem. It occurs when progressive gradients of change are no longer recognized, but sudden contacts between different elements in a discontinuous and non-articulated succession, therefore no longer ecosystem. The natural ecosystem is articulated continuously, while the city, even if part of the territorial ecosystem, with its violent interruptions and discontinuities generates fragments, edges, in-between spaces, marginal and resultant areas, unqualified and degraded.

Approaching territorial dynamics from the point of view of architecture, we do not consider fragmentation only as an ecological phenomenon, therefore an interruption of the environmental ecosystem, but also as a process of disarticulation of landscape, urban structure and relationships between city and rural territory. The fragmentation of natural systems is accompanied, or is caused, by a spatial fragmentation, which is linked to the presence of physical elements as infrastructures that create separation barriers, continuous fences that enclose large plots, large sets or large multifunctional containers, like shopping centers, airports or stations<sup>1</sup>, which are not in a relationship of scalable compatibility with the context and need big infrastructures to ensure accessibility.

Spatial fragmentation can often lead to dynamics of concentration in which a homogenization of building typologies and urban activities and an over-representation of a social group in a small area are linked to each other, thus supporting processes of social segregation. On the other hand, fragmentation, when caused by the presence of large continuous elements (enclosures, platforms, infrastructures), can take to a consistent increase in environmental risk due to interruptions of ecological networks, which often combine with degradation and segregation. In a general perspective, spatial fragmentation increases the risk of a gap in the distribution of spatial values, and can thus cause marginalization processes. Overcoming fragmentation and increasing the density of relationships is seen as a fundamental aspect of the urban interventions towards a sustainable city<sup>2</sup>.

Spatial fragmentation is part of metropolitan development as an effect of rapid, poorly controlled, or unstructured and non-organic growth. In the phenomenon of fragmentation, the effect of a conflict of scale between the local level and the metropolitan level can be detected. In fact, infrastructures, productive compounds, large containers are normally located according to supra-local principles, considering advantageous routes and accessibility conditions, but also cause fragmentation when they touch the ground and are implanted at the local scale. The elements of the metropolitan scale are not usually treated as agents on the geomorphological support, or considered by their physical consistency and the effects of their rooting on the ground, thus generating areas of result, intercluded, unable to acquire character and spatial quality, transforming themselves into degraded and marginal parts of the city. These are the in-between spaces generated by fragmentation that can be found within the city, or between city and not-city, in a city fabric that becomes less dense as far as we move

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<sup>1</sup>Those which american authors use to call big boxes and in D'Alfonso, E. ed. (2006) Milano Maplensa. La regione urbana nello spazio dei flussi are defined as urban morphotypes by E. D'Alfonso and new built form types by Roger Simmonds

<sup>2</sup>See for example Target 11.b of SDG 11: By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters [...]

away from the city center, interspersed with infrastructural barriers, undeveloped or abandoned areas. These in-between spaces are, however, a reserve of space of contact between urban and rural and infiltration of open and green spaces within the city fabric, a metropolitan border made of the internal and external discontinuous boundaries of the city, whose role of possible connection between built and natural must be valued, valuing its otherness, his peculiar condition (Galindo, Giocoli, 2013). This intermediate open space between dense built environments is what can be defined as a spacebody (Viganò, 1999; Shane, 2005), a void between full that has to be designed as a landscape characterized by its city-country being, in a condition of otherness with respect to the city and the countryside. The metropolitan border is part of the structure-meaning of the metropolis that has to be reconceptualized connecting the fragments and giving shape to a new pattern of continuity.

In this research, we used the green infrastructure as the operator of this new pattern because it is a broad concept, capable of including the diversity of border areas within the open spaces that can offer services to the city. To assess the presence of open spaces in the city which not only considers their aesthetic value but the set of ecosystem services (Costanza et al., 1997) they perform, the green infrastructure combines built and natural environments planning and designing the edges of the city. It is fundamental, then, to clarify that green infrastructures, in addition to providing ecological services, can constitute an intentional matrix (Batlle, 2014) that in the combination of natural and built elements, the green and the grey, define a typical figure of the territory (Rogers, 1958) that is form and structure of the metropolis (Contin, 2021), to be considered as a morphological element with the instruments of our discipline: the drawing, the tale, the description. This research, in fact, proposes a spatial approach that does not intend to start from general rules and apply them to territorial planning, but from a meticulous look at the metropolis of things (Solá Morales, 2008), with a bottom-up process capable of revealing the principles that form the city as a network of relationships between topographic support, ecological matrix, technological infrastructures and activities, and using the practice of drawing as a foundation for cultural elaboration and investigation (Crosas, 2019).

Green infrastructure is defined in a metropolitan framework<sup>3</sup> because the concept of infrastructure subtends those of connection and continuity. Its scope needs, then, the dimension of the metropolis, which is not simply a built density, a conurbation, but is the net-city (Shane, 2005), a polycentric and interconnected system that works as a unit and is made of central nodes of compact urbanity and an intermediate space, the space-body of the diffused city, the small centers, the borders. Green infrastructure makes the edge areas elements of infiltration within the city, a passage of the ecological network through the urban fabric, in a redefinition of the relationship between the city and its surroundings in new terms. From the permeability of the borders a more habitable metropolis is achieved, thanks to the rehabilitation of the open spaces inside and outside the city that are connected in a continuous armature. A network of green infrastructures can bring value from the metropolitan scale to a point that does not locally achieve by itself the capacity to attract investment and acquire quality, thus activating urban portions that are abandoned and incapable of regeneration.

Green infrastructure is the operator that allows to include metropolitan center and smaller cities in a whole look and approach, a new metropolitan pattern that exceeds the usual center-periphery picture to implement models of more equitable diffusion of services and values and support a habitability of the peripheries comparable to that of the centers. The

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<sup>3</sup>"Redefinir el paisaje de la metropolis" in Quaderns 14 Infraestructura verde metropolitana, Col·lecció Quaderns PDU Metropolità, AMB Barcelona



metropolitan green infrastructure has to support this distribution, integrating grey elements, such as roads, pavements, living spaces, and green elements, thus constituting a green-grey infrastructure (Contin, 2021) that preserves and disseminates ecosystem services instead of thinking about a simple ecological consistence and mitigation of impacts. The metropolitan green-grey infrastructure has to accommodate functions, infiltrate all corners of the city, impregnate the porosity of its fabric being accessible and connective, support structure of the project of public spaces and a slow and sustainable mobility (Secchi, 2013). Intermediate-scale architecture (D'Alfonso, 2003), which designs city pieces as well as large multifunctional containers, has the task of integrating regional ecological continuity with the need for urban habitability. Thus, the green-grey infrastructure is the solution to the contrast of scales and spatial fragmentation.

### Goals and methodology

This research aims to show how urban fragments, marginalized at the local scale, can actually support a green-grey infrastructure strategy at the metropolitan scale. Indeed, this study identifies anchor points for this green-grey metropolitan infrastructure within the city fabric, taking advantage of the presence of abandoned buildings and areas to create opportunities for urban regeneration in the interaction between the territorial ecological armature and the city.

The production of maps at different scales is the main method of approximation. The map is considered as an instrument of knowledge and representation of a territorial structure/ knowledge, a project activity to approach the city from an operational point of view that gathers analysis and strategies.

Four scales of representation are chosen:

- XL Scale, corresponding to a broad view of the territory, covering the geomorphological elements and infrastructural connections that relate landscapes and fabrics to the national and international networks;
- L-scale, relating to the observation of the whole city, including peri-urban agricultural areas, to observe the characteristics of the urban edges;
- M-scale, applied to interior areas of the city where the relationship between urban morphology, open spaces and green-grey infrastructure is tested;
- S-scale, applied to a space that offers an opportunity for integration of the green-grey infrastructure into the city fabric.

The maps, in each of the scales of approximation, build a narrative that gives rise to proposals, with the aim to abstract from the close-reading a dynamic that can guide a strategy of intervention, allowing to pass from 'what is happening?' to 'what do we want to happen?'. Each map gives shape, as a project in itself, to a specific operator linked to a figure of the green-grey infrastructure, detailed as a design resource according to the different scales of approximation:

- XL-scale: Metropolitan matrix
- L-scale: Urban armature
- M-scale: Network of open spaces
- S-scale: Strategic urban project<sup>4</sup>

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<sup>4</sup>See as a reference for the relation between the scale and the results of the representation: Quaderns 14, AMB Barcelona, ob. cit.

### Case-study: the city of Piacenza as a contested territory

The case study chosen is the city of Piacenza, in the geographical area of the Po Valley in northern Italy, a medium-sized city of approximately 100,000 inhabitants, located at an equal distance from the metropolitan cities of Milan, Turin, Bologna and Genoa, and connected to them by large infrastructural axes. The condition of being located at the edge of different metropolitan areas, makes Piacenza a particularly interesting occasion to investigate the territory of the metropolitan borders, being itself a border-territory.

From its very foundation, Piacenza has been a city of passage, starting from the Romans, who built the initial core of the city as a military camp to control the flat lands lying north of the Appennini, and then in the Middle Age for the pilgrims getting from Northern Europe to Rome and back. Its geographical rooting testifies this nature, approximately halfway of the west-east Po river course in the confluence of the Trebbia, next to the mountains and quite near to the sea, but well connected with the main cities of the flatland. The Via Emilia that links Rome to Milan since the Roman Age crosses the Po right in the city of Piacenza. This strategic position has supported the growth of Piacenza as far as infrastructures were developing, with a strong affirmation of productive activities, mainly in the mechanical sector, leading to an industrial area that has become as big as the city center since the 90's. But particularly in the last 20 years, thanks to the new high-speed train line and to the development of the TEN-T trans-European infrastructural corridors, the logistics sector impelled by big international companies has been strongly developing in Piacenza and its province, promoting a peri-urban expansion that has led to much higher land consumption and levels of traffic than in the recent past, and also to significant modifications of the social composition. The province of Piacenza, with 19.7% of foreign citizens, is the second in Italy in percentage of foreign citizens over the total number of residents<sup>5</sup>, with the city overcoming the percentage of 20%. The extension in constructed area of the logistics polygon reaches 2.5 million square meters, larger than that of the historic center<sup>6</sup>.

Another aspect is the presence in the city of a large number of abandoned urban areas. These are mainly unused or underused military areas or buildings, but there are also abandoned factories and infrastructures. The set of abandoned urban areas surrounds by extension of surface the 1.2 million square meters, according to data from the municipal plan<sup>7</sup>. Urban abandonment and peri-urban expansion are inscribed in a situation of strong spatial fragmentation. On the one hand, this is due to the presence of fenced plots of great extension and limited access, such as the historic military and industrial enclosures that have been absorbed by the urban fabric. On the other hand, spatial fragmentation in Piacenza also arises from the presence of functional concentrations of great extension, although not effectively isolated, as in the case of the Caorsana industrial areas to the east and Viggioletta to the west, and the Le Mose logistics compound between the Via Emilia, the railways and the A1 highway. Spatial fragmentation, urban abandonment and peri-urban expansion are the effects of a contrast of scales that generates conflicts between the different demands driving the territorial development: urban regeneration, logistic growth and preservation of agricultural areas. The bad effects are seen on the local dimension of a phenomenon that has its reasons in the metropolitan dimension, that is the growth of logistics compounds and infrastructures, leading to a fragmented urban environment, with a high presence of areas that lay abandoned and unable to regenerate.

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<sup>5</sup>Osservatorio Regionale sul Fenomeno Migratorio, Regione Emilia-Romagna (2021). L'immigrazione straniera in Emilia-Romagna.

<sup>6</sup>Annex to the municipal plan of Piacenza "Schede progetto degli ambiti di trasformazione"

<sup>7</sup>Ibidem

### **The metropolitan dimension: metro-matrix and urban armature**

In this first part, the readings at the XL and L scale are presented.

In the XL scale, we have the aim of a general knowledge of the territory, which allows us to understand its patterns and geographical and morphological structure and insert the green-grey infrastructure in it as a driver of continuity. The bounding-box considered for the observation measures approximately 50x50km, covering almost the extension of the province of Piacenza, adapting to the extension of the elements and geographical and morphological relations represented in the maps. The selection of the elements is designed to support the construction of the metropolitan matrix (Metro-matrix, Ortiz, 2015) made of the green-grey infrastructure, based on the integration between the geomorphological support, ground and waters, and the dynamics of growth represented by infrastructures and urban settlements (Figure 1). A first growth pattern mapped is based on a radial development, traditionally centered on the city of Piacenza, and a second, linear and polycentric, driven by the importance acquired by highways and railways, being axes of localization mainly for industrial and logistics areas.

Once observed these two patterns that merge into the territorial settlement, and whose traces can be recognized in the maps, the hypothesis of the metropolitan matrix for Piacenza is therefore based on the green-grey continuity reinforcing the potential of the latent but yet evident net-city by denying radiality. The aim of this interpretation is, above all, to frame the territorial system of Piacenza in a regional continuity that reflects the territorial ecological continuity, and thus overcome the condition of periphery of which Piacenza suffers as a metropolitan border, and that leads to a development that does not solve abandonment and marginalization. Moreover, to identify within the metropolitan matrix of Piacenza those points that suffer specific situations of fragility and to take advantage of the matrix as an instrument that can direct sustainable and equitable development in the different parts of the territory.

The L-scale series of maps allow to observe more specifically positions and morphologies of the elements that shape the city: urban settlement, natural enclaves and rural fabric. The L scale covers an extension that corresponds approximately to that of the municipality of Piacenza, taking a frame of 6x10km to get to a map representing the urban armature of Piacenza as a shape-figure related to a metropolitan dimension of the green-grey infrastructure conceived in the XL-scale map as the metro-matrix. The concept of armature surpasses that of infrastructure and refers to the physical consistency of the matrix, which is no longer a line of an abstract and geometric mesh, but has to be thought of as a space with an environmental, landscape and civic character (figure 2). The urban armature establishes a continuity between the ecological corridors of the Trebbia and Nure rivers, which belong to the metropolitan scale, thus ensuring an inter-scalar correlation. The armature, crossing the city and adapting to its morphologies and typologies, identifies opportunities to link the city with the territory, capturing latent potentials in some points and reactivating them in relation to the metropolitan scale.

As already said, the urban armature is a tool that, building the urban-rural linkage, can be used to remedy the marginality of the peripheries. The metropolitan border, becoming a space of transition instead of fragmentation, can thus host opportunities for the regeneration of areas at risk of abandonment. The construction of the urban-rural linkage is interpreted through the figure of the transect. Its structure is characterized by starting in the rural surroundings and ending in a point of high intensity located in the city fabric with the capacity to become an intense civic point. The transect in the L-scale map also passes through a productive area and thus aims to resolve the isolation and marginalization of the industrial periphery. The urban-rural linkage, using an urban civic point, becomes a stick-operation, an anchorage to the city of the green-grey armature belonging to the metro-matrix. The area in which this anchorage

operation is represented is the urban sector, where the network of open spaces is framed to analyze the interactions of the green-grey urban armature with the city fabric. Finally, the anchor-point has to be marked by the strategic urban project.

### **The local dimension: open spaces network and strategic urban project**

In this second part, the analysis of the approximations in the M and S scales is presented.

The M-scale maps show first of all the physical consistency of the urban armature that has been identified as a shaped green hatch in the L-scale, allowing to understand its relation to the urban morphology. Taking the chance of underused spaces like parking lots, abandoned compounds, military unused fenced areas, old rural buildings to be regenerated, many opportunities for the ecological armature to infiltrate the city fabric are identified and related to each other, articulating a network of open spaces at the scale of the urban proximity. The anchorage of the urban armature to the city fabric, in the anchor point of the transect of the urban-rural linkage, lays inside this network as the spark of possible activation of the whole system and gravitation of the different sequences of spaces and paths. Finally, the S-scale maps and drawings observe in detail the anchor point and the opportunities for a strategic urban project. The goal is to demonstrate the potential of the articulation between the node and the urban armature to anchor the metropolitan green-grey infrastructure to the city, thus solving fragmentation by designing open and public spaces able to give structure to a vivid urban image (Lynch, 1960).

The urban sector analyzed is located in the southeast area of Piacenza, centered on the Via Emilia Parmense about 2km away from the east-edge of the historical center (figure 3). This sector shows a transition between the rural area, which is found very close here, and a dispersed urban fabric that can be actually considered as part of the consolidated city. A transition marked by the presence of industries, a partially abandoned military compound, and some rural farmhouses incorporated into the fabric or abandoned. The main element of this context is the compound formed by the church of San Lazzaro and the Alberoni monastery and religious school, which recalls the origin of the area, formerly a rural village on the road to Piacenza called San Lazzaro, then included into the municipal extension of the city. San Lazzaro town grew as few houses next to the church and the monastery from the XVI century with the role of hospitality for pilgrims coming to Piacenza from Rome, as it was the first big construction they were meeting on the road to the city.

To this institution and the small town, the campus of the Catholic University was added in the '50s of XX century, thus making this area a pole of urban and metropolitan attraction. The presence of these functions creates the conditions to form a knot of intense urbanity, an anchor point for the urban armature that crosses this area. However, it is observed that these buildings are actually contiguous but isolated clusters. Despite a strong character of the architectures, there is in this sector a lack of a public space that builds the urban scene. The contribution offered by the urban armature is to focus on the interrelation between the open, common and public spaces, and the morphological character of the node on the urban scale, so that this can effectively become the point to generate a new kind of urbanity between urban and rural.

Via Emilia can indeed play a fundamental role of linkage. The drawing sections give an account of an incoherent urban environment, where the monumental building of the Alberoni Monastery is located next to a gas station and to the fence of a military compound (figure 4). The opportunity of an urban regeneration lies in the open space adjacent to the junction between Via Emilia and Strada delle Novate, which has to be structured as a practicable public space

in continuity with the surrounding green spaces and nearby rural areas. Identifying points to cross walls and fences and give accessibility to some closed green areas, like the park of the Alberoni Monastery and the gardens and parterres of the University campus, is a part of a strategic urban project able to connect green and grey elements in a new pattern of urbanity (figure 5).

### **Conclusion: from the fragments to the structure**

The case study demonstrates the potential of an approach based on the coherence between urban architecture project and territorial reading, and on green-grey infrastructure as a resource of interscalar relationship. The approach to the metropolitan scale is essential to ensure territorial resilience and sustainability. However, it cannot be solved only through general policies and strategic planning that disregard the concrete nature of places, but it is necessary to act at the local scale minding the metropolitan. In this scale of proximity, typical of the architecture, it is possible to control that the urban space is accessible, practicable and habitable, and at the same time considering the metropolitan scale, the urban space has to implement the continuity and infiltration of the territorial ecological armature (figure 6).

In summary, the urban project has to act at the local scale responding to a general structure that is a strategic vision of the city, taking the metropolitan matrix as a tool that allows conceptualizing and acting from this vision. The sustainable city, then, will result from policies and strategic plans as well as from concrete interventions inscribed in this general strategy, according to a vision that shapes the place and generates an urban image. All parts of the city-territory participate in this construction capable of giving meaning to the space-body of the metropolitan border, which is structured as a new physical and spatial dimension, to implement an effective regeneration of the peripheries and resolve the marginality of the fragments of space, multiplying and extending the metropolitan continuity.

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### Illustrations and tables

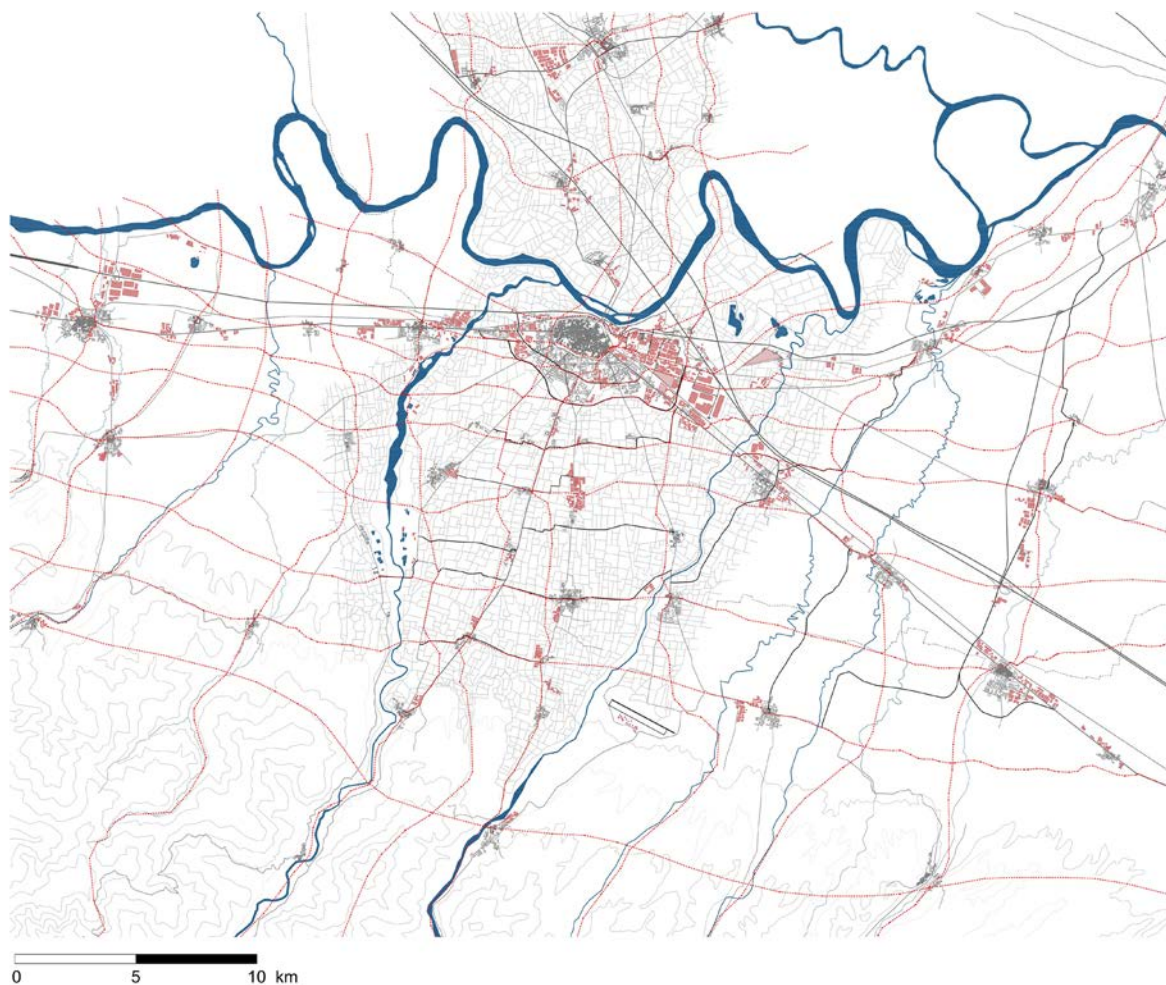


Figure 1. (Metro-matrix of Piacenza)

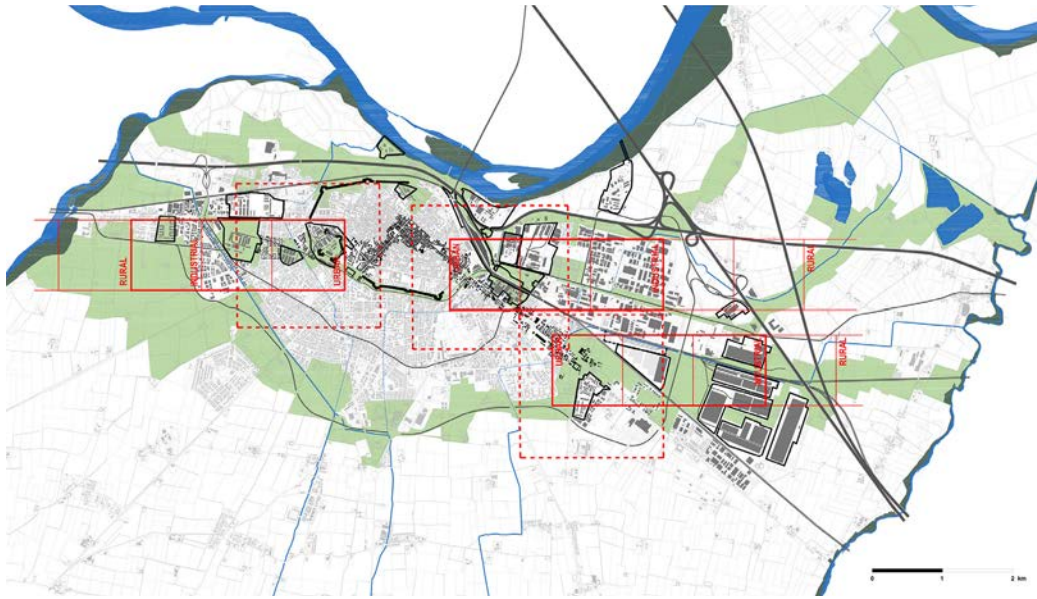


Figure 2. (Urban armature of Piacenza)



Figure 3. (Network of open spaces in the south-east urban sector)



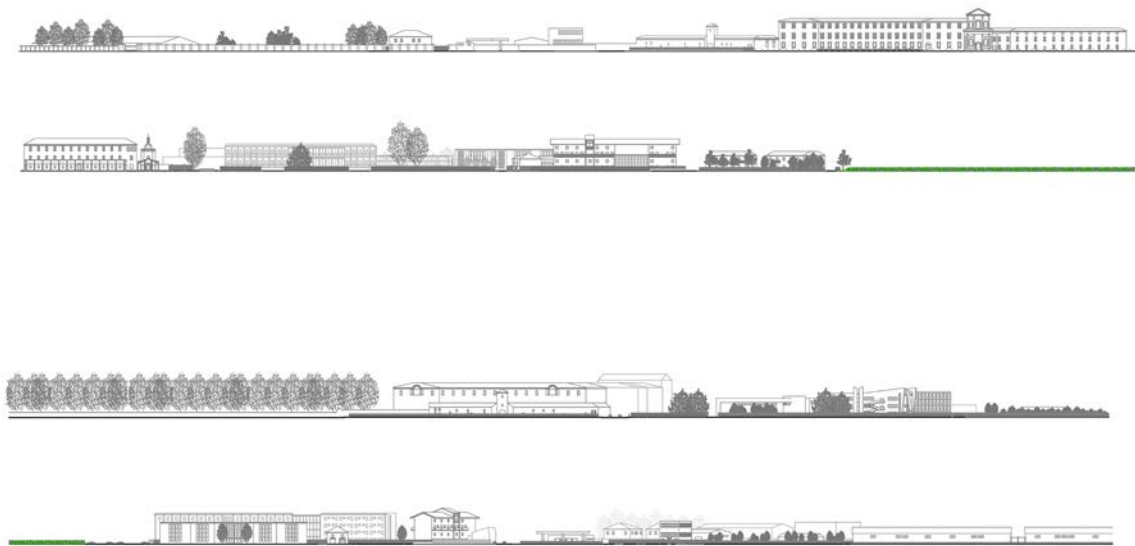


Figure 4. (Urban-rural linkage sections)

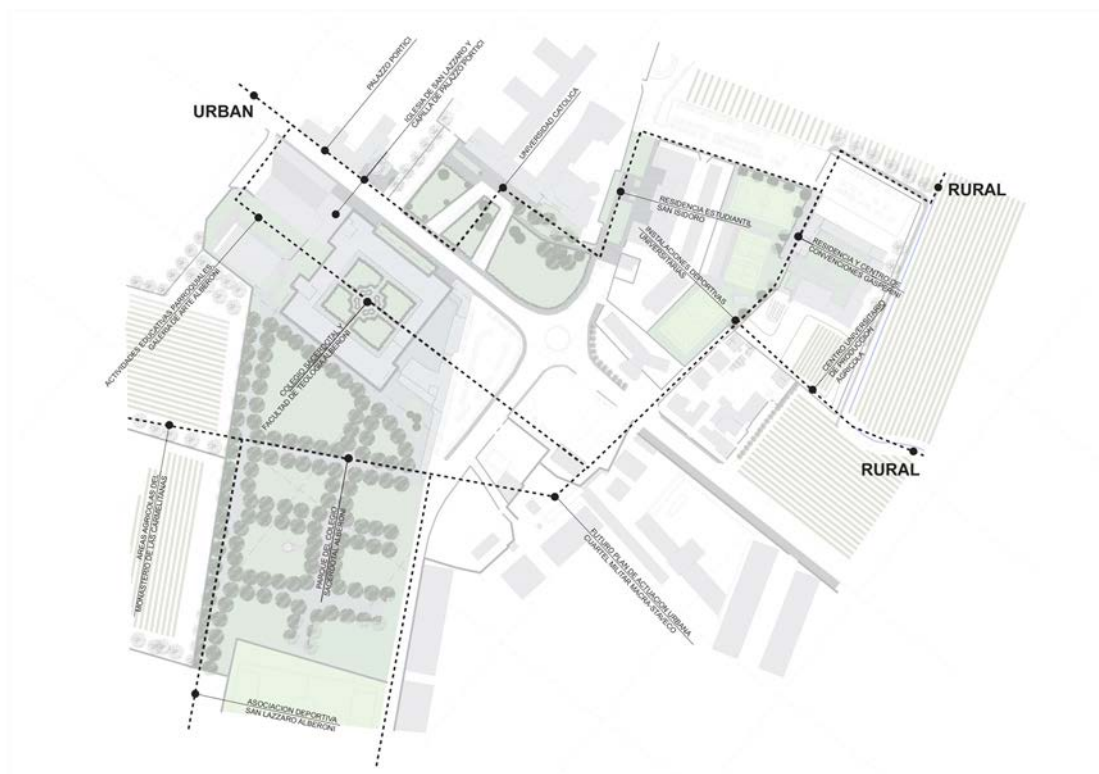
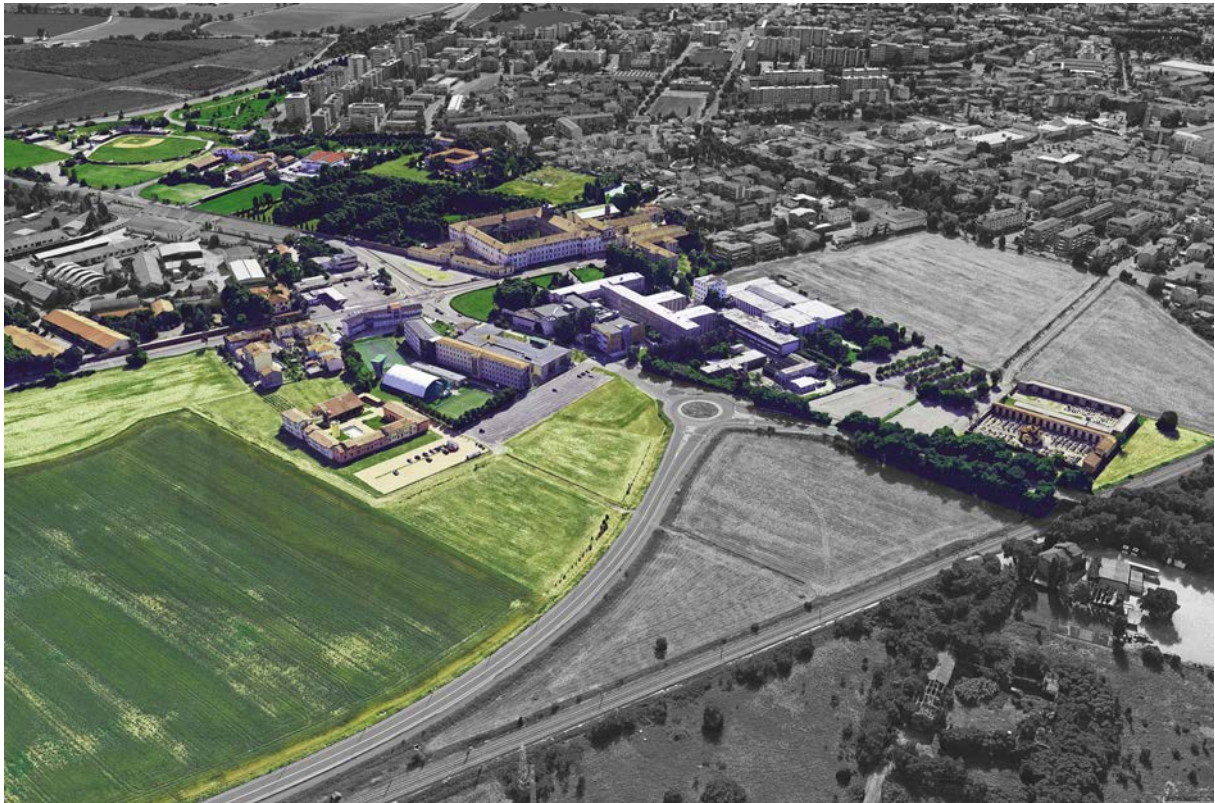


Figure 5. (Strategic urban project in Cattolica and Alberoni area)



**Figure 6.** (Aerial view of the urban armature crossing the Cattolica-Alberoni anchor point)

## The concept of porosity in the Japanese reality: morphologic and environmental study on Nihonbashi Neighbourhood, Tokyo

Alice Monacelli<sup>1</sup>, Marco Maretto<sup>2</sup>

<sup>1</sup>Università di Roma La Sapienza, DRACO (Dottorato di Ricerca in Architettura e Costruzione), Piazza Borghese 9, 00186, Roma, Italy

<sup>2</sup>Università di Parma, Dipartimento di Ingegneria e Architettura, Via delle Scienze, 181 / a, 43124 Parma

E-mail: <sup>1</sup>alice.monacelli@uniroma1.it, <sup>2</sup>marco.maretto@unipr.it

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Conference theme: Reading the Changing Urban Form

**Abstract.** The concept of porosity has been adopted several times by the urban planner Bernardo Secchi in his urban studies. The Greek etymology of the term is *πῶρος*, which means *poros* and indicates a stone of a structurally not very compact composition, permeable to the absorption of external substances (such as air or water). From an urban planning point of view, porosity can be ascribed to the capacity of the urban structure to open up and accompany the passer-by to discover its elements. Based on this concept, which can be scientifically calculated through the ratio between gross useful area and hectare (FAR), this paper tries to deepen the value of the concept of porosity in reference to the quality of the urban space and urban form by making a diachronic comparison between the traditional Japanese neighbourhood in the Edo period and the contemporary one. The paper investigates a selected reference neighbourhood in Tokyo, which is the city that represents the mayor change in the Japanese context. In fact, Tokyo, despite continuing to secure an optimal interconnection for pedestrian movements, has lost many interstitial spaces used by the community. From the challenging reality of Tokyo, the same analysis could be also extended for many other European and non-European cities: reflecting on its public spaces helps to define the change that the urban neighbourhoods have undergone in recent decades.



### Porosity and urban studies

Porosity represents a thematic discussed in many topics; in fact, we can find the concept of porosity in chemical description about physical bodies, representing the percentage between solid and void structures. It is actually an intrinsic propriety of the material, exceptionally functional in order to describe how much a corpse is able to receive external fluids and, consequently, it could be influenced by the external environment. In fact, the formula of porosity concerns to the following equation:

$$\text{Porosity} = (\text{Volume of Voids} / \text{Total Volume}) \times 100\%$$

Voids represent in this equation the first element to take in consideration, as if they give to the material its own characteristic and essence from the emptiness. In a dichotomic play between two different consistencies, void and emptiness, we could find out that for their existence they have to live within each other's: their definition comes from the limit of their essence.

In this vision, architecture has also acquired the concept of porosity in order to describe the ratio between the built (solid) and unbuilt space (voids). Building footprint is equal to the porosity formula, but reversed: it expresses the ratio between built space in the whole considered area and the total area, that before the construction's disposal could be interpreted as a void. In order to comprehend better which type of space constitutes the void in the Meso-scale, the Open Space could be used as an important instrument in the Urban Morphology Analysis: in there it is possible to comprehend the transformations and the contradiction that happen in the every-day life (De Capua, Errante and Palco, 2021). The recognition of the empty space comes from the analytical but at the same time critical Map that Gian Battista Nolli drew up in 1748, that is already interpretable as a Meta Project regarding the Urban Environment. what Gian Battista Nolli suggests not only refers to the degree of built and unbuilt within the urban space, but a clue towards the openings of the buildings within squares and streets. In fact, sectioning the ground floor plans of the main roman buildings at 1.50 meters, he gives us a clear idea of how the urban space is structured not only in terms of footprint, but also in terms of openings and accesses.

In particular, in this paper Tokyo's reality is taken in consideration. According to the process established by G.B. Nolli and geo-graphically taken out by the GIS system, it is indeed possible to define different types of reality in order to comprehend the relationship between emptiness and fullness in the Asian metropolis. Moreover, the way to emphasize built and non-built space together with accessibility and districts' functionality is very insightful to comprehend the differences that have occurred between the traditional Edo-neighbourhood and the contemporary one, considering the location in the Nihonbashi district, distant one km from the Edo-Castle (the urban core of the Metropolis of Tokyo). Finally, also the environmental factor is taken in consideration, contributing to underline how buildings' forms and materials of the traditional and new Nihonbashi neighbourhood could impact the environment, thanks to the use of Envi-MET software.

### Research area

The analysis tries to carry out an investigation about Urban Morphology regarding the Nihonbashi plot, in the city centre of Tokyo, in two different time: the one of the Edo Period (1600 a.C.) and the nowadays period; this diachronic investigation helps us, indeed, to understand how the different plots' use (buildings' construction process together with the public space's use) have changed over the time. Originally, the Nihonbashi district has developed as a territorial feudal organization for popular-extraction-inhabitants, who had their homes around the Shogun's dwellings (Shogun was the military title of the Japanese governor until the second half of 1800).

This type of hierarchical relationship was very influential on the territory's infrastructural system. In fact, as Heide Imai has explained in his book *Tokyo Roji – The Diversity and Versatility of Alleys in a City in Transition*, each infrastructure has a precise role and classification in the urban form of the Japanese cities (Imai Heide, 2017). In general, we can group the Japanese streets within two systems: the main ones, that can be ascribed to Matrix and Connection streets, that comprehend the *ōmotedori* (main street), *yokochō* (side street), *uramachi* (back street); the minor roads that go inside the plot systems, the *roji* (alleyways). These last ones are particularly interesting since they promote, at the same time, an interconnection with the main public system and a relationship among the different Japanese houses inside the plots.

If this type of streets' composition has undergone different usages over the time, the general hierarchical structure has survived in many areas of Tokyo. In particular, the plots' subdivision has remained the one already defined during the Edo period and responds to the 'perfect plot size' of a neighbourhood, confined in two rectangles of 120 meters by 41 meters, that could host about 300 inhabitants. During the Edo-Period, this plot was very vivid and could host both commercial activities (concentrated in the border of the plot) and a residential area located inside the limits of the perimeter streets. The modernization of the Japanese capital began explosively towards the end of the Meiji period (between the end of 1800 and the beginning of 1900); in this period, the Asian culture entered in contact with the Western one (it was at the time of western expansion and curiosity towards the 'far east', which produced also many architectural contaminations between the two cultures). With the introduction of the high-speed- infrastructures and the inclusion of skyscrapers in the area, the Nihonbashi district has changed a lot during the time, becoming a business neighbourhood where not so much of the residential and tiny dimension of the Edo- Period remained. However, also today the area has endured to be profoundly active, but not so easy in order to live in, since there are very few residential buildings and cost to live in are particularly high.

For the specific investigation, has been decided to consider one half of the Nihonbashi plot, since the two rectangles that compose the neighbourhood are almost specular regarding the functions inside of them as well as the number of buildings and connections' type.

### Measurement and analysis

The applied methodology for the Nihonbashi's plot consists in five different phases:

1. Using of quantitative parameters in order to identify the degree of porosity in architecture in three phases of the plot's development: Edo period (1600), Meji period (1800), contemporary era (2000).
2. Choice of the two different periods to put in comparison for their difference in urban morphology features: Edo period plot and contemporary era plot.
3. Investigation of the two phases in plan and view, by measuring and drawing the built forms' occupancy inside the plot and the buildings' frontages (using both with quantitative and qualitative parameters).
4. Analysis of the environmental output of the two periods' plots with the use of the Envi-MET software.
5. Discussion of the results.

In particular, the phases have brought out the following data:

1. The first analysis was carried out throughout the drawing of the different buildings' footprints with the use of the GIS software. This result has taken out a black-white image (an output related to the Nolli map model) functional to give us the Buildings Footprints index; since the analysis was focused to enlighten the public space within the area, the output was reversed

and in particular corresponded to the 0.3 (ratio comprehended between the 0-1 value) of unbuilt space in the case of the Edo-Period, 0.4 for the Meiji period and 0.5 for the contemporary period (Table 1, Figure 1). Apparently, the contemporary phase shows half of the space dedicated to public use, whereas the traditional one only one third. However, this investigation does not consider the accessibility and permeability of the space, that also represent important parameters in order to define the porosity value. In order to investigate better this output, it has been chosen the comparison of the Edo-Period and Contemporary period for a further analysis.

2. In the comparison between the two different period an Urban Morphologic analysis has been conducted, in particular detecting the Connections' type and the Buildings' Function. In this analysis was important to consider not only the plot in plan, but also in view; in fact, in order to comprehend which kind of passage were possible inside the neighbourhood system, Google street view, photos and axonometric view of the urban plot were used. Concerning the infrastructural system and therefore accessibility, it results very clear the fact that the tiny passages in contemporary Nihonbashi are not possible to access: their walkability is only privates' prerogative. Moreover, unbuilt space that gave us a huge amount of the unbuilt value has actually been already occupied by further projects that are already caught in google street view images, taken in 2022. (Table 2).

2.1 The comparison of the two plots has determined a very similar structure of the connections' type (Figure 2). In fact, the Matrix route corresponds to the Shuto expressway, which connects Nihonbashi bridge (an important nodal point during the Edo period) to Shinbashi district and therefore the west side of Tokyo. The other Connection and Buildings' infrastructures determined a rigorous grid with inside a series of local streets (roji alleyways), that unfortunately during the contemporary period have been transformed into private streets. Because of that, the accessibility's grade of the nowadays plot is almost even to 0 inside the plot.

2.2 Buildings' functionality regarding the plot is also very interesting to consider (Figure 3). In fact, in Edo-Period we can find commercial buildings located along the perimeter, in a very composite and hierarchical way, whereas in contemporary buildings we have mostly a mixité regarding the functions: every building has a commercial activity in the floor plans, with residences or offices on the above floors. Moreover, in the contemporary plot many other side-facilities, as public baths, water walls and warehouses have undergone; the specialization regards the type of commercial activity that is hosted inside the buildings.

3. The third investigation outlines the interconnection that happens between plans and frontages (Figure 4). Since the floor plans' values is mostly considerable from the Tatami measure, that responds to 0,9 \*1,8 meters (span dimension of a person lying on the ground), it is possible to use it in order to understand the frontages proportion. This type of survey was conducted both for the Edo period frontages and contemporary ones, in order to understand where it could be possible to have some connection between the two measurements. One interesting output appears if we consider the middle of the plot: here it is possible to see that there are similarities between old and new Nihonbashi, considering both the plan and high buildings' dimension; it shows somehow that the human scale is preserved in the core of the Nihonbashi plot, whereas the border and the corners of the neighbourhood are more likely to change and assume the Metropolis dimension.

4. The last analysis was conducted throughout the use of Envi-MET, a software used to define the environmental data in particular circumstances, matching the input epw-files with the materials and proprieties of the surrounding. The study was conducted comparing Edo- Tokyo with Contemporary- Tokyo, always referring to the same parcel of the Nihonbashi plot. The selected day for the simulation was considered the 8th of August, since here the highest value

of temperature and humidity are reached: these two data have allowed us to calculate the Potential air temperature (average temperature during the day) and PET (perceived temperature related to comfort or discomfort). Reading the data, we can observe that whereas the Potential Air Temperature does not show a huge discrepancy between the Edo-Period (min. 29.75°C- max. 32°C) and the Contemporary-Period (min. 31°C- max. 34°C), PET varies actually a lot: in Edo period varies between 30-51°C, in Contemporary period between 39-62°C, where the temperature difference is almost ten degrees Celsius (Figure 5). Since what has been changed for the two simulations is only materials and buildings' composition (it was used as input the same epw-file), we can assume that the assembly of material and buildings morphology have made the difference in human perception. In fact, during the Edo Period local and sustainable materials have been used for the buildings, whereas the modern concrete and glass could be not the best choice for a tropical clima. Moreover, the superimposition of massive buildings inside the plot contributes to not create a comfortable area for the passer by- especially inside the tiny infra-space between the buildings, the *roiji*, particularly vulnerable to high temperatures and humidity.

5. All the data could be put together in order to give an evaluation of the sustainable grade of the plot taken in consideration; in fact, merging together quantitative and qualitative analysis could be very significant to understand which potentials and criticalities could be found and further discussed to be improved.

## Conclusion

The different results that we have acquired in the survey are very important for the attempt to underline which kind of elements can be useful to describe a neighbourhood 'porous' and 'sustainable' throughout its walkability and liveability. First of all, is important to consider the dimension- and therefore the proportion- between the different architectural elements: Edo neighbourhood is surely more sensitive towards a human scale, empowering accessibility and recognition among its inhabitants. In fact, the *roji* alleys have their role of connection systems, promoting social interaction and safety exits (very useful in case of disaster like earthquakes, that commonly happen in Japan); their enclosure could mean the loss of both these characters. Moreover, frontages give also a sense of belonging and their openness (which therefore offers a disclosure, promoting certain grade of porosity in the façade); in Edo-period, every building has a particular façade that expresses its intention, similar to the teaching that Adolf Loos gave us. Instead, in the contemporary Nihonbashi district, we have a huge variety of buildings that present themselves in many ways; if from one side it could be interesting to have such diversity, that surely does not bring boredom in neighbourhoods, on the other side passer-byes could feel themselves dispersed and disoriented by it. What surely gives an order and definition in Nihonbashi plot is the alignments of the frontages towards the streets, dictated by a rigorous system of infrastructures' organisation that has endured during the years; this feature shades looking at other Tokyo's districts, like the more suburban ones, which resemble more to the American suburbs. As it could be seen from the frontages' survey, the recognition of a particular rhythmic in the neighbourhood (especially if consolidated by the historical mindset, i.e. the rhythm of the Edo period) it gives a sense of safety and characterization of the neighbourhood itself, together with other facilities (water wells, public baths), whose use is clearly normal that it has been overcome with the course of time, but could be replaced by some other elements that give recognition to the neighbourhood and prevent people from the feeling of dispersion that often occurs in nowadays Metropolis. Moreover, a mixite in the buildings' function and activation of the ground-floor-commercial activities that luckily the Nihonbashi district has

preserved could be very good to guarantee openness and liveability; nevertheless, it has to be calibrated with the richness that public space can provide to us in order to not enclose the concept of porosity only in the façade system.

Last but not least, it is particularly important considering also the Environmental value in the Tokyo's survey. Of course, huge buildings, made up of materials that retain the heat, could be very dangerous in a such dense Metropolis as Tokyo; in fact, if we look to the simulated Edo neighbourhood, we do not have strong heat peaks and the roji inside the neighbourhood manage to preserve the coolness provided from the shadow and external wind flows. As we can see, porosity has also an impact on environmental issue and it could be useful to accurately study the relationship between built and non- built space to design a good quality environment. To sum up, it is really important in neighbourhoods' investigation parallelly evaluating many factors that can influence the well-being: interdisciplinarity is very significant in that sense, as well as the knowledge regarding the environmental and cultural matter of the considered reality.

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<https://www.britannica.com/topic/shogun>

*N.B. Particular acknowledgement to Professor Hidenobu Jinnai, who has kindly provided us the necessary materials to permit the hereby reported investigation.*



Illustrations and tables

	Edo Period	Meiji Period	Contemporary Period
Unbuilt space	30%	40%	50%

Table 1. Ratio of the Unbuilt Space within the Nihonbashi plot.

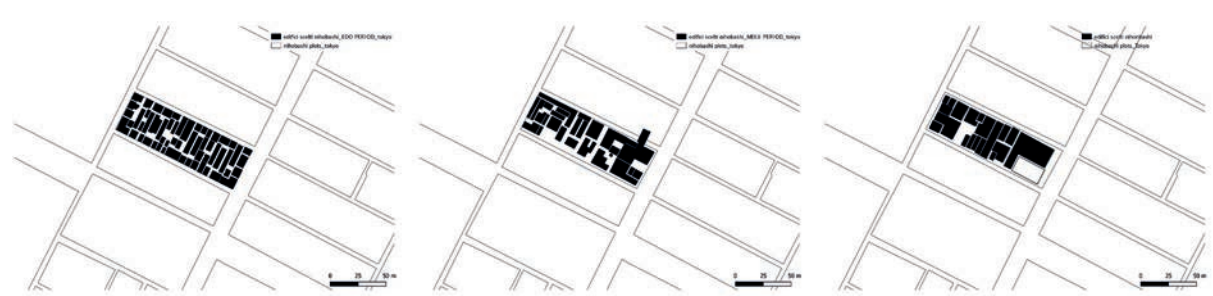


Figure 1. (Sequence of the Nihonbashi plot during the three phases considered: Edo Period, Meiji Period, Contemporary period)

	Edo Period	Contemporary Period
FAR	1.4	3.4

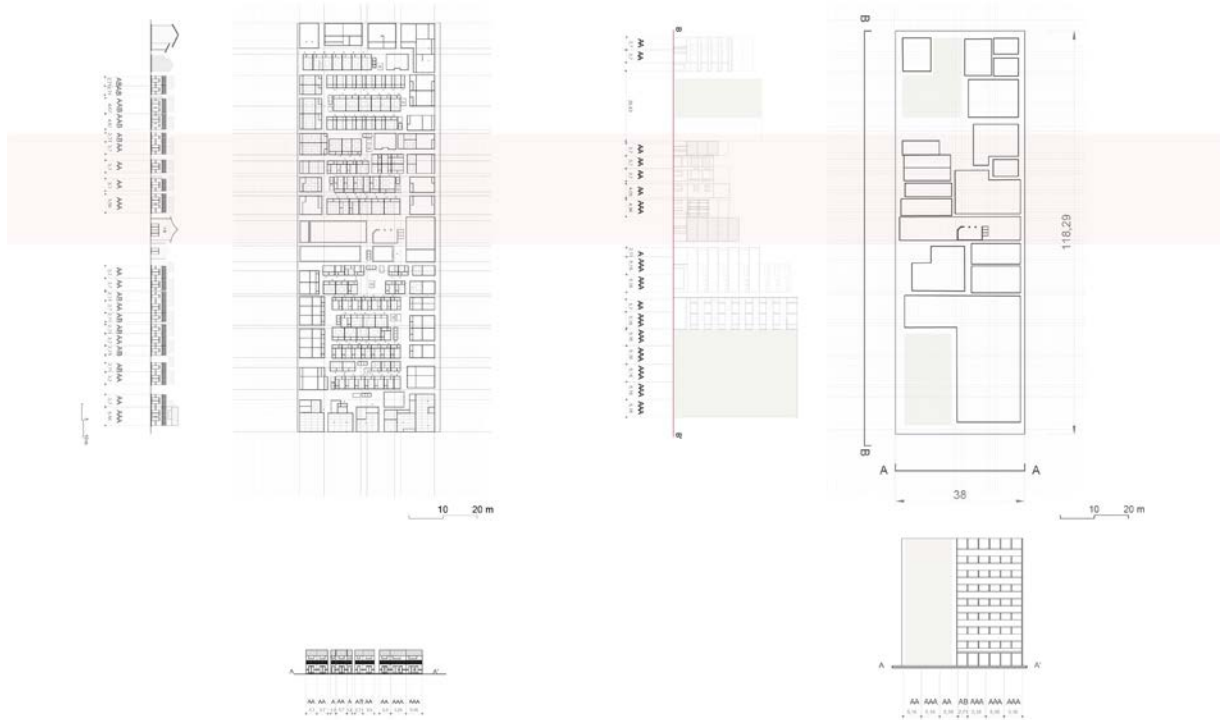
Table 2. Far (Floor Area Ratio, considering the values of the total floors amount in both Edo-Period and contemporary Period)



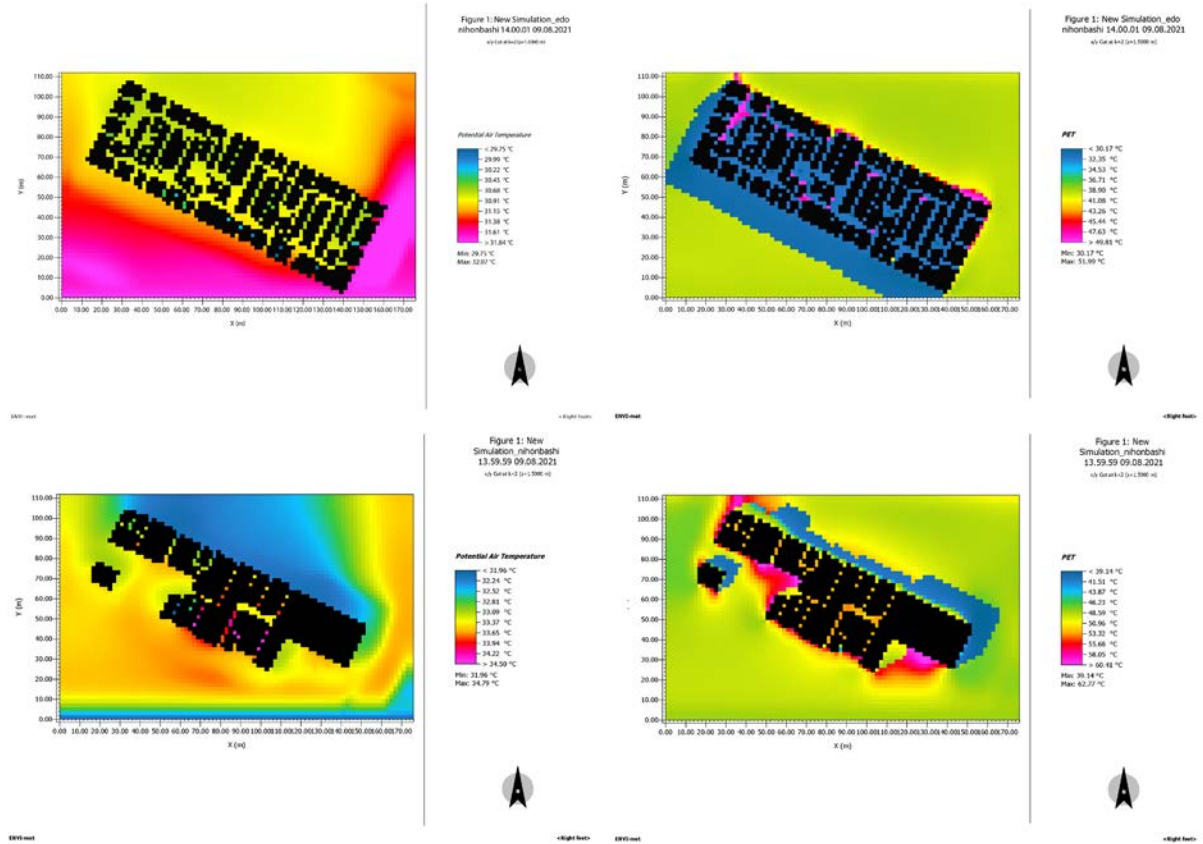
Figure 2. (Connection system compared in Edo and Nihonbashi period)



**Figure 3.** (Nihonbashi plot in Edo and Contemporary period considering buildings' function)



**Figure 4.** (Survey of the Edo and Contemporary plots, represented in plans and frontages. The red stripe tries to empathise the part of the plot where can be found similarities in dimensions -both in with and high- and the caesura of the buildings' typology, which responds to the middle of the plot)



**Figure 5.** (Representation of the Potential air temperature at 12.00 a.m. -left column- of the Edo Nihonbashi -first line- and the contemporary Nihonbashi -second line-; on the right column is represented the PET of the Edo Nihonbashi -first line- and the contemporary Nihonbashi- second line).



## Mapping the evolution of urban form in Tirana.

Jonila Prifti

Department of Urbanism. Polytechnic University of Tirana. Tirana. Rruga Muhamet Gjollështa

E-mail: jonila.prifti@fau.ed.al

*Keywords: urban morphology, urban form, building typology*

*Conference theme: Reading the Changing Urban Form*

**Abstract.** *With the fall of communism and the beginning of land privatization, Tirana went through a period of rapid urban expansion generating an unprecedented explosion of formal and informal settlements. The city has undergone radical changes at very short intervals and is struggling to develop its own identity. Since Tirana became the Capital, urban renewal and redevelopment represented the power of the regimes. This is clearly reflected in the urban planning documents and the process of demolition and reconstruction, especially in recent years. The aim of the research is to assess the evolution of the urban form of the city, in different historical periods with a diachronic approach. This research attempts to study the morphological aspects of the current urban patterns through mapping and diagramming elements of urban form in Tirana. The identification and classification of different morphological models represent the key to interpreting the transformations and stratifications that have taken place over time in shaping the urban form of the city.*



### **Tirana urban dynamics**

Historical facts dictate a cultural context that cannot be ignored. Research is focused in the Albanian city, a place in constant transformation. This transformation is reflected not only physically, in the way the city is designed but above all, in the way private buildings are designed and experienced. Tirana, as the State Capital, is loaded with representative potential and plays a fundamental role in the image of the country. The attention toward the urban spaces of the capital carries the will to produce an adequate image of national identity.

For more than a century, Tirana continues to represent a laboratory of urban experiments. The city has had the most foreign influences: from the Ottoman past to the Chinese revolution, from Italian fascism to Soviet totalitarianism. The strategies followed by the different regimes are visible in many elements of the city, from common spaces to housing estates and government buildings. These ideologies have manifested themselves in the spaces of the city. Even if it's a city relatively new that has undergone radical changes at very short intervals and the design has always been guided by the dominant ideologies of the time, still today, in a phase of eternal transition, it struggles to develop its own identity. The establishment of the regime and the impact of the communist ideology have radically transformed the way of life of the Albanians. If on the one hand, the Italians have brought their culture without impositions, the regime has triggered a cultural revolution, devastating the culture and civic uses of the territory. It proposed a new way of living both indoors and outdoors in the house. If before the Second World War the housing model was represented by single-family houses of 1-2 floors, in the communist period the proposed model is the collective buildings of 4-6 floors with minimal surfaces.

Despite the attempts of local institutions for urban regeneration, in the last fifteen years, have failed to find a solution to the problems. The central and local governments have organized several competitions international. International architectural firms were invited to find solutions. It is the period of large international projects, which are changing the face of the city, making it a sort of open-air laboratory. Arises the question of whether it is possible to reconstruct the identity of the city or consider the city as a "tabula rasa". The problem of contemporary architecture is it produces the same artistic solutions in different cultural situations of the world, with different traditions but in distant geographical positions.

### **Methodology**

The aim of the research is to assess the evolution of the urban form of the city in different historical periods with a diachronic approach. The identification and classification of different morphological models represent the key to interpreting the transformations and stratifications that have taken place over time and shaped the urban form of the city.

The aim is to put the physical characteristics of urban plans in social and political contexts and study the morphological aspects of the current urban patterns through elements of urban form in Tirana. This paper tries to reconstruct the evolution of the urban form of Tirana by analyzing the evolution of the building typologies, starting from the traditional tissue to nowadays. The research points out different periods of architectural and urban design and divides interventions into typologies according to the type of building. (Figure 1.) Six main periods that dictate a recognizable urban form came out from the analysis. A graphic representation of the elements of urban form: buildings, streets, and plan for each case study is important to better understand the evolution phenomena.

### New city, new urban form

During the First World War, a few years after the proclamation of Independence from the Ottoman Empire, the Albanian city had very small dimensions and a typical urban fabric of the Ottoman culture of the nineteenth century. While European cities marked the period of major urban reconstruction, implementing renewal practices e urban renewal, and new ways of designing large areas, the development of Albanian cities was completely left free to spontaneity. Disorder and order at the same time. Professor Maurice Cesari, a researcher of distinctive characteristics of Ottoman housing typologies, highlights the uniqueness of the structure Ottoman city. According to him, the typical Ottoman houses represent organizational units of low density and did not have a very large yard. The houses try to “usurp” the road, aligning themselves with it and also occupying a part of it, on the upper floors. The facades are not continuous and the alleys that lead to dwellings are perpendicular to the main road. The urban structure appears chaotic due to the dispersion of houses that do not follow compositional principles but adapt to the orography of the territory with forms open to the good sunshine. An extensive typology that opposes the Mediterranean organizational mode of hortus clausus (Cerasi, 1998, p. 119)

In 1920 the population reached 15,000 inhabitants an extension of 305 hectares, and a population density of 50 inhabitants/ha. According to architect Koco Miho, the “medieval extensive system” has been attributed to problems of land ownership. The location and orientation of the houses did not consider the road axis and were often set back from the road boundary. (Miho, 2003) In the long run, when the profession of the architect or urban planner was unknown, the task was carried out by an officer in charge of solving problems and proposing urban planning solutions, who was called “building aga”. (Bace, et. Al., 1979)

Since the First World War, a few years after the proclamation of independence from the Ottoman Empire, Tirana city had:

- a very small size
- an urban fabric typical of 19th-century Ottoman culture
- apparently chaotic urban structure due to the dispersion of the houses that did not follow ordering principles but adapted to the orography of the territory with open forms and well-oriented. (Cerasi, 1998, p. 119)

The residential buildings of Tirana were built between the XVIII century until the end of the XIX century. Based on the composition and functional structure of the dwellings in Tirana was evolved the building typology with a firehouse located in the center. It represents an adobe building and it is developed on two floors. (Riza, 1971, p. 113-125) Graphic representation of this period can be found in Figure 2.

After signing the Pact of Friendship with Italy in 1926, (L'illustrazione Italiana, 1939, p. 713) Italian architects were invited to deal with urban planning and architecture in Tirana. Their work leaves an Italian imprint on Albanian cities. The integration of the existing city with the new part of the city is one strategy adopted by rationalist architects to preserve historic fabrics. Brasini ignored the presence of Islamic architecture, in the immediate areas and neglected the integration of architectural languages in the new intervention. The period between the two world wars represents the moment of breaking with the buildings of the past and the capital's bourgeoisie valued the projects with an eclectic style because it met their needs.

The writer, Gustavo Traglia wrote in 1930 on Tirana and how fast the city was transforming: - How do you live in Tirana? Good. In this city, you witness an awakening of activity that cannot fail to impress. The assiduous, daily work has characteristic expressions. Then there is a state that is formed, there is the struggle between the old, conservative mentality and the new one that

is in a hurry to act and which, to act quickly, sometimes falls into the inevitable errors of which haste is the mother.

While in Europe every country manifested avant-garde works, solutions were proposed in Albania's stylistics of the twentieth century. The construction of several administrative buildings in one in a certain sense also imposed eclecticism on projects for private buildings. All the proposed architectural elements have nothing in common with the tradition of the country.

According to Bushati (1988, p.181), the goal was to 'find the beauty in monumentalism in the forms and the eclectic details. These traits add up without a principle, like an amalgam, failing to create our own physiognomy'.

With the intention of redesigning a city to the west, in opposition to the inherited spontaneous city, the group of planners led by Bosio divided Tirana into three areas with different densities: intensive, semi-intensive, and extensive. The extensive area was basically the garden city, a highly appreciated movement in Italy at that period. The idea of the garden city was in line with the structure of the existing city. I.N.C.I.S district, housing for state employees who would be relocated to Albania, was designed by Bosio and Piero Bartolini and composed of 16 large buildings, block type, organized on two levels, with an internal courtyard. The works were interrupted by the arrival of the war, in September 1943, with the arrival of German troops. Graphic representation of this period can be found in Figure 2.

### **City rebuilt under pressure**

From a detailed analysis of the historical events that have had repercussions on art and architecture and from what can be deduced from the texts by Faja (2008) and Kolevica (2004) this long period can be conceptually divided into three important moments for the conformation of the urban space:

- Adherence to the socialist realism of the Soviet Union, for almost a decade (period starting from the early 1950s to the first from the 60s)
- A silent search for modern movement lasted for a decade (began after the break with the Soviet Union until 1973)
- Towards a national form with ideological content (until 1990, with the fall of the regime)

In 1950 the city of Tirana counted almost 100,000 inhabitants. (Vickers, 2001, p. 180) The economy was mainly based on agricultural activities and handcrafted products. The existing buildings had suffered serious damage during the war and there were no financial resources for rehabilitation interventions. With the establishment of the dictatorial regime of the proletariat, a new era of the architectural and urban approach began. According to Crowley e Reid (2002, p. 3), the nationalization of land indicate that space was subject to political interest. Knowing what kind of space praises certain totalitarian regime helps us understand the reason for choosing certain transformative interventions.

Socialist realism brought new ways of conceiving the space inside and outside buildings to Albania. The few completed projects are influenced by the architectural style of the Soviet Union during the 1920s-30s. The slogan 'socialist in content, national in the form' set the model for all fine arts. Anatole Kopp (1937, p. 234), in his study about architecture and urban planning in the Soviet during the twenties, claims to notice an 'absolute necessity of monumentalism, of simplicity, unity, and elegance in architectural expression and time itself of the need to rely on both new compositional procedures than to those used by classical architecture'. The urban space is ordered according to rational and monumental criteria. The urban model was based on linear buildings arranged along the main axes of transit. The Stalinist regime favored the construction of large buildings which could serve as a demonstration of political power.

(Crowley e Reid (2002, p. 8) Architecture was influenced by imported styles. The architecture was strained with ideological violence. Kolevica (1997) claimed that the voice of the architect was a vox ciammans in desert. The use of capitals, frames, and decorations was external to the tradition of the country.

The foundation of the new cities and the reorganization of the existing ones had to take place based on the 'return' to nature. This concept of eliminating the differences between cities and the countryside can be read clearly in the realization of the same urban interventions, without morphological and typological distinctions, in rural centers.

The city was designed on an orthogonal network, with the main street connected to a road network. The compositional unit, the block, had the shape of a rectangle and large size, and the buildings within floated freely. The proposed building typology was linear. Almost all the buildings were arranged on the territory in such a way that create a continuous alignment with the main road. The scarce development of building technologies did not allow the construction of several levels above the ground level. The residential buildings of Tirana between 1955-1965 had three distinctive features visible in the urban structure:

- the spatial configuration and linear typology
- two section buildings, two apartments per floor plan
- the materials: load-bearing thick walls), up to three-story buildings
- the pitched roof and basement plan
- the compositional unit: the large block with green spaces
- garden city approach

After the ideological detachment from the Soviet Union, which took place after 1960, the figure of the architect has always been able to experiment with other architectural styles consistent with the system and under close observation. The dictatorial regime was very centralized and leaned towards urban operations ignoring private property, with architects and planners enjoying the freedom of revolutionaries to transform everything.

Many architects with foreign professional degrees followed with interest in the European events on architecture and CIAM activities. Finally, although in the way silent, not declaring the belonging of the style, in art and in architecture one could be free, without suffering physical, moral, oppression, or violent censorship. There was the freedom to apply the principles of modern urban planning and the Charter of Athens. (Faja, 2008, p. 14) Modern architecture has become part of the urban fabric without any noise, without being declared, and without any approvals. The residential buildings had these distinctive features visible in the urban structure:

- folded façade
- bearing bricks wall
- up to five-story buildings
- three apartments per floor plan

In 1973, at the IVth Plenum of the Central Committee of the PPSH Party, the topic was identified and discussed as a vital emergency, to deepen the ideological war against foreign influences and liberal attitudes towards them. Communism has declared war on modernization in architecture and freedom of artistic expression. The slogan 'socialist in contents, national in the form' depicted the model of all the figurative arts. With the creation of architectural types and standards, architecture and urban planning had become monotonous in urban spaces and landscapes. Was missing the quality, the materials, and above all, the freedom of artistic expression was missing. (Faja, 2008) The denial of the right to private property was sanctioned by the constitutional amendment of 1974. The government proposed the need for architecture

with clear and simple forms under the motion "keep costs down, build well and quickly". Discussing the costs became essential, given the economic crisis that the country was going through.

It was necessary to build quickly because with the growth of the population the housing demand was very high. To minimize construction costs by making linear buildings with multiple sections. We see the first buildings made with prefabricated concrete panels were born. The construction materials were left free to view, using plaster meant spending for nothing. Buildings without plaster and without color left the brick and the binder-free to view.

While other European states responded to the housing emergency with high-quality proposals architectural as opposed to the quality of the materials, in Albania the figure and the work of the architect have been devalued as they have fallen into uselessness. For housing experimented with "typing" and the "standardization". Researching the types of housing units, they needed to propose itself 'in series', had as its objective to achieve equality. The apartments were distributed according to the number of nucleus members familiar.

Standardization also included the architecture of social buildings. All this created a standard and

monotonous architecture, poor in form, materials, equipment, and technology. The use of collective housing eliminated private housing or other typologies. Buildings with prefabricated panels were built to overcome the residential emergence. Every section had 2 apartments per floor plan. They were built with load-bearing panels reinforced concrete skeleton structures.

- More flexibility to determine the length and continuity of a building
- Experiment with new urban form
- More space for the apartments
- Pointing interest in public spaces more than the private one

Buildings divided into units were built starting in 1989. They were designed to break the uniform façade and plan of building type. The different combinations of the units give, as a result, a different floor plan of the section. The different combinations of each section could bring a different shape to the building. Graphic representation of this period can be found in Figure 2. After the fall of communism and the start of land privatization, Tirana has gone through a period of rapid urban expansion which has generated an unprecedented explosion of informal settlements. With the liberalization of internal migration, citizens have begun to migrate immediately to major cities and the capital was the preferred destination.

We can highlight two main reasons that caused a favor for illegal building and sprawl: on the one hand, the communist regime has left a very high housing demand and on the other, it can be seen an inability of governments, central and local, to take the brakes on one situation where private property was not regulated. The urban space becomes a free ground for any possible development decided by individuals. Everyone finds space or forcefully requests it, to delimit it with fences, occupy it with sales structures, or for residential use. Graphic representation of this period can be found in Figure 2.

In Tirana, the anti-sprawl "movement" was born spontaneously. After an initial period in search of free land in the city limits, the interest of the builders is directed to the land near the center, to take advantage of the differences in the land rent. This long process was triggered by both privatization of publicly owned lots and the re-appropriation of private properties. The lack of a programming document territory has favored the expansion of legitimized urban planning practices. The result of this process is the overwriting of existing fabrics without principles or rules or blatantly violating those few zoning rules prescribed in the 1998 law. As Faja (2008, p.13) states 'in this period, everyone dealt with architecture and urban planning, except the



architects’.

The latest Master Plan of the city was drawn up by the Stefano Boeri studio Architects and UNLAB and IND for “Tirana 2030”. The plan was adopted in January 2017 and was characterized by the vision of creating a polycentric metropolis kaleidoscopic that constitutes the new image of the city. The municipal administration will make use of densification techniques to aim for compactness. One of the strategies that were proposed for this purpose in Grimshaw’s Architects plan is urban densification.

## Conclusion

With the fall of communism and the beginning of land privatization, Tirana went through a period of rapid urban expansion generating an unprecedented explosion of formal and informal settlements. The city has undergone radical changes at very short intervals and is struggling to develop its own identity. Analyzing historical facts on buildings and urban development contributes to understanding the building stock in Tirana. The study of morphological aspects of the current urban patterns of Tirana through elements of urban form in Tirana contributes to learning the physical characteristic of the city. Reading the evolution of morphological aspects of Tirana contributes also to growing the debate on what to do with the “old” and traditional buildings and why the city does not have a historical urban tissue.

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## Illustrations and tables

		Before 1920	1920-1940	1958	1977	1980	1982-1983	1988	>1990	>2000
1	Design	1-2 floor plan	1-3 floor plan	2-3 floor plan	5-floor plans	5-floor plans	5-6 floor plans	5-floor plans	2-3 floor plans	>8 floor plans
		> 4 rooms	3 rooms	3 rooms	3 rooms	2-3 rooms	2-3 rooms	2-3 rooms	3-4 rooms	2-5 rooms
			basement	basement	no basement	no basement				
		pitched roof	pitched roof	pitched roof	flat roof	flat roof	flat roof	flat roof	flat roof	flat roof
		one family		2 sections 2 apartments x section	1 section 3 apartments x section	> 2 sections	1 section 3-4 apartments x section	> 4 sections	Individ.	> 2 sections
2	Economic	Traditional / cheap	quality	quality	cheap	cheap	cheap	very cheap	very cheap	medium-high quality
3	Technologies			assembled slabs	reinforced ceramic concrete slab	reinforced concrete slabs	reinforced concrete slabs precast concrete slabs	reinforced concrete slabs		
		adobe/clay bricks	brick bearing walls	brick bearing walls	brick bearing walls	prefabricated concrete walls	reinforced concrete	reinforced concrete	reinforced concrete	reinforced concrete
				span 3.65 m & 3.03 m		span 3.6 m & 4.8 m	span 3.4 m & 4.2 m & 6 m	span 4.95 m	span 4 m	span 6-8 m
					anti-seismic	anti-seismic	anti-seismic	anti-seismic		anti-seismic

**Table 1.** Characteristics of building typologies

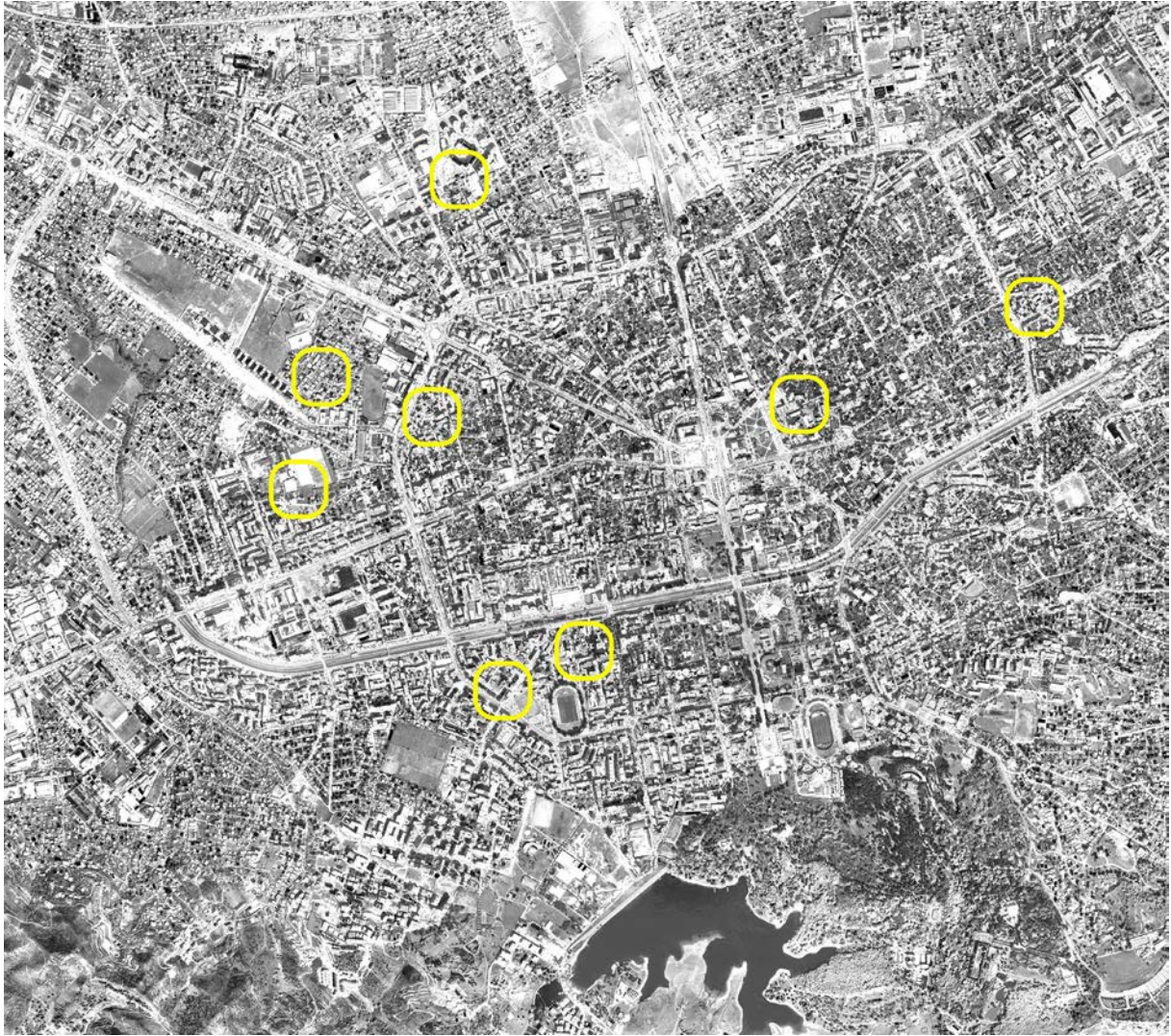


Figure 1. Case studies\_areal view



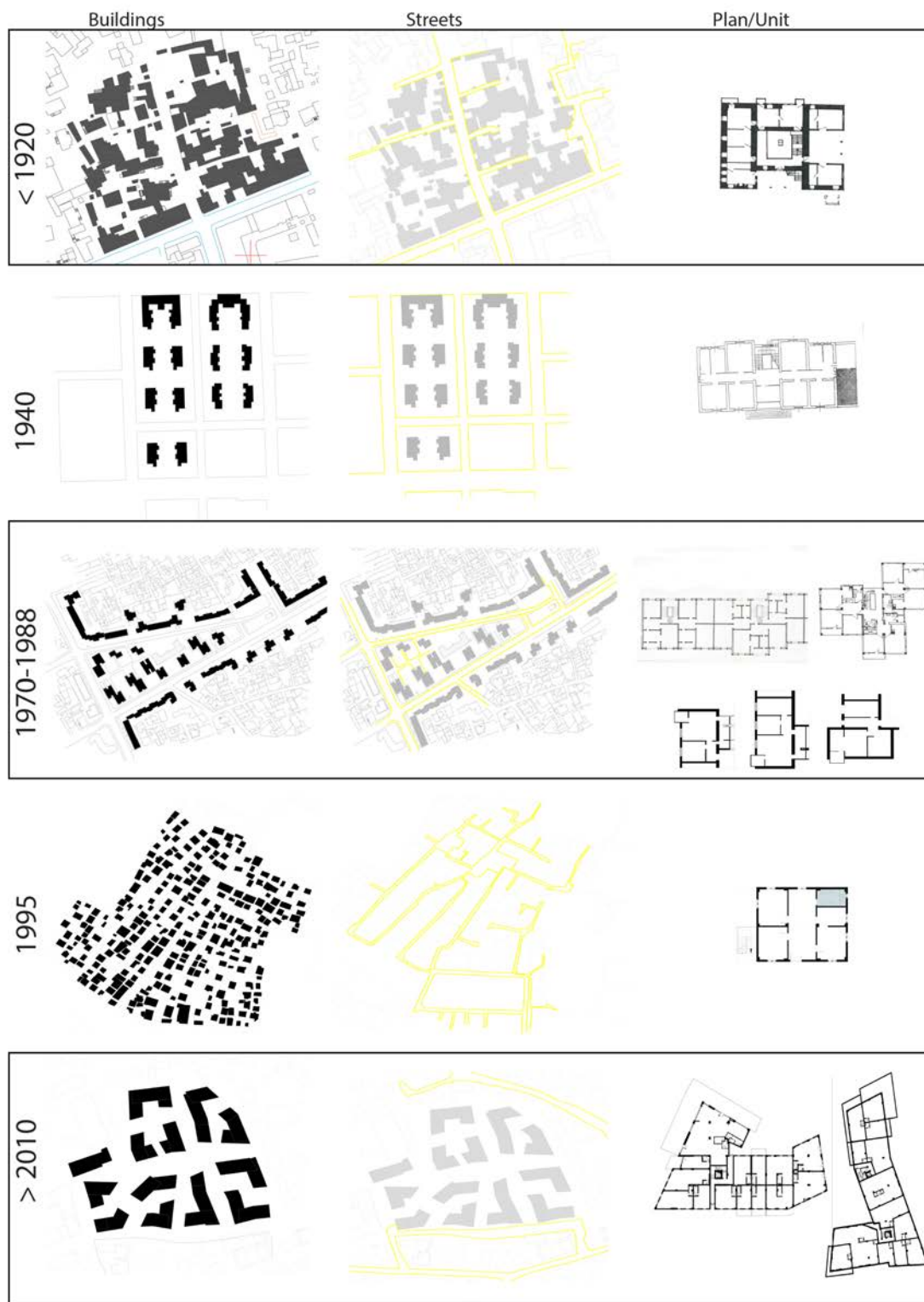


Figure 2. BuildingsStreetPlan\_\_evolution\_6periods

## In-formal settlements: recurrent patterns and recurrences. Mapping the changing morphology of informal settlements

Ana Ricchiardi

"Transitional Morphologies" Joint Research Unit member, Department of Architecture and Design, Politecnico di Torino. Castello del Valentino, Viale Mattioli 39, 10125 Torino, Italy.

E-mail: ana.ricchiardi@polito.it

Keywords: mapping, informal settlements, remote sensing, recurrences

Conference theme: Reading the Changing Urban Form

**Abstract.** Long-standing ways of reading the city can reveal contrasting interpretative categories. While necessary for understanding urban phenomena, these categories provide a restricted perspective and simplify urban complexity. In the context of an ever-changing urban world, the nuances of what is planned and unplanned in cities are increasingly blurred. Within this context, this study emerges from an interest in the spatial character of emerging morphologies and points to finding ways to clarify, in morphological terms, the phenomena of informal settlements. This paper highlights a multi-scalar mapping operation as a mechanism for remote observation of urban forms and presents cases in the context of Sub-Saharan Africa. Remote sensing data is used to acquire information to collect samples to be analyzed. For the samples, the study uses diachronic reasoning, an analytical approach and deductive observation of open-source information. Recurrences of spatial patterns are emphasized as a result of the mapping operation. The morphological outcomes of informal processes can be interpreted through characteristic elements that describe their morphology. The mapping operation identifies patterns and permutations in terms of settling process, defining edges and building footprints. These patterns can be seen in all samples and are dependent on the settlement's level of development. In the quest to search for a universal character of human settling, one way to learn about this anthropological settling nature is to dissect and systematically observe urban settlements. In this way, the use of mapping operations and urban morphology as a descriptive language can challenge how we learn about cities.



## Introduction

Settlements can be planned or they may arise and develop spontaneously. Kropf contrasts the singularities that are supposedly at the theoretically opposing extremities of the urban spectrum. He argues that there is a contradiction between the fact that cities are the outcome of intentional, coordinated human effort and that they also show traits of self-organization and emergent behavior (Kropf, 2009). The planned and designed type of settlement typically has a defined form and is referred to as a formal settlement. The second type is known as informal settlement, a phrase that suggests that it has no formal structure. Dichotomous interpretative interpretive categories can be revealed by long-established methods of interpreting the city. Binary systems of conceptualization of the city are produced when a phenomenon is described in terms of how distinct it is from the "other." This method falls short of defining comprehensive viewpoints on modern urban settings (Lutzoni, 2016). Models that oppose the formal and informal consider the term "formal" as one that has been assimilated; as a term that has or produces specific forms and elements and has been standardized. The formal-informal dichotomy misplaces various essential aspects of the urban: social relations, spatial forms, urban economies in a binary structure that fails to give a broad and comprehensive explanation of what a city is and how it develops.

The majority of the literature on informal settlements does not focus on the urban form and its logics. A limited (but growing) body of literature focuses on understanding the structure of informal settlements (Dovey & King, 2011; Karimi & Parham, 2012; Samper, 2014; Carracedo, 2015; Dovey & Kamalipour, 2018; Jones, 2019; Kamalipour, 2016; Loureiro, 2017; Ivone et al., 2017; Kamalipour & Dovey, 2018; Viana, 2019; Kamalipour & Dovey et al, 2020). The lack of an articulate discourse about the physical or spatial dimension of informality derives from an attention to the ways in which practices of urban renewal have been unsuccessful in architecture and urban planning discourse in the early 1960s (Samper, 2012). Modernist ideas' demise forced the discipline to adopt discourses unrelated to urban physical space issues (Sanyal, 2005). It is in the 2000s that a renewed interest to understand landscapes of informality appears when a recognition of the informal city as greater and more complex than ever before appeared (Davis 2006).

Although the field of Urban Morphology has emphasized the study and concept of the broader city, in morphological terms the study of informality represents a neglected aspect of analysis (Duarte, 2009; McCartney & Krishnamurthy, 2018). Mainstream Urban Morphology studies give evidence on the morphological evolution of cities with a long and steady pace. The morphological models matured by Urban Morphologists used samples with enduring and precise legal properties declinations; these models were not developed to explain the vagueness that surrounds the world of informality. There are not many tools available to address the fluid property and building lines, rights of use, incremental housing adaptation practices that result from the negotiation, transgression, and determination of new territorial boundaries and form changes that are common in informal settlements (Jones, 2019). This is why the attempts of studying informality from a morphological point of view tend to use mixed-methods of analysis with case studies observations and a component of temporality.

Spolaor and Oliveira (2021) highlight examples of studies that use Urban Morphology approaches to study informality, particularly studies that focus on space syntax (Karimi & Parham, 2012; Loureiro, 2017), historico-geographical and process- typological approaches (Maretto et al., 2014; Ivone et al., 2017). Referring to Space Syntax approaches, Karimi and Parham (2012) identify a number of axes in slums in Jeddah through the reading of the current spatial configuration of the areas. The authors argue that slum segregation can be reduced with

minor adjustments to the physical environment. Also using Space Syntax, Loureiro (2017) focuses on streets and identifies patterns, debunking the notion of disorder attributable to informal settlements. As for historico- geographical and process-typological approaches Maretto et al. (2014) explore Villa 31 in Buenos Aires to lead masterplan and design recommendations based on the current urban forms and patterns of settlement development. Other examples of Mixed-method approaches can be found in the works by Iovene et al (2017) where three types of investigations (Pattern Analysis, Longitudinal Analysis and Morphometrics) provide a framework of analysis for an informal community in Lima. The authors argue that informal settlements would develop in ways resembling pre-modern cities with a faster rate of expansion. Another approach is recognized in Viana's (2019) investigation of Maputo, Mozambique, that uses mixed methods of analysis and looks at the interaction between urban forms and activities. This paper presents the results of a study that joins the efforts of clarifying the morphological traits of informal settlements. The purpose of the study is to prove that the informal has a form and to further the notion that in an ever-changing urban world the distinction between formal and informal types of settlements' provide restricted perspectives that simplify urban complexity. As proven by many authors, the morphological characters of informal settlements can be observed with the same descriptive language of the so-called formal city. The use of urban form as a decoding artifact, brings to light observations about informal settlements and patterns of development of such form can be recognized. The ultimate aim of the work is to highlight how Urban Morphology and mapping can be harnessed as tools to create knowledge about the spatial characters of informality.

## Methodology

Generally speaking, research on the mapping of informality has used three main approaches, based on census data (focusing on a socio-economic perspective), participatory methods and advanced remote sensing image analysis (focusing on a physical perspective) (Kohli et al., 2012). In the last decades, new approaches and technologies dealing with Earth observation methods and remote sensing have been implemented to build more extensive spatial data structures of settlements coming from informal processes. Although the information on these settlements is still fragmentary and difficult to access, the use of technology helps provide information to improve the management of the settlements.

The relative lack of Urban Morphology studies that deal with the particularities of informal settlements creates a paucity of established methodological frameworks to draw from. As a result, the methodology proposed for the study refers to a mixed-methods multiscalar mapping operation that uses open sourced data. The use of mixed-methodologies allows the exemplification of the phenomena through four case studies and diverse morphological samples of each case with information sources coming from different open-sources. The study applied visual Image interpretation, a manual mapping method for the collection of the morphological data to be observed and for the interpretation of the samples. The mixed-method framework combined qualitative and quantitative sources and approaches applied to four selected case studies in the Sub-Saharan region. The methodology was projected in five incremental steps and focused on different scales of analysis: geographical, territorial, urban and neighborhood (see Ricchiardi, 2022).

For the results presented in this paper, a focus on the last two scales allowed the recognition of the patterns and recurrences. The expansion of cities makes it possible to locate samples that best represent the phenomena being researched. Three samples are chosen at the urban scale, and they are watched closely over a variety of time periods from 2000 to 2021. Streets

and their arrangement, as well as building footprint and open spaces were defined as variables of analysis at the urban scale. The reasons for the definition of such variables of observations relate to how stable they are in terms of urban form. The delineation of these three samples allows the observations of patterns of development in different time frames; observations on regularity and consolidation of street arrangements, quality of open spaces and building alignments and occupation can be drawn at this scale. The observation of the variables as the overlaying of different conditions of urban form not only allows to have a codified descriptive language for the developments in different periods of development but also allows the observation of its evolution in time. (see figure 1)

At a neighborhood scale the morphological mapping points to focus on what and how urban form of the samples have changed in time, and how these changes can shed light into the definition of patterns of agglomeration and morphological permutations. For this operation, up to four aerial photographs taken at various intervals are used to create a multilayered database that includes urban form components such as building footprint, streets, and defining edges (ranging from 2000 - 2020). The three fragments chosen for each case, for the mapping exercise are purposely heterogeneous, with the intention of highlighting different dynamics and possible invariants and permutations of the morphologies. From the observations at this scale, patterns of development are then recognized, these patterns contextualize the morphological characteristics of the informal samples in each case and respond to induced and spontaneous characters. An effort to observe the samples in a synchronic and diachronic manner is carried out. (see figure 2)

In terms of data accessibility, the SSA case is intriguing due to the diversity of resources available based on location and analysis scale. With the evolution and diffusion of technology and the access to the internet, a recent apogee of data and applications that deal with open sourced information has changed the way research is being carried out. The availability of open source solutions and resources has become commonly used in the last years; attention to these methods is given as promising data gathering tools that allow non- professionals to investigate spatial conditions of remote places. For the delimitation of the methodology and the selection of data to deal with, the work concentrated in open-source data, freely available for all with the conviction that sound policies and informed decisions would be simplified by free flow of information.

As for the resources available for the collection of data, the study classified them in 3 types. The first one refers to Open Remote Sensed data (Satellite images and street views). The second one refers to databases, the main database for information on urbanization in Africa being Africapolis. Other databases include the Global Administrative Areas (GADM), Department of Economic and Social Affairs, and Atlas of Urban Expansion datasets. Open mapping sources like OpenStreetMap (OSM), Map Data by Google, and Google's Open Buildings are the third type of resource. These resources are used concurrently and as the foundational data for the mapping process at various scales.

For the selections of the samples to be mapped a series of elements were considered. These elements deal with the type of universe the research dealt with, the availability of sources, the sizes of samples and the parameters of interests for the work. Since the type of universe that the work deals with has an infinite number of possible samples to be observed, the study decided for a cluster spatial sampling of three samples in each case study in areas that developed in different time periods. This process of sampling is useful in places where small areas within a larger study location show clear differences, in the case of this study the differences refer to morphological traits. For the sampling at an urban scale a grid of 1.5 km to 1.5 km was drawn

and the selection of the samples prioritized samples where clear visual contrasting morphological characters could be identified. For the sampling at a neighborhood scale a grid of 400m x 400m was drawn and the parameter for the selection of the sample to be observed was defined by the presence of informal traits of development.

### Measurement and analysis

The observation of recurrent patterns in the mapping operation of the samples of the four selected cities points to making remarks about the similarities and differences found. The observational techniques applied to the samples chosen allowed the identification of the developments as elements in transition. When tackling complicated phenomena like the urban one, urban analysis typically emphasizes a prior morphological order and a changed one emphasizing the variations between these statuses. The look at the “in-between” of those two stages allow their dynamics and gradual changes to be observed. Thinking in this direction, the work, as an academic exercise, provided a space for methodological exploration. The four case studies observed present different contextual characteristics and the samples selected were directed to find the processes of transition in informal settlements defined by situational conditions in each specific case. For the case of Luanda the samples were selected from areas with different consolidation statuses; for the case of Lagos the samples were selected from areas that exemplify modifications to the urban environment by new (mega) projects; for the case of Kinshasa, the samples highlighted the Congo River as an important driver for developments; and for the case of Nairobi the samples taken into consideration were chosen based on the targeted priorities of the new masterplan for the city. In all cases, informality and its morphology were seen as a practice of adaptation to actual urban conditions.

The fragments of the samples chosen for analysis were heterogeneous. Nevertheless, some remarks about the dynamics of the development of the mapped morphologies and their modification in time can be made. Following the analysis of samples of homogeneous size, the aim here is to define some observations about the logic of the transformation and development of the analyzed samples. The observations refer to all the cases observed and in the following sections are exemplified with specific cases and samples of observation. The informal morphologies in the observed and mapped samples assume recurrent patterns exemplified ahead in terms of the settling process, defining edges and building footprint.

### *Settling process*

The settling process of the observed samples varies due to the stage of development the samples finds itself in. The samples observed characteristics recognized in different stages of the informal rooting (Tessari 2020). These stages range from implantation, consolidation, densification and congestion (see figure 3). The heterogeneity of the stages observed in the samples relates to the time period observed and defined for the samples (2000-2021). Samples in the stage of implantation appear as the ones with the lower number of buildings. In these samples where the initial stage of settling is observed, the process begins with a quick and unexpected occupation. Usually, the initial occupation happens in spaces considered residual but with strong connections to planned city areas (eg. Luanda sample C Time 1, Kinshasa sample B Time 1). Samples in a consolidation stage relate to situations where improvements and replacements are made to the shelters, the structural consolidation of the buildings allows for upper floors to be built. Samples in the densification stage show signs of an incrementation of the spaces occupied by new morphologies but that do not transgress the conditioning edges defined by the contextual characteristics of the sites. These conditioning edges are

infringed in the congestion stage of development. In this stage, a profuse and abundant saturation of the available space is observed (eg. Kinshasa sample A, Nairobi sample C). The external circulation spaces between the buildings are narrow due to the occupation of the external spaces for residences expansion of circulation points for upper floors, a process of vertical growth can be observed. This last stage usually is a consequence of a demographic escalation that could result in what Tessari (2020) defines as hyper-congestion or Dovey et al (2020) as slum-like conditions. Fragments of the settlements that develop in areas with homogeneous topographies, like the ones mapped, expand through the repetition of the described process until the possibility of occupation of a surrounding area is constrained by a defining edge or external force. The congestion stage might be the most critical in the development of informal settlements because it imposes new dynamics of urban development generated by compression rather than rarefaction (Tessari 2020); leading to critical situations where clearance and demolitions are common. The interventions in the stages of densification and congestion make the urban tissue and the morphologies go through a process of morphological pattern definition that progressively and potentially points to reach the requirements of the formal city. Informal morphologies gradually integrate into the formal fabric of the city and their condition of parasitism evolves into interdependence becoming an integral part of the urban landscape and presenting a variety of nuances of informality.

#### *Defining edges*

The defining edges variable mapped in the selected samples of the work highlighted the role that the contextual conditions of the sites where the settlements develop have as catalyzers of the development of the morphologies. These edges refer to railways, highways, coastlines, shores, rivers, walls and gated morphological agglomerations that represent constraints to the growth and expansion of the morphologies in the samples (see figure 4). Commonly, these spaces represent areas with no attraction for the formal housing market for their complicated conditions: terrains subject to hydrogeological risk (eg. Luanda sample A & B; Kinshasa Sample A), interstitial areas near railways or road infrastructures (eg. Lagos sample B, Kinshasa sample B), areas bordering industrial sites (eg. Lagos sample A; Nairobi Sample B). In the context observed areas, where urban redevelopment is in progress, the new projects represent one of the contextual variables for the settling of new informal agglomerations (Luanda sample B & C; Nairobi sample A), in these cases, the new projects become appealing options for job seeking and trigger an acceleration in the settling process. Thus the new sites become triggers of informal processes that develop simultaneously. In cases where location and land, occupied by informal morphologies, become attractive for the development of big projects, the developments raze to the ground the informal morphologies that occupied the land. (Lagos samples A & B).

At an urban scale, the observed samples present elements that in many cases clearly divide private developments and informal ones. What is more, the role of topography and hydrogeological factors greatly influence the definition of constraints in the samples. In samples where at a certain moment the water component represents a deterrent for the development of planned projects, the progressive occupation of the areas is visible, when these areas are then seen as potential sites for developments, processes of demolition and clearance are the norm and interventions for reclaimed land from the water are visible in the samples.

#### *Settlement agglomeration patterns*

As for the observations of the building footprints variable mapped in the samples, a classification



by common traits of settlement characters is proposed as an attempt to create a comprehensive picture of the logic of agglomeration in the development of the settlements. The built-up area of the studied samples and in general of this type of settlement, with its apparent chaotic fragmentation, leads to assumptions about the indistinguishable aggregation of heterogeneous parts with no continuity, hierarchies or logic. Explorations and empirical in situ observations made by academics have proven these assumptions wrong (see Carracedo's work in Manila (2009); Monica's analysis of Freetown (2011)). The variables mapped for the morphological exercise deal with urban elements and do not differ from the conventional elements used to describe any urban settlement through its components in terms of urban form; access network, building footprint and conditioning edges. The settlement logic and patterns recognised in the mapped samples are classified as singular buildings, linear agglomeration and clustered agglomerations. These patterns can be observed in all samples and depend on the stage of development of the settlement in the sample. Figure 5 exemplifies the settlement's agglomerations logic with examples in the mapped samples at a neighborhood scale.

Singular buildings refer to morphologies that prevail especially in the implantation stage of the settlements, in areas of recent expansion and in areas that present the lowest density. The size of these dwellings presents strong heterogeneity and variation in conformation and alignments. Linear agglomerations refer to the succession of morphologies side by side that could be observed to be built in a specific time frame; suggesting incremental extensions in a sequence of "room by room" pattern of growth (Dovey & Kamalipour, 2018). In cases of samples where the access network is defined this type of agglomerations appears along the main roads identified. Some of the samples present contiguous buildings agglomerated in a linear disposition and others present buildings that present morphological independence with separation gaps between the buildings that are narrow.

Clustered agglomerations represent the most common agglomeration type in the mapped samples and refer to single morphologies settled side by side in a pseudo-block pattern with more than one access to the dwellings. These agglomerations present highly heterogeneous morphologies that develop progressively. This pattern of development is formed around shared spaces.

## Conclusion

The work developed and the elements presented in this paper recognizes that the maps produced photograph states that belong to specific observed periods. In this sense, the maps created are neither complete nor exhaustive. However, the maps are used as a means that can build wider awareness of the dimension of the phenomenon. The intention of the mapping operation conducted was to highlight the presence of informal traits and nuances across various geographies. These nuances indicate that while a process with recognizable morphological characteristics of development exists in all contexts that present informality, it also indicates that location, access to infrastructure networks, topography and context influence heavily the generation of built form. Cultural preferences, historical events, and contextual variables are often influenced by social norms governing architectural form as an informal code that are difficult to detect without engaging socially in the settlement (Tessari, 2020). On this note, the study focused on the morphological aspects of the development of the mapped samples since the on-ground engagement with the context was not feasible at the time of development of the study.

The research used a methodology that includes mixed methods with a broad range of data-collection from different sources. This methodology for systematic observation of urban forms

anticipated to produce consistent and comparable results across case studies. Single methodological logics were applied to various realities as a way to provide a means of confronting the realities and making observations both within and across case studies. All the elements mapped and selected as variables fit the infrastructural and constructed category on one side and voids or empty areas of the samples as spaces of negotiation or contestation on the other side.

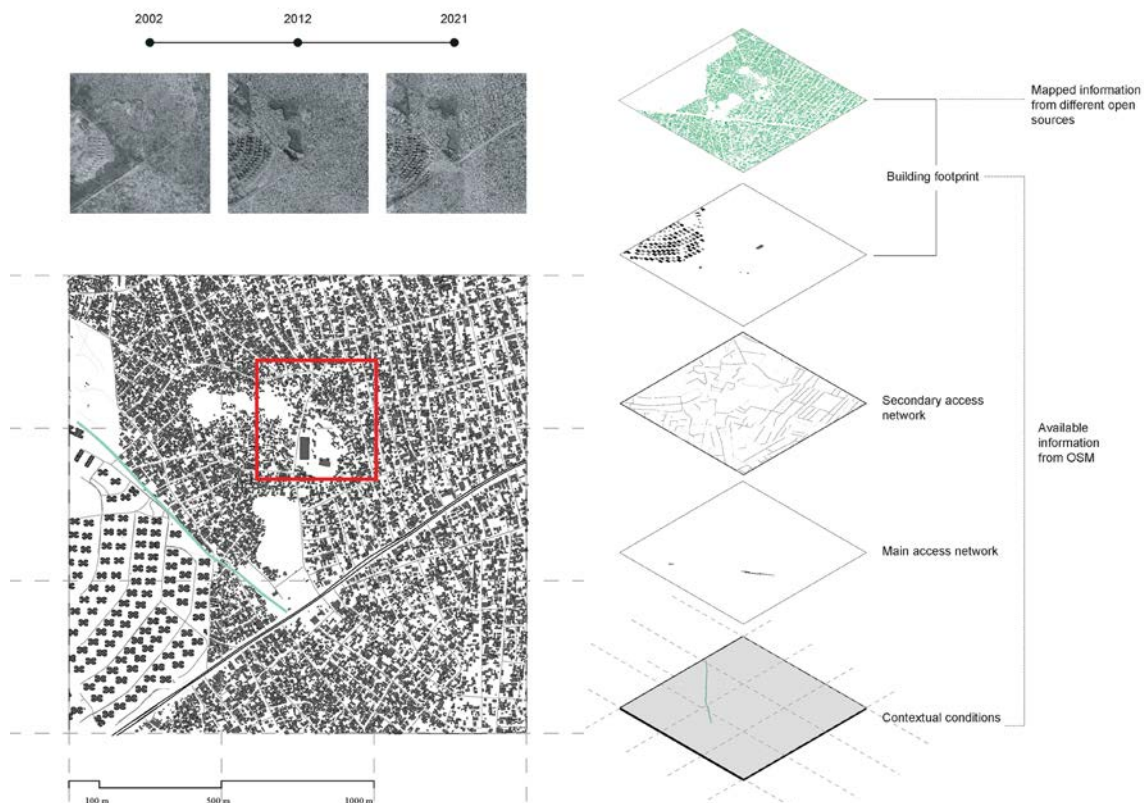
The attempt to decipher the complex characters of informality has pushed to an examination of the elements that compose it and to determine what morphological settlement logics can be deduced from the nuances of the mapped samples. The observations presented and the mapped elements resulting from the urban sampling process show that morphologically the results of informal processes can be read through typical elements that describe their morphology. In this sense, mapping and urban morphology allow the systematic observation of complex urban environments at a distance. The acknowledgement of the processual stages of development of informal morphologies exemplified by the work forces another recognition, informality in the urban works as a method of spatial production with tangible and recognizable traits in constant transformation.

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## Illustrations and tables



**Figure 1.** Example of Mapping operation. Luanda's sample B at Urban Scale. Highlight on sample for neighborhood mapping

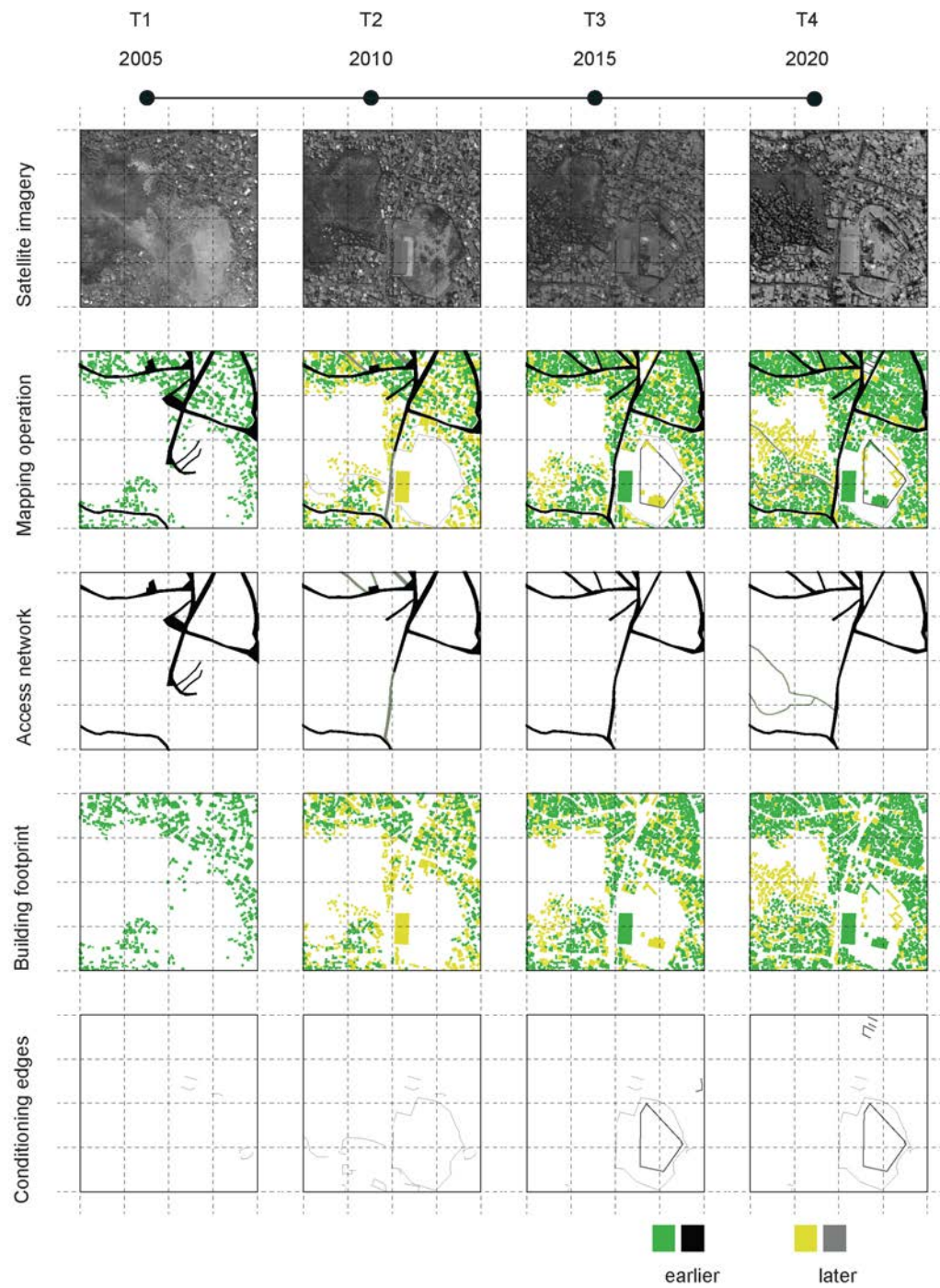


Figure 2. Diachronic Mapping operation of Luanda's sample B at Neighbourhood Scale



# Stages of settling process recognized in the sample mapping

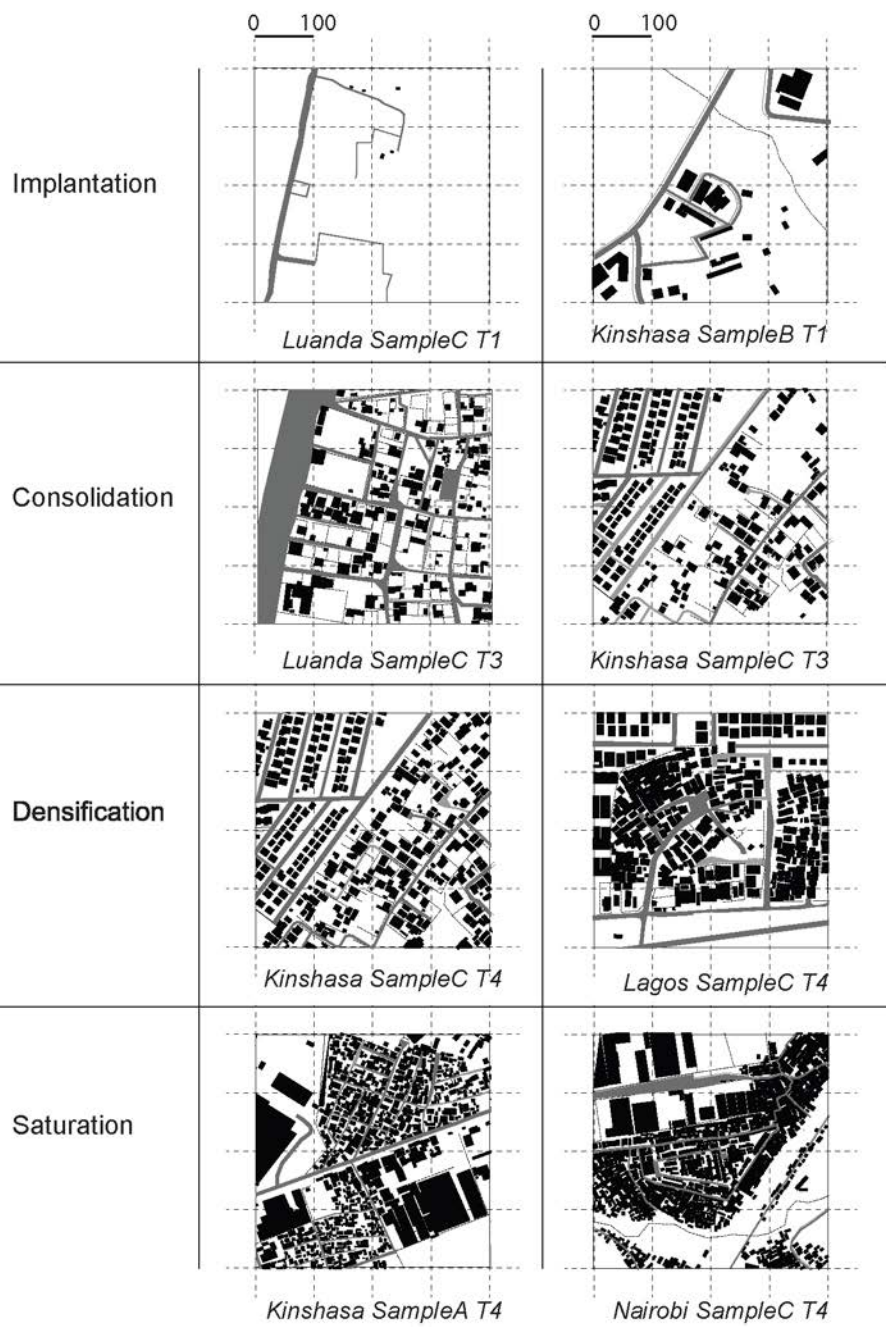


Figure 3. Settling process recognized in mapped samples



## Defining edges recognized in the sample mapping

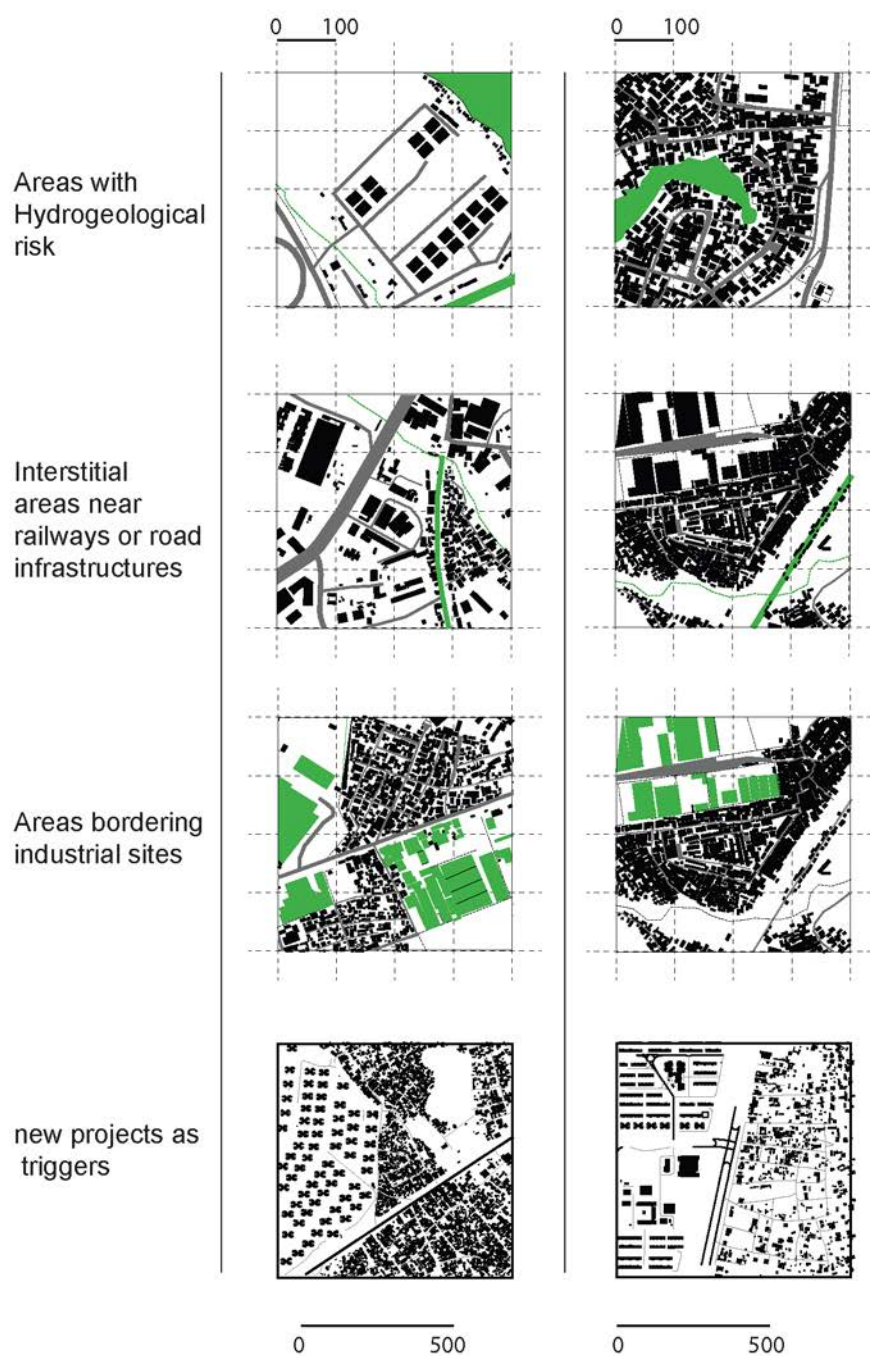


Figure 4. Defining edges recognized in mapped samples

# Settlements' agglomeration patterns recognized in the sample mapping

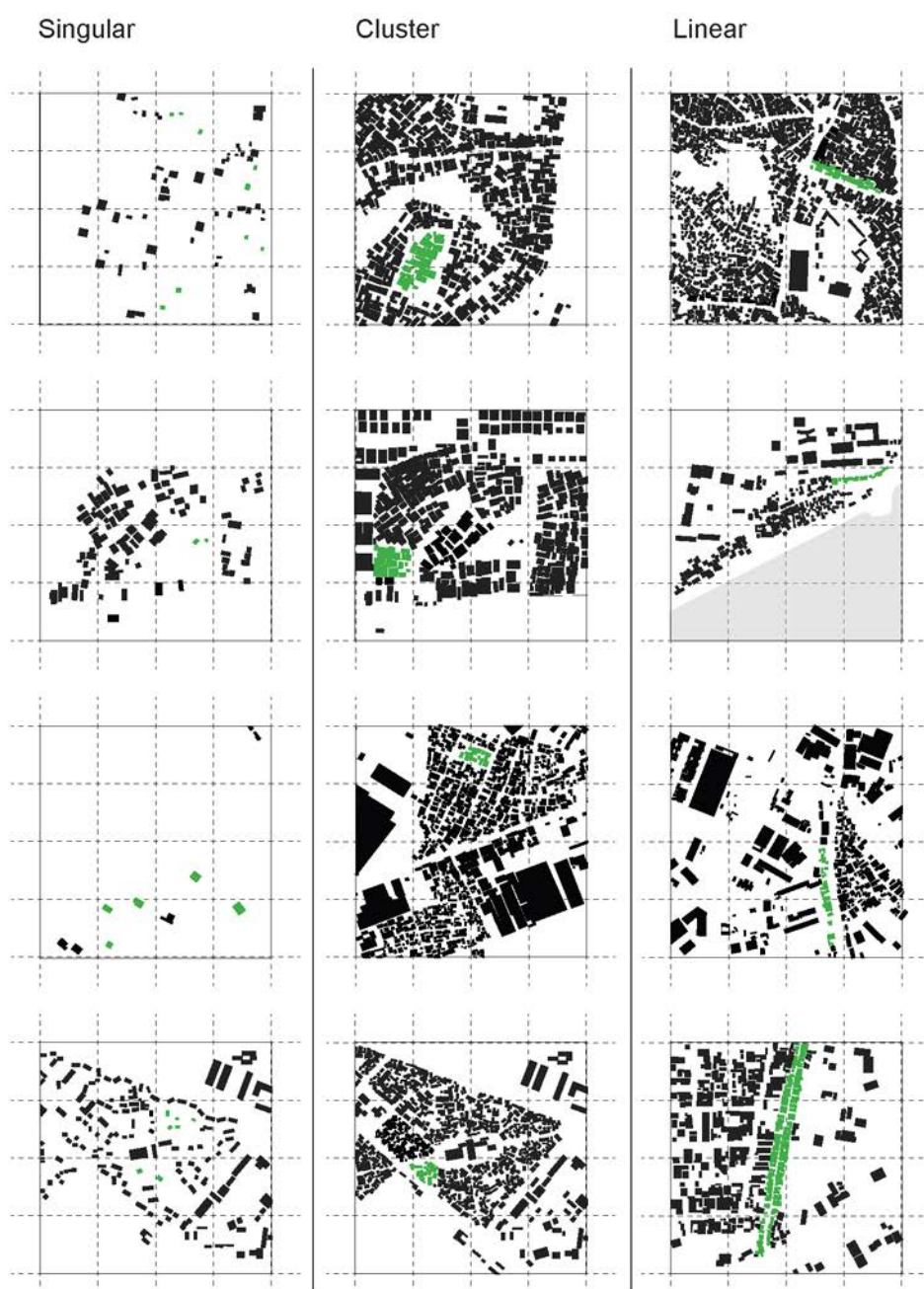


Figure 5. Settlement agglomeration patterns recognized in mapped samples



## Diachronic urban morphology: The formation process of Ait Ben Haddou, Morocco.

Imane Saidi<sup>1</sup>, Alessandro Camiz<sup>2</sup>

<sup>1,2</sup>Department of Architecture. Özyeğin University. Faculty of architecture and Design. Nişantepe, Orman Sk. No: 13, 34794, Çekmeköy, İstanbul.

E-mail: <sup>1</sup>imane.saidi@ozu.edu.tr, <sup>2</sup>alessandro.camiz@ozyegin.edu.tr

*Keywords: Urban morphology, building typology, architecture, urban history.*

*Conference theme: Reading the Changing Urban Form*

**Abstract.** This research focuses on the Ksar (Ighrem) Ait Ben Haddou, an outstanding example of well-preserved settlement in Southern Morocco. This fortified town is located in a semi-desert basin near the city of Ouarzazate, on the side of a hill, and is constructed mainly using local materials. The village is formed by an ensemble of residential building aggregates, which present different characters in terms of their architectural style. In 1987, the settlement was inscribed in the UNESCO's World Heritage list, and several researches indicated that the oldest constructions in Ait Ben Haddou do not date before the 17th century, although the building techniques used in the South Morocco region have existed and survived for centuries, as reported by Al-Wazzan (2005), he mentions the existence of Kasbahs in the 15th century along the Drâa valley. That being the case, we aim to investigate the formation process of the settlement by comparing the data provided by the fragmentary historical sources and the results of a typo-morphological analysis, extended to the urban organisms and the surrounding territory. The research will correlate chronologically the historical events and the urban form, by building the typological process of the different types, houses and Kasbahs, as a tool to comprehend the built environment. Finally, we will present the diachronic evolution indicating the formation process of Ighrem Ait Ben Haddou, and explain the economic, social and political factors determining the formation process of the settlement of Ait Ben Haddou.

## Introduction<sup>1</sup>

The settlement of Ait Ben Haddou is one example of earthen architecture, located on the edge of the Atlas Mountains, along Ounila valley. This Ighrem (village, In Berber language, Tamazight dialect) is a fortified village, distinguished with its earthwork building technique of adobe construction, which is spread across the Drâa, Toudega, Dades, and Sous regions. In fact, the region is supported by a set of oases ecosystems, which marks the boundary between the northern Mediterranean climate and the sub-Saharan climate. Palm trees are therefore an important part of the valleys in which the settlements are situated, as well as a component of the construction in the settlement of Ait Ben Haddou (Baglioni, E., et al., 2016). The Ighrem of Ait Ben Haddou has witnessed several historical and social events, many of which have contributed to its development. According to the text of the World Heritage List, the history of the settlement based on available testimonies, doesn't go further beyond the 17th century. Yet, the Drâa region has been notable for centuries with its unique architecture design, and Ksour that date back to earlier times, as mentioned by (Al-Wazzan, 2005, P. 494). The region of Draa according to (Ibn Khordadbeh, A. 1991; P. 86) was linked by several trade routes that connected African countries such as ancient Sudan (The geographical region spreading from West Africa to Central and Eastern Africa, including Republic of Mali) with Marrakech and Sijilmasa city and linked countries passing through the Sahara desert region on their way to Egypt, through the valleys of the southern region of which include the valleys existing in the Drâa region, such as the Dades and Ounila valley. At the junction of the Ounila and Draa valleys lies Ait Ben Haddou, along the Oued El Maleh River, along a trail that passes several earthen settlements called Ksour, which are believed to date back to ancient times.

## Methodology

This Paper focuses on examining the built environment and the urban organism, from the built spaces, districts and street networks, using the Caniggian urban morphology method, in order to understand the formation process and the diachronic evolution of the settlement Ait Ben Haddou. We will conduct an analytical study of the tangible sources, historical and archival data concerning the settlement in particular along with the social life, and the historical events taking place in the Ighrem, through studying the history of the region, we could understand the influence many aspects could have affected the settlement of Ait Ben Haddou. Additionally, this research will present an analysis of the building typologies existing in the settlement as a mean of understanding the urban territory.

## Building typologies in Ighrem Ait Ben Haddou

The hot and dry climate of the Drâa region marks the building typologies of this area. While the temperature changes seasonally and diurnally, the houses offer modest but remarkable design principles. The climate of the region can reach 37 Celsius and a minimum of 6 Celsius in winter. Therefore, the buildings in this region have thick walls made of adobe material which on one hand keep the thermal insulation in winter, and on the other hand protect from the summer heat and the winds in the region, with small sized windows that can only allow ventilation flow through the houses. Additionally, other widespread features in the region are flat roofs, along with courtyards that allow constant ventilation and sunlight to enter the houses. The main building typologies in the region are Kasbahs or Tighrematin, and Tiguemi houses, which are both, constructed using Adobe and rammed earth (pisé) building material; however, they

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<sup>1</sup>This paper is part of an on-going Master thesis research.



have different height levels and design approaches. Both Kasbah and Tiguemi exist within the walls of Ighrem Ait Ben Haddou. Tiguemi which translate to house in Berber (Tachelhit dialect), are found in a dense urban fabric; houses are very close to one another and sometimes connected and built over pathways, creating tunnel passage ways, while Kasbahs are fortified buildings with towering walls on each corner, having mostly a quadrangular plan (Baglioni, E. 2010), owned by wealthy families or by Amghar, who is the leader of the village. A Kasbah is usually inhabited by wealthy large families and can have from three to four floors, it is also known for its ornament exterior designs unlike Tiguemi house, which is also a house for large families of lower social class which usually doesn't surpass more than two floors, however, it doesn't include any ornament on its exterior except the rammed earth material that speaks for itself.

Both Kasbah and Tiguemi have a patio, which is one of the necessary elements of architecture design in the region, which can be used for more than one purpose, depending on the season and the occasion.

One of the Tiguemi building typologies, under the name house Oukassi, which belongs to Oukassi family, located in Ait Ben Haddou, stands right at the highest point of residential built frame of the territory (fig1), at the highest level on the hill before reaching Ighrem Niqdran. A two floor house of a quadrilateral plan, including a central patio surrounded by four main pillars among a sequence of rooms in each side, with an open court extension which is mostly used for the purpose of storing certain elements of agriculture use, or animals.

When it comes to Kasbahs inside the village of Ait Ben Haddou, we can identify different types of houses with towers, of different number of towers of fortification. A classical traditional Kasbah has four towers of fortification, but we are able to find houses with two towers only, and the reason for that goes back to its location and its purpose. Sometimes a Kasbah can be built right along the fortification wall surrounding the village; therefore, it must include extra towers to protect the house that is on the border, but also give an impression of power to the intruder. On the other hand, a classical traditional Kasbah of four towers is designed that way to reflect the power and status of the owner family, and also honor its powerful presence in the settlement.

### Construction techniques

The construction techniques used in the settlement are common in the region. Walls built on a stone base, using moistened rammed earth and organic materials like straw, mixed together and placed inside a wooden frame panel, to ensure its shape. A result is a dried dense and solid monolithic wall. The houses in the settlement have a flat roof, which is the case for all the buildings in the region, with roof terraces that serve for different purposes, as they are part of the living space, especially in the summer months when they are used to sleep outdoors. The roofs, therefore, are covered with canes and adobe melange, that don't allow moisture and rain water to seep into the walls. Reinforced with beams and joints made of palm wood in different sizes, in a circular cross movement. The size of the beams is also an important element when it comes to the size of the rooms, or rather the distance between the walls and/or the pillars. , the pillars are one important element in the architecture of the settlement, they are found at covered passages, houses, and in patios. They serve as a support for arches and lintels, usually surrounded by arcades (López Osorio, et al. 2012). The local materials are the main construction material of all the Ksour and kasbahs in the region. In fact, a description from 15th century, reported by (Al-Wazzan, 2005, P.180) of the Ksour along the Draa river describes them as being constructed of mud and raw bricks, which is still the construction method of most original houses in the Draa region today.

### Street network

Since the settlement stands on a slope of a red rock hill, it is established on inclined cascade topography, buildings are connected by staircase pathways or sometimes simple inclined roads or tunnels. The stairs are made of rammed earth and stone, while the inclined sloped routes are simply earth. Moreover, shadowing elements exist over a number of streets. These covered streets are located in areas where the extension of the house plan occurs over the already existing pathway, which then connect two different built elements along the streets, consequently creating a shadowing element or tunnels which also serve the locals of the village. These tunnels are shaded with adobe construction ceiling and reinforced with beams of timber, making it a place for cool air circulation that most people use during summer time as a shelter from the heat of the Saharan sun (Baglioni, 2010). It is considered a fresh tunnel for inhabitants of the Ighrem, as well as passages that prevent from making any coordinated attack and advancing into the city.

### Formation process investigation

#### *Historical record*

The region of Draa where the Ait Ben Haddou resides has been most notably a significant region, which was reported and mentioned in many historical sources, mostly mentioning rivers, which could be an indication of trade means, since rivers connect to certain natural ports, where trade takes place between the Mediterranean and West Africa. Moreover, (Strabon, 1805, P.336) gives a reference to a local people under the name of 'Gaetulians' living in the Region of Draa, along with Gaius Plinius Secundus, who also mentions the Gaetulians of Draa as and adds to mention several animals residing in the same area, such as crocodiles in the River of Draa during the second century (Pliny, 1877, P.203). Not only that, but one of the earliest mentions of the Drâa region is presented in the first world map, Ptolemy's world map (90-168 AD), under the name 'Dara flumen' or Drâa River.

The settlement lies along the Oued El Maleh, with an agriculture setting, taking place between the settlement and the valley. The river of Oued El Maleh within the Draa river line can be dry. However, that isn't always the case, taking into account the different climate of the area, the river can go from a dry state, to a flooded state, within couple of days. Accordingly, (Al-Wazzan, 2005 P.480) narrates that the river of Draa can overflow during winter until it becomes like an ocean, and can dry during summer until it can be crossed by passengers.

In the matter of trade and natural resources, Al-Wazzan mentions a place known as 'جزولة' (Jezula) in the 16th century, as a place that includes the Draa region, which contains a large quantity of cattle and a large amount of barley. He also mentions several copper and iron mines, from which copper vessels are made to trade it for other necessities (Al-Wazzan, 2005, P.156). All of this indicates a possible trade that took place for centuries, and the existence of Draa in many historical records doesn't seem to be missing. Not only that but it seems that Draa was homeland of many plants and spices, including Indigofera, which served as a plant for indigo dye (Carvajal, M. 2020, P.148). Furthermore, a significant subsistence of Jewish history is also found in the Draa region, due to the prominent Jewish presence in Ait Ben Haddou, as (Ahda, 2016) explains that the Jews began migrating to Morocco in the 6th century BC and settling in the Saharan valleys. (Al-Wazzan, 2005, P.491) in parallel, records the presence of Jewish artisans in the region of Draa as well. It is clear that the settlement of Ait Ben Haddou seems to embrace all of the traits of building typology, Jewish history, agriculture and trade, found in the historical records of the Draa region.

### *Morphological analysis*

The Morphological analysis of the Ighrem Ait Ben Haddou displays a specific order within the village. It is divided into three main areas. A central setting which is at the core of the village, mainly for habitation dwellings and residential housing. The second setting is the Jewish zone on the South east, next to a block of compact set of dwellings passing by a synagogue, and a road leading to the eastern entrance of the Ighrem, while on the south west and a third setting portrayed as an alignment of Kasbahs (building of adobe construction, surrounded with towering walls of reinforcement) that join with the settlements' fortification wall towards the west. In this setting, there are six Kasbahs, which constitute the only number of Kasbahs in the entire village, all of which are located along the road that leads from the western entrance.

For security and control reasons, people can access the settlement through two main gates only, one entrance from West and one looking towards East. The Ighrem shows a clear social classification, when it comes to building typologies, we can clearly notice a group of modest houses which are smaller in size and lack any ornament properties unlike others, also with a clear difference of material use in these two, which both stand in the core of the settlement and the Jewish zone setting.

From the eastern entrance, an initial step towards a set of housing of a regular and orthogonal form is found, which represents the Jewish zone in the village. A compact set of Tiguemi buildings lines the eastern entrance path of this zone, where it is discernable that most houses have their doors and entrances facing each other, from both sides along the settlement's eastern path. In the same Jewish zone, on the upper parts of the hill, is a compact form of regular housing block named Mellah (Jewish neighborhood in Moroccan cities), which is a predominant element in every Moroccan city. Furthermore, the middle section of the Ait Ben Haddou includes different residential housing blocks alongside a mosque, which acts as a hinge, and an intersection point between the two main streets of the village; the Western entrance route and the eastern gate route. Notably, a development of houses as well as Kasbahs of different sizes and shapes, are created along the Western entrance street. It is clearly manifested in the city plan that these Kasbahs and houses are strictly following the western street path. The two main streets in the settlement are the Western street, crossing the valley, and an eastern street which is located along the valley route, connected with a number of secondary streets, that connect each block of houses and takes us uphill towards the Ighrem Niqdran (The granary house on top of the hill). As a result of the formation of these different house blocks along different streets of the village, and through analysing the urban layout of the village, we can distinguish a possible sequence of chronological phases which could have taken place to establish and explain the formation process of Ait Ben Haddou.

### *Territorial organism*

Through analysing the territorial organism of the area, which inspects the ridge routes, valleys routes and cross ridge routes of the topographical area, we discover that the village stands on hill that falls at the head of the ridge route along Ounila valley making the settlement a low promontory settlement (Fig.2).

From the territorial organism ( Fig.2), we can also distinguish that all the villages of adobe material follow the same organism, and are all at an end point of the ridge route. It is also evident that most villages along Ounila valley are placed along the valley route.

Moreover, when assessing the build environment of the Ait Ben Haddou in particular, we perceive two fortification walls, the first is a large wall entouring the top of the hill, where a building called Ighrem Niqdran stands within its frame and the second wall which serves as the

village's fortification wall, located at the lower part of the hill, with its two gates that take towards the village. Therefore, the settlement includes a fortification wall that protects the city built on the lower hill, and another fortification wall on the upper point of the hill.

#### *Formation process analysis*

By analysing the urban territorial organisms and the built environment, we can determine that the settlement evolved at different stages over time. The earliest stage is presented along the East entrance, (Fig.3) where a set of houses are built on an orthogonal plan layout, in a compact manner. All houses are facing each other along the street path that extends towards the Jewish corner on the northern side, and extends in the form of different house blocks on the west side). Consequently, the continuity of the path coming from the eastern gate towards the West continues along a set of buildings that create the central sector of buildings inside the village. Subsequently, with the village's expansion from the Jewish East side towards the western side, a new path is formed. This path connects the eastern gate with the western gate routes, creating new residential housing blocks connected with secondary streets (Fig.4).

Finally, an additional route crosses the valley connecting Ait Ben Haddou with settlements on the other side, making a western entrance to the village, where a new set of Kasbahs are built in an alignment (Fig.5) developed in accordance with the later addition path (the western path), belonging to the village leader and other wealthy households. According to the Caniggian approach of urban morphology, this is an indication that these buildings came later, after the road was established. A road must have taken place that connects different settlements with one another, which then encourages the building formation to take along the new road and eventually manifest in an expansion of the village. Therefore, we perceive a set of Kasbahs which represent the latest construction building typology in the village. Moreover, with the expansion of the settlement, a fortification wall was needed to protect the people from wars taking place during the time, where the Ounila valley was one main passage used by armies of Almohad era. Consequently, the formation process of the Ighrem Ait Ben Haddou, is formed under different phases, according to the available historical data, and through analysing the urban territory, it is necessary to state that these information reinforce one another, and are able to guide us through the origin of the earliest formation in the village.

Ighrem Niqdra, located at the highest point of the hill, is the only building that stands within the wall perimeter up the hill. This perimeter is a fortification wall, with 5 towers on each side which act as security towers. The location of Ighrem Niqdran stands right at the end of the ridge route, making the first ever location and formation point of the village, within the fortified wall up the hill (Fig.6) .

#### **Conclusion**

It is deduced that the formation process of the Ighrem Ait Ben Haddou, is formed under different phases, according to the available historical data and through analysing the urban territory, it is necessary to state that these information reinforce one another, and are able to guide us through the origin of the earliest urban fabrics in this village.

According to the Caniggian School of urban morphology, and through analysing the territorial organism, we can identify that Ait Ben Haddou represents a low promontory settlement. The current state of the settlement, where the village stands on the slope of a rocky hill, is in fact a descendant extension of the original location of the earlier village which once stood within the upper hill's fortification walls. Moreover, the history of the settlement and the region indicates that these earthen settlements existed in the past. As well as by examining the site we are able

to perceive the fortification wall which is located on top of the hill of Ait Ben Haddou, which lies right at the end of the ridge route path. By that we can assume that the earlier placement of the village was initially situated on the top of the hill, making Ighrem Niiqdran (building standing on top of the hill which served as a storage place) a trace of the village that eventually retreated downwards towards a lower slope.

Through this analysis we are able to explain the stages in which the settlement took to become the current settlement of Ait Ben Haddou and claim that the village of Ait Ben Haddou was initially on top of the hill, subsequently extended downhill, starting from an eastern expansion, which is presented in the Mellah neighbourhood, and later on towards the west, until the last stage which is depicted in the alignment of Kasbah buildings along the cross valley route.

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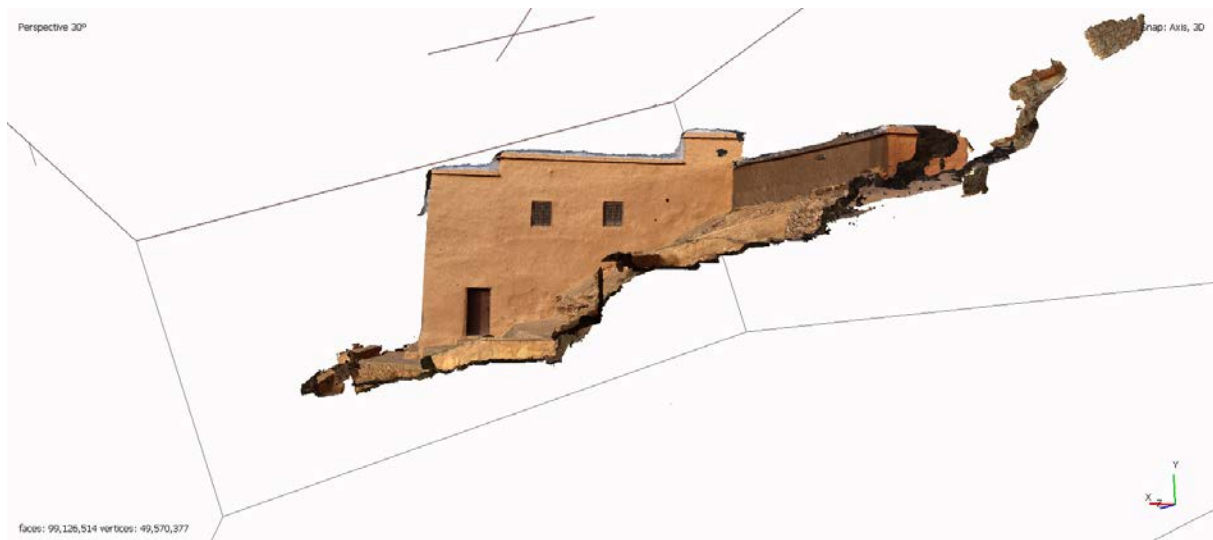


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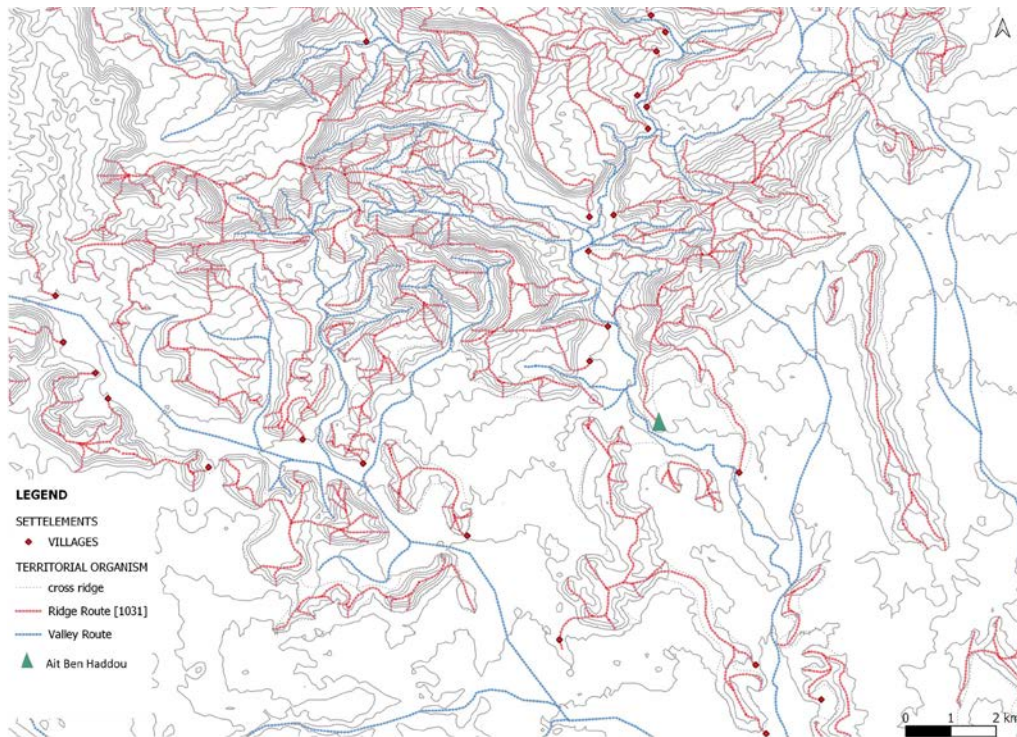
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## Illustrations and tables



**Figure 1.** Photogrammetric capture of House Oukassi, or Dar Oukassi, located on the highest point of Ait Ben Haddou perimeter. (Saidi.2022).



**Figure 2.** Prepresentation of the territorial organism showing Ait Ben Haddou's location at the end of the ridge route, along the valley route and several villages and settlements along the valley routes. (Saidi, 2022).



**Figure 3.** Representation showing the first formation organism of the settlement on the hill, in a form of compact buildings towards the east. (Saidi.2022)



**Figure 4.** Representation showing the expansion of the village toward the west, and the creation of a street pattern. (Saidi.2022)



**Figure 5.** Representation showing the final expansion towards the West route, and the formation of Kasbahs along the cross valley route. (Saidi.2022)



**Figure 6.** Representation of the fortification wall of the initial location of the earlier settlement on top of the hill, home to Ighrem Niqdran located at the center inside the wall frame . (Saidi.2022)





## Character and applications of Historical Judgement in architectural and urban design.

Francesco Scattino<sup>1</sup>, Marco Maretto<sup>2</sup>

<sup>1</sup>"Sapienza" Università di Roma, DiAP (Dipartimento di Architettura e Progetto), Via Flaminia 359, 00196, Roma, Italy;

<sup>2</sup>Università di Parma, DIA (Dipartimento di Ingegneria e Architettura), Parco Area delle Scienze, 181/A, 43124, Parma, Italy

E-mail: <sup>1</sup>francesco.scattino@uniroma1.it, <sup>2</sup>marco.maretto@unipr.it

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*Conference theme:* Reading the Changing Urban Form

**Abstract.** *The contemporary city is subject to constant processes of transformation recognizable in the design of the urban fabric and in the socio-cultural context that produces it. In recent decades, however, architecture seems to be able to impact on the city by producing only self-referential objects unable to contribute to urban construction, forgetting the form and with it the expression of sense. One of the causes could be found in the increasingly weak construction of a critical thought on which to base the process of architectural composition. In fact, the architect-designer seems to lack that sagesse, that judgment that can embody a type of knowledge that allows to accept the reality as a form. That value judgment that constitutes, in the practical act of studying architectural form, the trait-d'union between synthesis and project. The architect's task is to reconstruct the process of synthesis, which is nothing other than the process of concrete implementation of the social environment provided by civilization as a vision in living development. For these reasons he must judge well the acts that preceded him to reach his operative moment, the project. The research, starting from the first integration of value judgment in the study of architecture introduced by Saverio Muratori in the famous study on Venice, investigates the relationship between historical reality, understood objectively and unconditionally but conditioning at the same time, and our synthetic judgment, which must express a conception of the procedure that is total, intuitive, and absolute vision. It prepares and implements a reform of the city on a plan of topical design that solves without residue the problems not yet resolved.*

The purpose of architecture is its construction. This does not mean building without motivation, nor does it only mean building well, but it means assigning to building a sense that transcends it into a technical-compositional and creative act. However, architectural work, in recent decades, seems to have lost the capacity to express that sense, forgetting form and, often, being unable to contribute to urban construction itself. The constant transformation of urban space, in addition, imposes on us a revision of our attitudes towards it, particularly in relation to the phenomena responsible for the transformation of the contemporary city.

An attempt to answer the problem should be sought in the wide range of concepts and tools that urban morphology offers and that articulate the different aspects and elements of form, their relationship and the role of the agents that create, use, and transform them.

We know that morphological studies provide the architect with a relevant vision of urban form precisely because of his attention to the processes of formation and transformation through which the meaning of places can be understood. Making positive use of regularities, of patterns of formation, can mean possessing tools to be used during the act of designing new forms to be inserted into pre-existing urban contexts and beyond. These offer a means of using the built environment as a resource for design by looking at those forms as potential future solutions. However, Vitruvius himself reminds us, ratio as the exercise of an orderly progression of technical and procedural analytical phases would lead to poor results without the sudden irruption of a thought that casts everything that has already been decided in a new light, thus igniting a new resolving idea whose origin somehow disregards the individual factors to which this idea derives. This idea, this image, is identified in this research, in the concept of judgement. The value judgement is part of what we can call a range of tools that can be used to best describe the process of architectural synthesis, and it is therefore necessary to open a premise on how these are used.

The architect-designer possesses two sets of fundamental tools in the analytical-compositional act, in other words two general sequences: the first is the "analysis-comparison-synthesis" sequence, which is followed by the second sequence of "judgement-design".

The tradition of the architect's profession always draws attention to the centrality of the analytical moment. *Ex nihilo nihil fit*, an architectural work cannot come to birth without a careful analysis of the historical and cultural context in which it will arise, of the current situation, of the functional requirements to which the future artefact will have to respond through its appropriateness in expressing the social identity of its client, in operating in continuity. To these must be added the analytical conclusions regarding those general categories of architecture such as typology, technology, and morphology.

Urban morphological analysis includes a wide range of specific methods: from the identification of the geographical characteristics of the project area to investigations of historical, social, and economic development. Performing an analysis undoubtedly requires an investment of time and resources, which is why it is necessary to identify the aims and objectives at the beginning of the study to avoid an unnecessarily long and complicated procedure.

However, analysis alone is not enough. Reading is not designing, or at least, it is a necessary but not sufficient condition: we need to compare results and study them from several points of view in order to arrive at a better understanding of things and thus their synthesis.

Comparison is a fundamental tool in the identification of patterns, types, and the process of urban form. It is an exercise that operates at the level of the subconscious, in a simultaneous manner, like the entire analytical-compositional process; nothing precedes something, everything is simultaneous. In essence, on the design of an urban layout, we place models' side by side and look for similarities and differences. When we recognize a model, we compare it to

another that we already know. However, it is necessary to go beyond mindless disassembly, the comparison is used as a basis to arrive at the moment of synthesis.

The act of synthesis always implies comparison between one form and another, comparison between the different component parts of a form and the relationships between the parts, comparison between the different stages of development, growth, and transformation of the form, even between the different socio-cultural contexts that produced them. What emerges is a composite view, which is a synthesis based on experience that has developed through cycles of hypotheses, deductions, and inductions.

But, as anticipated in the introduction, in order to arrive at the design act, it is necessary to pass through judgement.

Kant, in the Critique of Pure Reason, identifies judgement, in the order of our faculties of knowing, as the middle term between the intellect and reason, distinguishing two types: reflective and determinative. The latter are the cognitive and scientific judgements in other words, which determine phenomenal objects by means of universal a priori forms such as space and time. The former, on the other hand, are the sentimental judgements which merely reflect on a 'nature' already constituted by means of the determinant judgements or interpret it through our needs, in this case design needs. In our specific case we will identify the judgement not as purely aesthetic, but critical of the synthesis resulting from the analysis, of value and therefore determinative.

In the field of architecture, very few have managed to accept the challenge of integrating value judgement into the analytical and compositional process. One of the main causes of the crisis in urban design today should probably be sought in the scarce construction of critical thinking on which to base the compositional process of architecture. In fact, the architect-designer seems to lack that *sagesse*, that judgement that can embody a type of knowledge that allows us to accept the real that surrounds us as form. That value judgement that constitutes, in the practical act of studying architectural form, the *trait-d'union* between synthesis and design.

Architecture not only has building as its ultimate goal, but above all represents critical thinking about the contemporary society in which we operate.

As the English philosopher and mathematician Bertrand Russell reminds us: 'to understand history we have to be philosophers ourselves in a certain sense. There is a reciprocal causality here: men's living conditions have a great influence on their philosophy, but on the other hand their philosophy has a great influence on their living conditions'. The same happens in the architectural and urban sphere. In fact, the architect's task is to reconstruct the process of synthesis, which is nothing other than the process of concrete implementation of the social environment provided by civilization as a vision in vital development. For these reasons, he must well judge the acts that preceded him to reach his operative moment, the project, which will in turn be judged in the future as a conditioning factor. This is a position of disenchanted autonomy of judgement towards the history of the city, based on a conscientious and documented acknowledgement of the values of history: which does not exclude the will not to renounce formulating value judgements and expressing one's own subjective contribution in an interpretative sense - therefore also innovative and transformative when necessary.

The fundamental character that is looked at is its urban quality, its capacity for dialogue with the context, its capacity to "stand in relation to" (to other existing architecture, to a given landscape, or to a system of infrastructures), to be an accomplished part of a process in the making.

Urban analysis gives a picture of the relationships, that is, of the possible laws that are established

between an intervention and its environment, between the project and the site, both in the sense that this can influence that, and in the sense that that can assume that. And the more parameters are assumed in the urban analysis, the more it will be possible to trace relationships that intervene in the design even in conditions of partial or total disappearance of the conditioning of the surroundings. It is here perhaps that one of the points of contact between analysis and intervention can be identified. The analysis of urban structures intervenes in the design, where a role must be assigned to the structures themselves, that is, to give them a judgement, which consequently becomes a design parameter: not of the single building artefact but of this and the surrounding area affected by it" (Aymonino 1975).

These words by Carlo Aymonino are sufficiently explicit to explain how the relationship is conceived not as mechanical but as dialectical, between urban analysis and design.

The same dialectical relationship can be found in the work of Saverio Muratori, who was the first to introduce historical judgement as an operational tool in the urban analysis of one of Venice's neighbourhoods, that of San Giovanni Grisostomo, carried out during his years of teaching at the IUAV and published in "Studi per una operante storia urbana di Venezia", on which the foundations for the typological-processual method were laid.

In his morphological analysis of the district, in fact, Muratori attempted to answer the question of the origins of the Venetian urban fabric by identifying different phases of development in the surveys carried out by his students.

From this study emerged the existence of the twofold aspect involved in any building survey: the identification of a building typology and the identification of a line of historical development, i.e. the relationship linking the individuality of the type with a new individual aspect arising as a development and differentiation within the former; aspects that, once the survey was complete, would merge into a single uninterrupted process, but which the researcher would have to seek out in order to grasp separately. The result was fundamental in being able to recognise the unitary meaning of building reality as a structural nexus and gradual development over time.

So, in summary we can assert that to avoid falling into mere classification it is important to identify the relationship between the built environment studied and the pre-existing environment. The former was generated by a precise social need, corresponding to the inadequacy that emerged from the former in the old fabric, which remains the conditioning and content of the new form.

In the neighborhood under study, the geometric clearness of the layouts makes it possible to trace back to its original layout by isolating the architectural speech through a qualitative and structural analysis of the existing masonry and building organisms, so as to discover which elements are authentic and which are overlapping.

In San Giovanni Grisostomo, three historical urban fabrics are thus identified that have characterized the development of the district: the lagoon fabric, the courtyard fabric and the calli fabric (Fig.1).

While summarizing the history of the city of Venice in this brief identification of a historical development line, it is necessary, according to Muratori, to focus on the transition relationship and to express a judgement of historical value that defines the moment in which what was the synthesis of an initial society becomes a datum, hence a type, i.e., the starting condition for a new synthesis corresponding to the new society that follows.

Even the most complex structures embody that continuity in which the society that produces them recognizes itself. Transformation, however, is never random or radical, but occurs gradually, often manifesting itself as an insertion into a pre-existing building organism, which thus takes on new meaning and functionality. But the nexus between structure and function,

the “quod significat” and the “quod significatur”, between form and content, can be understood if one compares the changes induced by the socio-cultural context of later ages with the production of the original structure of that same age, the latter of which can usually be found on the margins of the pre-existing core. Even in the case of the creation of a new building or urban type, it will be possible to find within its dialectical patterns of functions and structures of phases coeval with the oldest examples. This is the phenomenon that Muratori refers to as the life and vitality of the building and urban type, that is, its aptitude and need to integrate and enrich itself over time.

The investigation will have to recognize that historical becoming by degrees, by successive syntheses and will therefore itself proceed by successive visions for hypotheses that are gradually more adherent to the historical process studied. This dual condition of reality understood as form, of an absolute and gradual judgement, is the one that allows us to emerge from all misunderstandings and to base our strict insertion on the objective values of reality. Only an absolute judgement is an adequate recognition of reality. Between the architect who designs and the historian who judges, there is a precise difference: not the act of building, which is in itself always a synthesis of judgement and will, but the historical dimension, as the act of building is for the historian a precise precedent conditioning the historical synthesis. An investigation is formative of reality insofar as it is formative of the capable architect, as it is formative and transformative of culture and, therefore, unequivocally coherent with itself and with the past to which it relates. It must therefore be a synthetic judgement that must express a concept of the process that is total, intuitive, and absolute vision.

The urban planning problem, the urban design, must be solved in the critical awareness of the city's functional and spatial structures, in the judgement, in that functional integration through which they can be made relevant again. A very clear example is the one that emerged from the analysis of the “San Giovanni Grisostomo” district: if you have a structure that cannot be eliminated and you have nothing else equally valid with which to replace it, you are not condemned to immobility, because function is not conditional (form is not function), but it changes continuously. The city, if it were not planned at all, would still change, it would find a way to autonomously adapt its structures to environmental and social changes.

According to Muratori, in fact, urban design is only legitimate if it goes along with the functional variations permissible in the existing reality, in the structure. It will therefore be limited, not in a negative sense, but it will possess its own scale of values, its own forms, its own particular economic and social meaning.

Like Muratori, Gianfranco Caniggia also sees in the lack of critical thought construction one of the causes of the crisis of the urban design, but unlike the former, he does not look for an answer in the expression of judgement but in that operating conscience, which can be spontaneous or critical. The term consciousness expresses that immediate faculty of perceiving, understanding, and evaluating facts occurring in the sphere of individual experience. By spontaneous consciousness is meant the aptitude of an operating subject to adapt itself, in its actions, to the inherited civil substance, without the need and obligation of mediation or choice. It occurs in non-crisis moments and is an immediate and synthetic understanding of what it takes to create a building product. The construction of a house, for example, takes place without the dictates of various schools or architectural currents, in that particular moment in the image of a house, acting in this manner in full spontaneous consciousness.

Acting out of critical consciousness, on the other hand, is the opposite: in a moment of crisis, doubt arises about one's actions. In the absence of a collective codification, the rooted way of making is lost, it is no longer possible to act out of spontaneous consciousness. In this case,



the most useful thing to do is to exercise one's critical consciousness to the best of one's ability so that it adheres as closely as possible to the spontaneous one, in order to recover what one would do if one had continued to act through it. Through the exercise of the critical faculty, one must act on the acquisition of the continuous, progressive, and processual becoming of cultural heritage.

The methodological hypothesis proposed by Caniggia is therefore based on the assumption that it is necessary to operate critically by directing critical consciousness on the examination of the behavior of those who operated in the past according to spontaneous consciousness, and on the examination of the spontaneous consciousness that is still active, hidden in contemporary products by an opposite critical consciousness.

To judge is therefore to do consciously, with conscience, with concordance between creativity and planned work. Muratori sees the architect as an intellectual endowed with judgement, with a capacity for judgement that, however, needs to be developed through study, and which, to quote a paradox, with which Sylvain Malfroy gives his interpretation, "must find that freedom which is truer than that which one would have without studying".

Only in this way can judgement, both historical and of value, represent a continuity between "studying" and "designing". The architect who works with the built environment must see it as a medium for design with precise characteristics. Once we understand how it works and why we are attracted to it, we are in a better position to use that knowledge in design and to achieve better results, to implement a reform of the city on a topical design plane that solves unresolved problems without residue. The analysis is infused with formal purpose, and this is not pure aesthetic intentionality, as in the other arts, but is full of the concreteness without which architecture would not exist.

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**Figure 1.** Development of the urban fabric of San Giovanni Grisostomo in Venice: lagoon fabric, courtyard fabric, calli fabric and current situation.

Muratori, S. (1960) Studi per una operante storia urbana di Venezia, Roma, Istituto poligrafico dello Stato, Libreria dello Stato.



## The Trullo dwelling type in historical core of Alberobello. Survey on relationship between urban morphology and building typology

Raffaele Tarallo

Dipartimento di Scienze dell'Ingegneria Civile e dell'Architettura, Politecnico di Bari.

Via Orabona 4, 70126

E-mail: raffaele.tarallo@poliba.it

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**Abstract.** *Is there a relationship between building typology and Forma Urbis? This text aims to investigate this connection in the urban core of Alberobello, which is sited in the central part of Apulia region. Specific geomorphological features of Murge plateau promoted, on different times, the development of dry-stone technique. There are a lot of examples of this cultural tradition established in the Apulian territory among which type of trullo is most widespread. Trullo was born to be a country shelter as long as became the common type building in Alberobello, where it grew up according to aggregative forms with mainly urban features. In fact, the common aggregation provides for little and autonomous agglomerations which are inhabited by different families that is bounded by kinship relationship. The significant population increasing, and the diachronic transformations of the building typology caused a significant change in settlement processes of urban form. The city was born to implant workforce for farming in feudal era and it spontaneously developed along the main suburban streets where special buildings took place near the crossroads. Later, the independent cores unified gradually through the foundation of planned fabrics which is formed by serial building types. That phenomenon shows a gradual coding process of urban building that can be reads synoptically through the typology upgrade. The contribution would like to exemplify how much the deepen knowledge of settlement processes can be necessary to address project choices and rehabilitation plans for building heritage inside a fragile background as historical consolidated city is.*

## Introduction

The Apulian territory is sited in the southern portion of the Italian peninsula, occupying its easternmost part. The region is mostly flat with some important hills and foothills. In particular, the central portion of the regional territory is the vast plateau of the Murge which is configured as the most important karst formation in the area and is divided into two separate sections through a pronounced jump in altitude towards the Adriatic coast. In the south-east part, within the larger area called Murgia dei trulli, lies the Itria valley. The territory, despite the numerous changes, has maintained a strong rural character that made it distinguishable through centuries. An indelible trace of this are the numerous marks left by the peasant civilization through the modifications of the landscape for agricultural and productive purposes. Among all, the use of the dry stone construction technique is the most recognizable in the area. This tradition arises from a practical need which concerns the accumulation of stone material coming from the removal of the stones by the agricultural soils. The resulting calcareous material is well suited to be used as a building material for the construction of dry stone walls and buildings of modest size. In the rural area of the Murgia of the trulli, small buildings such as "specchie" and "pagghiare" characterizes the landscape and outlines the iconic image of central Apulia. The simplicity in finding the building materials on site and the relative ease of installation of the construction elements have contributed to spreading the dry stone technique. The most emblematic expression of this tradition is found in the trullo, which is a building type of rural dwelling characterized by the peculiar conical roof in limestone, called "chiancarelle", concluded by the termination of the pinnacle element. The distribution area of the trulli is very vast and occupies almost the entire central southern area of the region, mainly located outside the inhabited centres. However, there are rarely some examples of introduction of this type of building in urban centres of which Alberobello represents the most emblematic case. The city of Alberobello, in fact, has developed through aggregations of organisms composed of basic trullo units. It is reasonable to think that this leap from a rural to an urban condition arose precisely from the organic nature of the trullo and its aptitude for aggregation. The exceptional urban condition led in 1996 to the recognition of the UNESCO site of the "Trulli di Alberobello" world heritage of humanity, identifying as areas of excellence the Monti district, the Aia Piccola district, the Trullo Sovrano, and other sites such as the Casa d'Amore and Pezzolla house. The need to guarantee the protection system of this heritage underlines how much the trullo building represents a testimony of the history of this centre.

## Methodology

In order to describe in an exhaustive way, the phenomenon of trullo construction, a careful analysis of historical sources was carried out to find information about the city and the description of the urban morphology of Alberobello. The reconstruction of the urban development of Alberobello is quite a complex operation due to the lack of cartographic documents. The research begun from the reading of historiographical sources, chronicles and documents found in various archives<sup>1</sup>. The town of Alberobello was born at the end of the sixteenth century along the basin of the valley that crosses the ancient forest of Conversano. Although there are no historical sources to confirm an origin before sixteenth century, in the first half of 1900 the historian Notarnicola put forward the hypothesis of a prehistoric origin of the Alberobello settlement, underlining how the site of Alberobello had continuously had the

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<sup>1</sup>In particular, the State Archives of Bari, the private archive of Sangro di Martina, and the private archive of the Giorgio Cito's heirs.



character of a settlement which had preserved the tradition of the trulli since the Middle Ages. The scant documentation found, however, does not allow us to confirm this hypothesis. The only certain information<sup>2</sup> refers to the existence of a town in the "Sylva Arboris Belli" not before 1600. To confirm this news, Pietro Gioia, in his chronology, places the first urban aggregate around that period, identifying it with a pastoral or sylvan nucleus of about forty houses, which built with a circular plan and ending in a cone, edified by vault of the Acquaviva, earls of Conversano. The dry-stone technique, which does not involve the use of mortar, suggests a precarious nature of the building produced. Historiographic tradition reports that in this way the population was able to overcome some prohibitions imposed by state authorities<sup>3</sup>. By circumventing these laws, Earl Gian Girolamo Acquaviva introduced a progressive process of populating the forest to secure low-cost labour for the exploitation of the agricultural potential of this area. By interpolating the information of a historiographic nature with the analysis carried out on the historical maps, five historical phases have been elaborated in order to briefly summarize the settlement evolution of the centre of Alberobello.

The first phase of the development of the Alberobello settlement can be placed towards the beginning of the seventeenth century. At this date, in addition to the presence of the first aggregates in the Monti and Aia Piccola districts, the town is characterized by sporadic groupings of trulli near the current Matrix Church and Corso Vittorio Emanuele. The first operation was the analysis of some maps of the territory which made possible to draw, in a summary way, the outlines of the possible older aggregates sited on the first recognizable paths along the territorial connection paths with the neighbouring centres. According to this reconstruction, the first concentrations of trulli would have been more consistent in the monumental districts and more sporadic towards the Church of SS. Medici, on whose site there is also a first small 32m<sup>2</sup> facility dating back to 1609. At this stage, the building of the earl's house, dating back to 1635, is already identifiable in the urban layout. A kind of road axis about 400m long was thus formed which connected the religious pole of the church with that of feudal power. Along this path probably arose the first sporadic agglomerations of trullo houses.

The second phase of development of the Alberobello settlement begins in the second half of the seventeenth century, continuing until the end of the eighteenth century. The population gradually increases, leading to an increase in residential areas and expanding the original agglomerations, which however maintain a highly spontaneous character in the settlement. In 1725 it became necessary to expand the matrix church with the addition of four altars and the baptismal font.

The end of feudalism in 1797 marked the beginning of the transformation of the Alberobello landscape. The Alberobello wood was divided up and the various plots were assigned in free ownership to the citizens. Starting from the end of the eighteenth century, thanks to the freedom of construction<sup>4</sup>, a process of disintegration of the seventeenth-century and eighteenth-century town took place. The most evident modifications of this process involved the Acquaviva palace which was transformed into an elegant stately palace and the Trullo Sovrano which gained a new facade. Over time, the classic urban organization scheme based on neighbourhoods and

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<sup>2</sup>This information comes from a series of seventeenth-century papers preserved in the Sangro Martina archive and in the so-called Manoscritto di Cassano.

<sup>3</sup>Known by the name of Prammatica de 'Baronibus, these rules prevented the cutting of the woods to supply themselves with wooden material from the foundation of new towns without the authorization of the viceroy with the aim of controlling internal migratory flows.

<sup>4</sup>With the publishing of the Real Dispaccio in 1797, the state authorities allowed citizens to build their homes with the use of mortar.

the uniformity of social classes begins to disintegrate<sup>5</sup>.

The fourth phase of development of the town of Alberobello takes place at the end of the nineteenth century, when begun a substantial and fundamental transition from spontaneous to critical awareness. This is a typically nineteenth-century transformation caused by the development of the urban discipline of town planning<sup>6</sup>. In comparison between the plan and the morphological conformation of today we see an expansion on an orthogonal grid to via Monte Grappa, then via Cavour, on which a series of straight paths are set up. Other plan forecasts implemented are the installation of the two road axes of Corso Trieste and Trento and Via Cesare Battisti, which connect the city centre to the railway station, and at last the reconstruction of the street fronts of Corso Vittorio Emanuele. In this phase, important changes are also made to the Matrix church which was completely restyled by architect Curri.

The fifth phase corresponds to the contemporary condition that sees the clogging of the fabric and the definition of the current shape of the blocks.

### Measurement and analysis

The survey on the urban morphology was carried out considering the fabric in its current condition. Through a vast survey campaign it was possible to find information on the planimetric consistency and elevation of the blocks. The relevant operations were therefore carried out through a geometric survey made according to the method of trilateralization. The information relating to the urban fronts was recovered through a photogrammetric survey. The operations of graphic restitution consisted in the redraw of the estate registry plans carried out by assembling the board found in archives. The result obtained was the planimetric assembly of the ground floor plans of the area under analysis. The redraw also affected the urban facades. Making a representation code allows us to report the structure of the building elevations by representing a linear montage of the façade of the entire area using different projection planes. These data greatly increase the knowledge of the urban fabric and allows to recognize the structures that characterize the architecture of this area.

The fabric is made up of aggregates of building organisms for neighbourhood courtyards that are configured as small autonomous and independent agglomerations. A hierarchy is recognized in the path system. The Matrix paths are configured as the first to be born in the territory in a phase of spontaneous action, before the construction takes place. The matrix paths adapt to an irregular course conditioned by the morphology and orography of the place. Some, for example, have a sinuous trend to accommodate the slope and the aggregates placed on the greater share. The trend of the matrix paths is increasing due to the presence of polarity as in the case of the path that connects the matrix church to the earl's house. With the formation of the matrix pathways we recognise those nucleus that were formed spontaneously and first in the development of the tissue. These come to settle in the areas at a greater share. This is the case of the aggregates around the oldest neighbourhood courts that move along territorial connection paths. From the morphological point of view, in the initial phases of rural development of the settlement, the fabric of this city is formed by aggregates of building

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<sup>5</sup>For the analysis of the urban road layout before to the nineteenth-century transformations it was examined a census map named *Pianta dello Comune allo stato delle sezioni nel 1807*, which is preserved in the private archive Eredi Giorgio Cito, from which the original nuclei present around can be recognized. to the mother church.

<sup>6</sup>This change is mainly marked by the elaboration of a series of plans which, even if only partially realized, have marked radical alterations of the fabric. In particular, the first masterplan drawn up by engineer D'Elia in 1878 and the plan of 1885 drawn up by architect Antonio Curri. The latter shows a tendency towards the careless geometrization of the then still well-preserved urban layout.

organisms associated with each other for neighborhood courts that attest to a behaviour by spontaneous consciousness<sup>7</sup>. Those nuclei that are formed spontaneously and first in the development of the fabric come, as in the case of the aggregates called Corte Matarrese and Corte di Papa Cataldo.

At a later stage, the plant paths that bud from the matrix paths are developed, in anticipation of the planting of new buildings. This is the case of via Monte Grappa, from which a series of orthogonal streets branch off with a straight line, the result of planning. A further example is constituted by the new nineteenth-century road constructions, which rectify pre-existing extra-urban connections. This phase generally overlaps with the development of a critical consciousness<sup>8</sup>. The development of a system of plant paths that bud from the matrix paths is evident in the introduction of a more homogeneous building within the fabric, which is recognizable by a more regular conformation of the lots, with a tendency to a serial behaviour. Finally, the progressive expansion of the fabric leads to the definition of the current configuration of the blocks, with the consequent closure of some paths and with the creation of new connection paths. Some examples are due to the suppression of the dwellings on the lot, connecting the two paths that skirt the church. Isolates do not always show regular geometry attributable to large-scale planned tissue behavior. And in fact, especially in the expansion areas, there are often blockages of irregular shape in the aggregates, the result of contingencies related to the blockage of residual areas.

An analysis of the block demonstrates how modularity constitutes a key concept of the building. In the blocks attributable to planning we can see the repetition of the size of the lots and the repurpose of the same building type along the entire built front. The building stands on the pertinent bands relating to the two building system paths. The pitch of the blocks, approximately 6 m in size, is sometimes doubled while maintaining the depth of the lot constant.

Other blocks are in a different situation. Starting from the ancient nucleus of the neighbourhood court, further buildings are implanted in a phase in which critical conscience operates. In this condition the size of the lot built due to the initial spontaneous condition is very varied also due to the shape of the lots. Some blocks still show the configuration of the ancient neighbourhood court. The lots are extremely irregular in shape and varying in size from 4 m to 8 m.

The characteristics of the urban morphology are closely linked to the nature of the prevailing building type. The trullo is configured as an elementary housing model that tends to aggregate around a shared courtyard with the adjacent trulli according to the neighbourhood courtyard model.

Analysing the characteristics of the trullo building it is found that it is essentially formed by the basic module, which establishes the planovolumetric dimension of the trullo and which constitutes the central space that performs the functions of living and dining.

The elementary cell is accessed through an entrance that can be central, generally placed between two small niches, or lateral, placed next to a small space that often coincides with the fireplace. The focarile consists of a compartment of variable dimensions in proportion to those of the elementary cell and intended to produce heat and for cooking food. Furthermore, alcoves can be attached to the trullo, which are large niches used for night rest composed by

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<sup>7</sup>This can be defined as an expression of human work that reveals the attitude of the operating subject to adhere to established norms, rules, customs, traditions that derive from constructed reality. On the matrix path, the oldest building stands on lots that are generally less regular.

<sup>8</sup>Critical consciousness is configured as the development of an intentionality resulting from the need to make choices in urban development which leads to the rationalization of the laws in the morphological definition in a codified form.

a half domes or barrel vaults sustained by an arch inside and covered at the top by flounces of chiancarelle that connect to the roof of the elementary cell. Finally, the more complex types can have one or more added cells, or compartments attached to the basic module and characterized by a size similar to that of the elementary cell, equipped with a trullo covering. The recognition of the characters allows us to identify a typological taxonomy of the trullo, and to recognize the related synchronic and diachronic variants<sup>9</sup>. The mapping and dimensional classification involved the entire area which has 206 trullo building units. The classification involved the sizing of the basic module and the composition of the elements in the building units. The most widespread dimensional category in the analysed area is the Cell with dimensions between 9 and 15 m<sup>2</sup>. This is followed by the category of the Sub cell, which includes elementary cells between 5 and 8 m<sup>2</sup>, and the category of the increased cell, with dimensions greater than 16 m<sup>2</sup>.

## Conclusion

The definition of a cognitive framework on the historical heritage of the trulli of Alberobello is configured as a preliminary operation useful for directing the recovery actions of the building heritage. A radical transformation of the consolidated image of these buildings took place mainly, due to the lack of an adequate document to address the restoring operation of the trulli. The establishment of the UNESCO site has unfortunately led to less attention for the historic buildings of the remaining part of the urban center, excluded from the perimeter itself. Over time, in fact, prestigious buildings have undergone uncontrolled transformations that have led to a progressive distortion of the urban image of Alberobello. This study<sup>10</sup> therefore sought to identify operational tools for the recovery of the historical heritage and its enhancement in order to respect the traditional characteristics of dry-stone construction. Four categories of intervention have been identified for the recovery of the historical building heritage, through the cataloguing of the most significant construction elements, considering the scale of the building organism and outlining all the interventions that respond to the specific problems encountered.

The architecture of the historic center of Alberobello refers to the plastic-masonry tradition. This is characterized using load-bearing masonry in dry stone, with a whitewashed finish or frequently with exposed stone. Where the state of finish and treatment of the masonry facade conforms to the traditional one, interventions aimed at preserving all the elements of the masonry equipment are proposed. To restore the finish, materials and techniques conforming to traditional ones are used. At the same time, for buildings which appear unconventional for the treatment of the masonry front are subject to removal of the coating with the recovery of the traditional lime finish.

Another application example proposed is the intervention carried out on the fixtures. This area is characterized by a significant presence of windows totally different from the traditional type and which cause a distortion of the historical character of the trulli. The guidelines outlined are intended to carry out the recovery, where possible, of the original types of fixtures or, in the presence of non-compliant fixtures, to replace them.

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<sup>9</sup>Synchronic variants are defined as those changes in the load-bearing type due to topological, orographic or particle conditions, while diachronic variants are mutations subsequent to the realization of the type and due to changes in housing standards or socio-economic needs of users.

<sup>10</sup>The data retrieval and analysis operations were conducted within master degree thesis a.a. 2019-2022, supervisor Prof. Matteo Ieva, candidates: Roberta Occhionigro, Antonella Roma, Emma Sabatelli, Ilaria Stea, Raffaele Tarallo, Maria Pia Tridente.

Another relevant problem concerns the power cables which alter the legibility of the fronts. As part of the reorganization and burying of electrical cables, it is hoped that the bituminous roofing will be eliminated in favour of a limestone pavement in the road sections which are considered under an historical and cultural value. The proposed intervention foresees the burying of the power cables with the construction of raceways which will allow to reach the individual users with the minimum impact on the elevations. The gas pipes must be sited in the pertinence areas, and not on the street front. In the impossibility of carrying out this operation, the pipes must be well aligned at one end of the front and painted in the same colour by inserting elements that do not cause an impact in the facade for the allocation of the niches. A final consideration concerns the recently built buildings for which a uniform treatment of the masonry face is obtained, with the elimination of existing coatings, and replacement of the fixtures with types closer to the traditional ones.

In conclusion, the definition of these purpose for interventions is intended as a pilot strategy, an address to a series of operations, certainly not immediate, carried out with the awareness of providing indications, and certainly not rules, for intervention on the historical heritage of the trulli of Alberobello.

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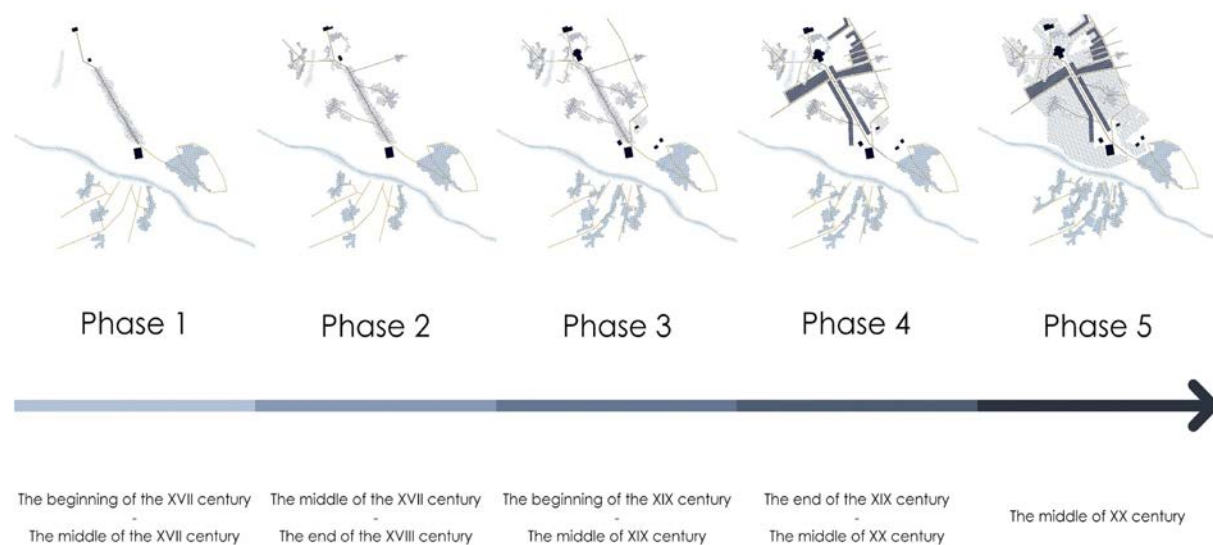


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## Illustrations and tables



**Figure 1.** Territorial localization and identification of the study area and UNESCO site.



**Figure 2.** Chronological evolution and schematization of the historical phases.



Figure 3. Planimetric assembly, photogrammetric survey and redraw of urban fronts.

#### STAGES OF SETTLEMENT'S DEVELOPMENT

##### Aggregations of organisms on connection path

- Pertinence bands on matrix path
- Pertinence areas on matrix path
- Pertinence bands on implantation path
- Pertinence areas on implantation path
- Pertinence bands on connection path
- Pertinence areas on connection path
- Matrix path
- Implantation path
- Connection path



Figure 4. Analysis of the path system and of the relative pertinence bands.



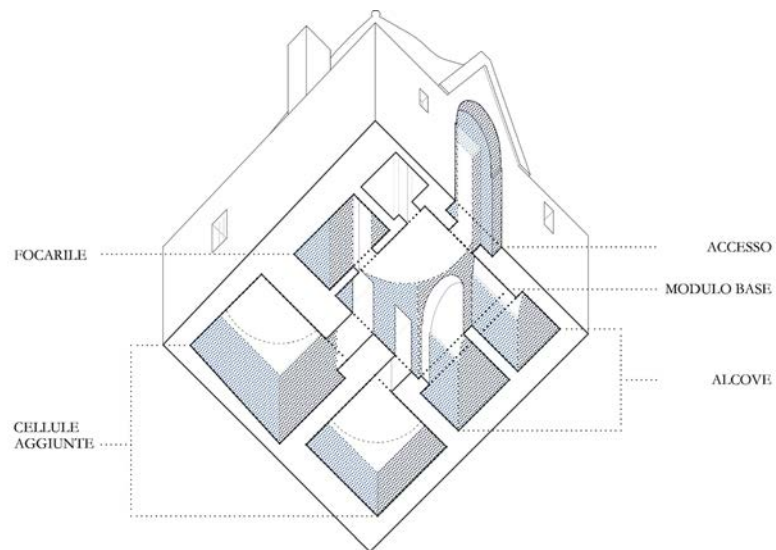


Figure 5. Elements of the trullo building.



Figure 6. Abacus of the categories of intervention proposed for the enhancement of the trullo building.

## The urban morphology of cities in the future: Évora and Setúbal – Portugal

Maria Tereno<sup>1</sup>, Manuela Tomé<sup>2</sup>, Filomena Monteiro<sup>3</sup>

<sup>1</sup>Universidade de Évora, Escola de Artes, Departamento de Arquitetura, Colégio dos Leões - R. Dr. Emídio Guerreiro 35, Évora, +351963350577, <sup>2,3</sup> Independent Researcher.

E-mail: <sup>1</sup>mcst@uevora.pt, <sup>2</sup>mjtome@sapo.pt, <sup>3</sup>monteiro.m.filomena@gmail.com

*Keywords:* Urban fabric, evolution, future

*Conference theme:* Reading the Changing Urban Form

**Abstract.** *The way cities have organized and developed, since their first human settlements, show the marks of the idiosyncrasies of the populations that gave rise to them, whether in the cultural, socio-economic, religious, and functional spheres. A comparative appreciation of the cities of Évora and Setúbal has been done in their evolutions during a period comprehended between the Middle Ages and the present time, while cities contained in walled enclosures, in the Middle Ages, until the present urban expansion. In the name of progress, at the end of the 19th century and the beginning of the 20th century, there was a very significant expansion and transformation of the urban fabric, creating the need to adapt to new circumstances brought about by the automobile, and the historic cities have seen many of their symbolic and identity elements disappear. The disproportionate urban growth and new trends, alerted to new organizational objectives, having returned to the previous model of the historic city with spaces for pedestrian circulation. In the future, it will be even harder to predict a morphological model to follow. Recent events, such as the pandemic, created a new paradigm of work, and if this trend continues, the movement of people will be drastically reduced. In a global society in constant and rapid transformation, with such mutable and unpredictable factors, it is sensible to consider flexible planning strategies regarding urban expansion, but relentless regarding its heritage essence, because unpredictability, everything will be open.*

## Introduction

Human settlements, as embryos of cities, date back to very distant times. The way in which they were organized and developed diachronically, show the marks of the peculiarities of the populations that gave rise to them, whether in the cultural, socio-economic, religious, and functional spheres. Évora and Setúbal are cities with very distant origins, still preserving their historic centre, delimited by a set of walls whose construction dates to the Middle Ages. These walls are remarkable for the interpretation of the urban picture and can be seen in the design of the urban fabric, in the case of Évora, as a radio-concentric city, and in the case of Setúbal, as an elongated shape, generated by the orientation of urban axes parallel to the coastline. Taking these cities as a case study, in a time span that covers from the Middle Ages until now, we compare their evolution as walled cities, as well as their expansion beyond the city walls. To make this comparison, relevant bibliographical documents, cartography, iconography and photographic images of both cities were used. These elements were gathered and then analysed considering the era where they were produced.

Another factor, not least is the support of the decades of academic and work experience of the authors, as well as the profound knowledge that the authors have about both cities, either from their past times, and currently.

## 1. Evolution of the urban morphology in Évora and Setúbal

The medieval defensive system was reinforced since 1640, with the construction of modern bastioned fortifications that enclosed the consolidated urban areas.

With the creation of these new limits, there was a disruption of the old urban setup, with the loss of functionality of the old defensive structure and its opening to widen the walled city, creating better accesses and new neighbourhoods.

In the end of the 19th century and the beginning of the 20th century new paradigms of development and wholesomeness emerged giving rise to the creation of new principles of urban morphology.

### 1.1. The Modern Age

The restoration of national independence in 1640 and the political situation that the country was experiencing at that time, led to a higher concern with the protection of the villages, leading to the improvement of the defensive systems, either by reinforcement of existing structures or by building new ones, after 1640.

Several military engineers were dedicated to the construction of the new fortifications. In Évora, military engineers Charles Lassart, Jean Gillot and Nicolau de Langres worked here in the construction of the new fortifications. We consider Engineer Jean Gillot and Fr. Johannes Cosmader, who conceived the new defense structure, João Ruiz Mouro, and João Thomas Correa. Jean Gillot represented the studies with drawings of the outskirts of the village with great definition of details. As in Évora, Nicolau de Langres also worked in Setúbal, having made blueprints of this fortification, although with a more simplified layout.

In Évora, the initial urban center focused the urban evolution in a walled enclosure and determined the radial organization of the various types of urban design, with the roads radiating from the main doors (Figure 1).

In Setúbal, the centralization of the urban center and the coastline determined the urban organization, with the development of the main roads parallel to the course of the Sado River (Figure 1).

The religious power, and influence of churches in the development and in the urban morphology,



dates to the Christian Reconquest, in the 12th century. In Setúbal it was based in the churches of Santa Maria da Graça and São Julião, which became the first two parishes until the 16th century when the parishes of São Sebastião and Nossa Senhora da Anunciada were created, in 1553.

These four parish churches are mentioned in the voyage of Cosme de Medici and designed by Pier Maria Baldi (Figure 2), in the urban profile as landmarks of the city, which have remained until the present, with the exception of the Church of S. Sebastião which was demolished in the 19th century. However, the current Church of São Sebastião, in the Convent of São Domingos, is also a relevant mark in the city's image.

## 1.2. The present

With the introduction of the canning industry in the 19th century, Setúbal enjoyed a big economic development and started a process of big urban transformations that would happen during the following century.

In the name of progress, at the end of the 19th century and the beginning of the 20th, there was a very expressive expansion and transformation of the urban fabric, creating the need to adapt to the new circumstances brought by the car, and the new social aspirations and their insertion in the city.

In the name of progress, at the end of the 19th century and the beginning of the 20th, there was a very expressive expansion and transformation of the urban fabric, creating the need to adapt to the new circumstances brought by the vehicle, and the new social aspirations and their insertion in the city. The historic cities saw the disappearance of many of their symbolic and identity elements.

Until the middle of the 20th century the cities remained confined to the walled space, having then emerged new urban dynamics influenced by European movements. With the changes recommended for the cities, an environmental quality would result that surpassed the limits of the "historic medieval city". A new cycle of economy based on industry was also beginning. The adaptation of cities to new realities began with the implementation of public facilities, infrastructure, public walks, creation of new public spaces and the organization and regulation of buildings.

The development of these cities can be understood through the photographic images that constitute fundamental testimonies for their knowledge from the mid-19th century onwards. Of Setúbal stands out the first known photograph, which contributes to the understanding of its urban and architectural history, by Anthero Seabra. For Évora we must refer José Pedro Passaporte.

Portugal was going through a period of new policies, called "Estado Novo", during which new interventions in the historic urban fabrics were planned. In Évora, Étienne de Gröer designed the creation of new squares, opening different streets and realigning others, through the demolition of existing buildings. In Setúbal, João Aguiar designed the General Urbanization Plan. Of this Plan, the devaluation of monuments (fortifications) and the existing urban structure stands out, with demolitions that advocated a great expansion, zoned on a structure of main roads that traversed the city, ripping perpendicularly through the existing main streets. New ways were pointed towards the already created Av. Luísa Todi, whose relevance was reinforced with the construction of landmark buildings, to the detriment of the old town facing Sado, with the current Av. Dr. António Rodrigues Manito becoming a major road axis.

In Évora, the urban space defined by the successive urbanization plans was structured through the construction of a set of roads, some radial and others circular, which allowed the

interconnection of the various neighbourhoods scattered around the historic centre surroundings. The constitution of circulation axes, inside the walled space, together with the constructive reinforcement along the paths, would create, according to Gröer, a more intense urban image adapted to the demands of the new times.

The preliminary urbanization plan for Évora, designed by the urbanist architect Étienne de Gröer, began in 1942, proposing different types of interventions for different socio-urban scenarios. Outside of the entire walled space, Gröer proposed the construction of a new urban area with the characteristics of a "garden city" that, surrounding the old nucleus, constituted a "lung" that would allow for a better environmental quality.

In Setúbal, wide avenues were created featuring new typologies, with two lanes separated by a tree-lined central space, and drawn perpendicularly and parallel to Av. Luísa Todi, projecting the city to the North and East with the construction of new districts. This transversal profile of the streets has been changing and there is currently only Av. 22 de Dezembro.

The current Évora Urbanization Plan, maintaining much of the road structure proposed by Gröer in 1944, continues to preserve the spirit of a radial city with the respective circulars, densifying the housing areas, which fill the previously existing urban voids.

The urban consolidation of Setúbal remained within the limits of the 17th century fortification until the end of the 19th century, when the earthworks carried out on the Sado River allowed the acquisition of new areas for construction and the transformation of Rua da Praia and the beach into the new avenue, changing the urban morphology, making this avenue the main structuring axis of the city.

The city expanded to the South (Sado River), with the creation of equipment and large lots for housing, to the North and East, with the creation of housing districts, with great emphasis on social housing.

The morphological structuring lines of these medieval cities have changed with the new roads, but they have kept their urban center, which dominates all the morphological space (Figure 3).

## **2. Causes of urban morphology transformation, different morphological treatment scenarios.**

Cities have undergone morphological changes over time for very different reasons, with Évora being an example of destruction by the same culture, during the Islamic period.

The factors of progress, such as industrialization, also completely altered the image and morphology of cities, with the excessive influx of populations to cities, creating factories and housing and travel needs. The rampant growth of cities and their ever-increasing size has made the use of the motor vehicle essential. This factor that has contributed in a very relevant way to the alteration of the urban morphology configuration, as well as to the loss of heritage values of reference, to allow the automobile circulation.

The current pandemic (COVID-19) has changed the paradigm of the ways of working, demonstrating that work can be done from the home, may also have consequences for the use of means of transportation and the use of urban spaces.

Another factor that contributes to changes in people's lives are armed conflicts, determinant in the maintenance or alteration of references in correlation with the morphology of cities and the consequent emergence of new morphological dynamics.

We try to give some examples of the situations mentioned above.

### **2.1. Automobile occupation**

In the old walled enclosures, due to the growing need for automobile traffic, several old gates

(19th and 20th centuries) were demolished, as well as other relevant sections of the walls.

In Setúbal, several adaptations were made, with reference being made to the total connection between Praça do Sapal and the surrounding urban areas, with the demolition of Porta Nova for a better connection to Bairro do Troino, and other doors and sections of the medieval wall to the opening of the same. The urban centre, with all its valences, has also become the center of the city's road network. The new urban models determined the expansion of the urban space with the Sado River landfill to create large lots of housing, equipment, and industry.

At the end of the 20th century, we witnessed the proliferation of a new design of renewal in the road network, to solve the flow of traffic at intersections, by building traffic circles, which invaded our cities.

This new system of intersecting roads reached a diffusion that sometimes exceeded the rationality of environmental and cultural management, causing in Setúbal the destruction of sections of the aqueduct, whose construction dates to 1487 and earned the classification of Public Interest Property in 1971 (Figure 4).

## **2.2. Economic and industrial development. The transformation of the landscape**

The historic center of Évora has a fully consolidated urban structure, and the buildings are progressively being restored by their owners. Following the classification of the historic center by UNESCO, in 1986, tourism has played an important role in the city's experience.

The urban design has been maintained, but the dynamics of morphology has changed with the changes of use of the building for tourism.

Setúbal had a strong connection to the river, either by the factor of economic sustainability or by the length of beach along the coast, which combined with the natural environment, the favourable climate, and the quality of its waters, made it a beach holiday destination, to which the city has adapted with the construction of support equipment necessary for this use.

Industrial development dictated a more profitable urban occupation of the beach area with the need to build canneries there.

The city expanded along the river to create new blocks of construction dedicated to the canning industry, which also no longer exist. (Figure 5).

## **3. Motivation for the morphological changes. Other paradigms**

The causes of destruction and reconstruction can be quite varied, from natural catastrophes which can submerge cities and make ancestral cultures disappear, as is the case of Alexandria, to earthquakes, or volcanic eruptions, among others as in the example of Palmira, whose existence benefited from the presence of an oasis in the desert

Through the studied cities we verified the alteration of their urban morphologies, throughout several centuries, for several reasons that refer to new forms of technological, hygienic and health, economic, sociological, and political life.

However, nowadays these dynamics arise at a faster pace and, for the most part, unexpectedly, of which we give some examples, and for which a satisfactory solution has not always been found for the respective communities.

### **3.1. Technical development**

The construction of the Alqueva Dam (1975/2010) on the Guadiana River in Portugal, allowed a major agro-industrial development in the surrounding area and a major transformation of the landscape.

For this construction it was necessary to relocate (1998 / 2002) the old village Aldeia da Luz,

which would be completely submerged in the largest artificial lake in Europe.

A new village was built in the image of the previous one, without, however, having reached the goal of total acceptance by the population, who live with the memory of the previous village.

### **3.2. Natural disasters**

Setúbal has a location that makes it vulnerable to accidents caused by nature and its destruction. With the prospect of rising sea waters, it will be one of the cities with the lowest part at risk, and the Sado River may come to reclaim what was taken away from it. It has already suffered several earthquakes that almost destroyed it, namely in 1531, 1755 and 1858. The streets were destroyed, the buildings were damaged from the second floor onwards and there was a great loss of historical heritage. This destruction forced repair work to be carried out over a number of years. However, the urban morphology of the city was maintained with the reconstruction on the foundations of the existing buildings.

The same did not happen in Lisbon, that when the destruction occurred with the 1755 tsunami, the managers appointed by King D. José I, for this purpose, opted to make tabula rasa, of the territory, ignoring all the existences, including the cadastral ones, they planned a new urban area with a new morphology in which only the main references were maintained, namely the churches, with the Church of Carmo still in ruins that are still preserved. It continued to be the city's urban center.

### **3.3. Pandemics (COVID-19)**

The COVID-19 pandemic, with the restrictions imposed for public health reasons, has given cities an image never seen before: completely deserted cities. There has been no morphological change, only the image and experience of city life has changed.

This situation brought about new habits that, in many cases, will remain and reveal to us the existence of cities that are less lived out, where the use of the car for daily commuting is more reduced and the streets, once again, are less crowded.

### **3.4. Destruction by armed conflict**

The current geopolitical situation in Ukraine demonstrates that urban morphologies and consolidated cities can be destroyed in seconds by the power of current military weaponry, leaving the question of which way to go when the situation ends.

- Rebuild in a manner similar to previous presences? It will mean devising a false history.
- To build by tabula rasa of the existing? It will mean erasing the morphological and cognitive references.
- Maintaining the morphology of cities with the reconstruction of the buildings that are part of the cognitive memory of the citizens and that constitute the material and immobile heritage that embodies the immaterial heritage? It will mean an approach to the sociological balance of the community.

## **4. The appeal to cognitive memory after the destruction of heritage references**

The feeling of loss of identity, which can cause the disintegration of citizens or the sociological instability associated with nostalgia, makes us feel the desire to relive the past, revisiting images from those times or recreating artificial scenarios, when the renovations carried out have caused irreversible changes. Sometimes the nostalgia of the communities demands the recreation of this destroyed heritage, arising the need to revive the memories with the

construction of replicas, museums, photographic and other exhibitions.

In the case of Setúbal, in 2005, a replica was built of one of the oldest wells in Setúbal, the Poço do Concelho, which was demolished in the mid-20th century, when it was no longer used by the population. Also, the recent urban rehabilitation carried out in the riverside area restored the Praia da Saúde in this space, eliminating the old boat construction site that existed there. Museums are a relevant example of heritage loss showcases, in all cities. Part of this heritage is still present, but decontextualized. Furthermore, we refer to the example of the Museu Nacional Frei Manuel do Cenáculo in Évora, which contains a collection of architectural elements taken from buildings of various urban periods of the city.

### 5. What scenarios for the future of the cities?

The disproportionate urban growth and new trends, alerted to new organizational objectives, have returned to the previous model of the historic city, in which pedestrian circulation spaces are privileged.

Considering recent factors such as the pandemic, which has created a new paradigm for work, it will be more difficult to predict a morphological model to follow in the future. If this trend continues, the movement of people in cities will be drastically reduced.

In the face of climate change, it would be desirable that they influence behavioral practices, more appropriate to the permanence of the urban space and the persistence of the cognitive memory of the population of the historic city, in which pedestrian circulation spaces are privileged, in a less polluted city.

All these factors, whose future is unknown, may appear to us in an unknown way and in a very quick time, influencing the ways in which cities and their respective morphologies will develop, as well as the decisions to be taken.

### Conclusion

In a global society in constant and rapid transformation, with such mutable and unpredictable factors, it is sensible to think of flexible planning strategies regarding urban expansion, but implacable regarding its heritage essence, because in the unpredictability, everything will be open, except the feeling of life and collective memory of communities.

It would be desirable that there be no changes in the historic urban morphologies, for these remain very incisive in the identity of the communities. Likewise, special care should be taken with the destruction of the architectural heritage of cities, as they constitute fundamental references of collective memory.

Whatever the future and the results in the territory, it will be correct to plan the territory to be occupied, using multidisciplinary work teams, and always with the perspective that changes may occur outside any planning, and in these cases, it will be necessary to restart the process in view of the new premises (Figure 6).

The idea of ideal planning is not recent, and already in the 16th century, the genius Leonardo da Vinci projected the ideal city as an organism structured as a whole, however this organism has its own life and external influences always in constant mutation and an image that is always unfinished, because today is no longer tomorrow. "We understand that the intervention actions in this[these] old city[ies], should follow judicious solutions, in the understanding that its working stage is a city that has consolidated social and memory values, which should be associated with the new working objectives, increasing its potential and improvement of practical results of the actions." (Tomé, 2017).

We can only hope that, in the future, the gods will enlighten the minds of the designers and



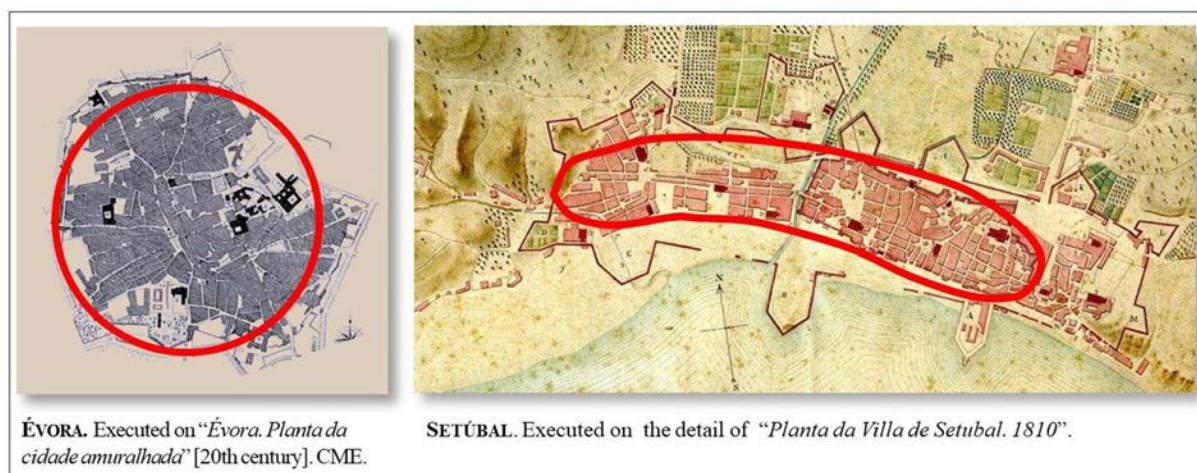
managers of the territory in the most appropriate decisions for the daily and future life of communities, always keeping in mind that there is a heritage that, under any circumstances, as a collective good should be maintained (Figure 6).

Our objective should be the continuity of a society sustained by forces of physical-functional, organizational-intellectual, and practical-emotional balance, for a desirable sociological balance.

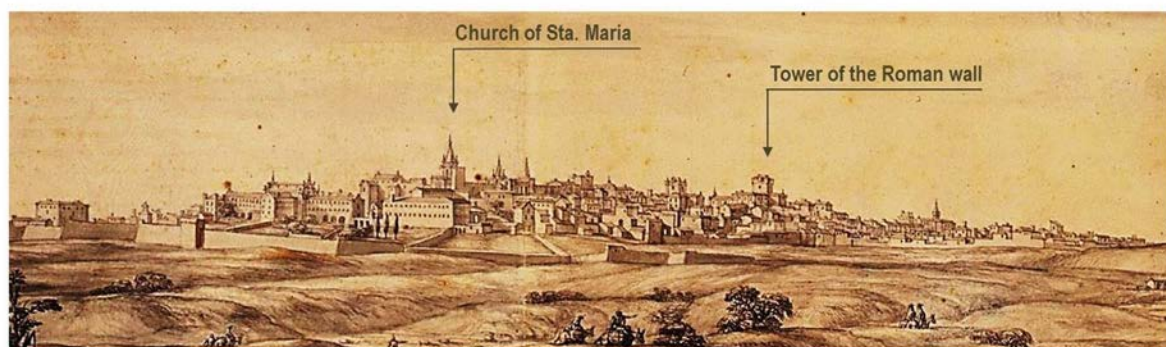
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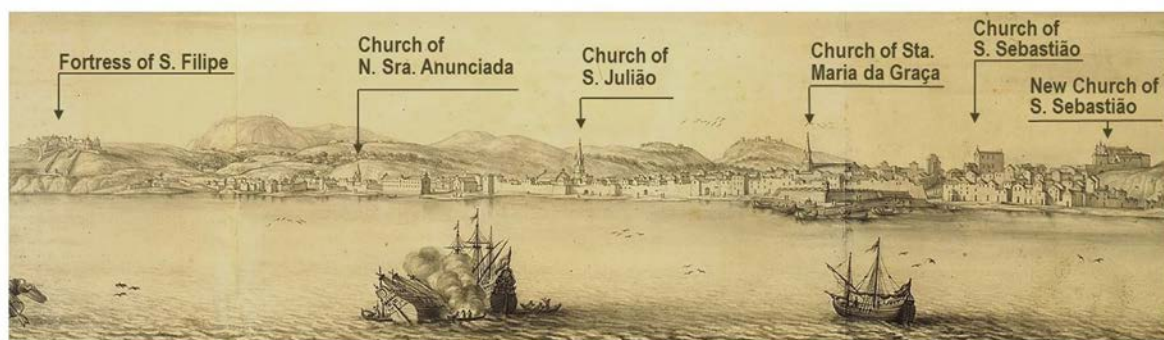
## Illustrations and tables



**Figure 1.** Évora and Setúbal: Urban morphology scheme of these cities.



ÉVORA. Executed on the detail of “*EVORA*”, by Pier Maria BALDI [1668-1669] (Magalotti & Baldi, 1933). BNCF, BML.



SETÚBAL. Executed on the detail of “*Satubal*”, by Pier Maria BALDI [1668-1669] (Magalotti & Baldi, 1933). BNCF, BML.

Figure 2. Évora and Setúbal: View of the cities (17<sup>th</sup> century).



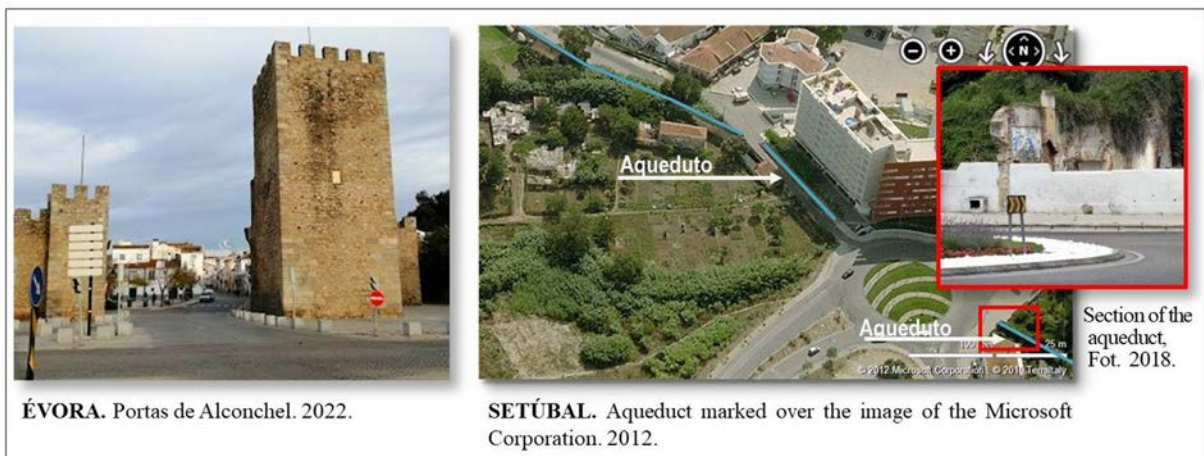
ÉVORA. The urban center on the Presentation Plant, Étienne de Gröer, s/d. CME.



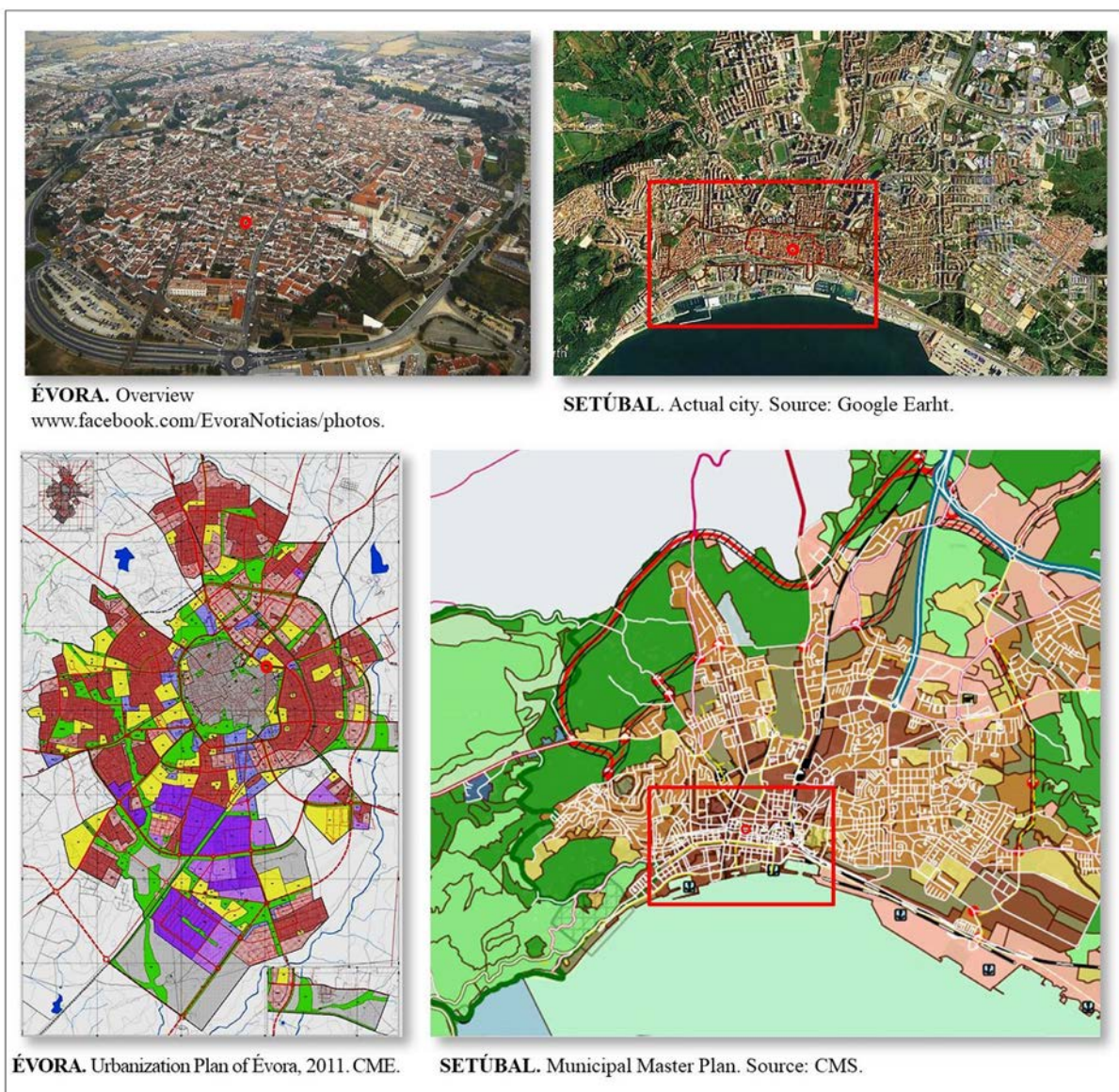
SETÚBAL. Executed on the General urbanization plan of Setúbal, João AGUIAR, 1944. CMS.

Figure 3. Évora and Setúbal: Urbanization Plans (20<sup>th</sup> century).





**Figure 4.** Évora and Setúbal: Examples of cultural heritage demolitions due to cities' adaptations to car traffic.



**Figure 5.** Évora and Setúbal: Nowadays.



Group work, with multidisciplinary teams



Allegory to the 1755 earthquake, João Glama Strobërle, 1755. MNAA.

Figure 6. What will the future be?





## Architecture and culture in cities with a gender perspective. Complex evaluation from antiquity to the present

María Guadalupe Valiñas Varela

Professor of Postgraduate Master's and Doctorate in Sciences in Architecture and Urbanism at the Higher of the School of Engineering and Architecture ESIA Tecamachalco in the National Polytechnic Institute, México

E-mail: arquinova@hotmail.com, mvalinasv@ipn.mx

*Keywords: Urban design, architecture and feminism*

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**Abstract.** Architecture and culture have been linked since ancient times with the outline of the cities that at the time were the product of worldview, mathematics and geometry applied to urban space. The gender role in making a city was apparently defined by tradition, however, not by equality, whose struggle prevails today, where apparently the roles established between men and women have unleashed social and urban conflicts, through various marches and confrontations. Sustainability and care for nature seems not to be the priority nowadays, but to generate profits. The male-female duality and complementarity was paramount in ancient times, as well as communication with mother earth. This study consists of contrasting the knowledge that is transmitted from generation to generation orally and analyzing how roles are currently being read in cities differently and constantly changing. The methodology will have a complex approach that will combine deep hermeneutics, semiotics and phenomenology, through discourse analysis, and urban ethnography through citizen participation, as well as site analysis. The results will be contrasted with various places chosen for their relevance. The conclusions will be related to the concept of social anastylis proposed previously, in addition to the concept of feminism in order to achieve a common restoration based on equity.

## Introduction

In pre-Hispanic times there were several cultures in the formerly called Mesoamerica, very important human settlements of which we can mention, for example, Teotihuacan with the pyramid of the sun, the pyramid of the moon, the citadel, the road of death, among others. There is also Montealbán where there were even tunnels that connected different spaces, in this place, in the background, there are even large stones with female representations of fertility.

Another very interesting place is Tula Hidalgo, where many people say that the Atlanteans of Tula may be women because of the clothing that seems to be related to a woman's chest.

The Mexica culture is also very relevant because it lived in the Historic Center of Mexico City more than five hundred years ago, a place called Tenochtitlán. It is worth mentioning that when investigating there is a manuscript cataloged with No. 72 of the Aubin-Goupil collection of Mexican manuscripts that are currently kept in the National Library of Paris, on the genealogy of the Mexican princes of this culture stands out in the second line Atotoztli, clearly the female partner of Tezozomoc, who seems to have a place in royalty but there is little about her.

These places previously remembered the importance of women in those times, especially for being represented in fertility, social order, in addition to the fact that their presence was very important for culture and traditions.

With the above, the question would be what is happening today with women? Why are there so many marches and protests by feminist collectives? Starting from the hypothetical assumption: The damage to the Heritage of women groups is a reaction also of a social hurt exerted towards women where their participation in society has been made invisible, in addition by the lack of public policies that generate equal rights, gender equity, participation in the work in the city, in addition to fairer laws.

The male-female duality and complementarity was essential in ancient times, as well as communication with mother earth. This study consists of contrasting the knowledge that is transmitted from generation to generation orally and analyzing how roles are currently being read in cities in a different and constantly changing way.

## Theoretical Framework

Without a doubt, questioning ourselves about the actions of a woman in those times invites us to reflect, to ask ourselves if we really know within this colonialism what really happened at that time.

In the different codices that are preserved from the time, as well as ceramics and sculpture, they realize that women, depending on their lineage and trade, performed different actions. Almost all women did the same, they were at home, both those who belonged to the nobility and the people. These last ones had an important economic participation since they exchanged in the "tianguis" products elaborated or harvested by themselves, in addition to animals. (Barcena 2015)

Feminism is part of the 19th, 20th and 21st century, which represents a struggle of women to obtain equal conditions of participation and rights, according to The History of the feminism in Mexico of Galeana:

- French Revolution Olympia de Gouges: The lack of rights of women and citizens is the cause of public misfortunes. 19th century: John Stuart Mill Female slavery "In favor of them neither privileges nor protectionism; all that we ask for is reduced to the abolition of privileges and protectionism enjoyed by men".
- 20th century: great Revolution of women. Rights: labor, education, political, decide on your

body, live free from violence.

- 1869: High School for young ladies. 1883: women demanded a vote.
- 1888: Normal School of Professors. Teaching first recognized profession.
- 1904: Society for the Protection of Women.
- 1915: Divorce Law.
- 1919: National Council for Women. 1923: Elvia Carrillo Puerto, Beatriz Peniche and Raquel Dzib, proposals 1919: National Council for Women. 1923: Elvia Carrillo Puerto, Beatriz Peniche and Raquel Dzib, proposals for deputies.
- 1923 (May 20-30): First Pan American Feminist Congress. 1923 (August 26): Lázaro Cárdenas grants women the same politics as men.
- 1947: Miguel Alemán grants a vote to women, but only at the municipal level.
- 1953: Adolfo Ruíz Cortínez grants full citizenship to women.
- 1955: the first time that women cast their vote.
- 1977: Proclaims March 8 as International Women's Day. 1993: political parties can promote women to elected positions. 1993: first femicides in Ciudad Juárez. (Galeana 2017, 1:19)

Can be sure that the hand of women in Architecture has been very present, however it has been erased for centuries.

A scientific ...las mujeres han dejado muchas menos huellas que los hombres en la documentación histórica. Esta es una de las consecuencias más importantes de las actitudes culturales negativas hacia las mujeres. Si su historia se define como los hechos de los hombres se menosprecian sus acciones, la vida de las mujeres se hace "ahistórica", al vivir fuera del mundo de las empresas masculinas..." (Anderson 2007)

The gender perspective is related to another point of view of things where it is contemplated that neither men nor women are superior, but that feminism is part of seeking substantive equality.

The gender perspective is based on gender theory and is part of the critical historical theoretical paradigm and the cultural paradigm of feminism... gender analysis is the synthesis between gender theory and the so-called gender perspective, derived from the feminist conception of the world. and of life. This perspective is structured from ethics and leads to a posthumanist philosophy for its criticism of the androcentric conception of humanity that left out half of the human race: women (Lagarde 2019, 13)

Feminism is a concept rejected by many, who seek to discredit it by saying that it is the same as machismo, but in the opposite way, however, its definition focuses on generating the same rights, the same opportunities for men and women, taking into consideration that women have been the most vulnerable throughout history. Women have suffered for centuries different violence as we see below:

Violent acts are read in different ways in different cultures. In the United States, marital rape did not become a crime until the 1970s, and it was not until 1993 that the marital exemption from the rape law was removed in all states. Laws define and frame actions, but the visceral shock of violent acts, of being forcibly beaten, injured or raped is not uniquely human." (Hustvedt, 2017, 357)

In the case of Mexico, the participation of women in different levels of society is recent, such as the right to vote itself, which was given in 1955 after a tireless struggle by many feminists of the first wave that began in 1916 in places like Mérida Yucatán where the first Congress on feminism was held, Hermila Galindo was one of the most important promoters at that time who fought for the right to vote, divorce and participation in politics, as well as the right to freedom. Below are some important events in the social life of women in Mexico:

"The first world conference on women was held in Mexico, in 1975, during the International Year of Women. The event was linked to the strategy with which the government of Luis Echeverría Álvarez sought to improve the international valuation of the country in human rights issues, deteriorated after the "Tlatelolco Massacre" in 1968. Around this event, several exhibitions and activities that reviewed the place of women in Mexican art. The images that shaped the story of each exhibition created a zone of questions and representations that, in some way, invaded the city. the plastic arts and the Poliforum Cultural Siqueiros, Pintoras and sculptors from Mexico. paintings had been made by men" (Giunta, 2019, 137)

The foregoing is extremely important because it can be seen how even art and painting exhibitions with themes towards women were only carried out by men, how the important murals of the Palace of Fine Arts are and the same happened with Architecture. Cases like that of Angela Gurria were constantly repeated in history, she, who is currently one of the most renowned sculptures, had to sign in her beginnings as Ángel Gurria.

Therefore, women have sought to be treated in the same way as men, but how to address the concept of equality if we are all different?

Gender equality. That an urbanism is authentically egalitarian means that it is authentically democratic, a concept of modernity that is still trying to fully unfold. It has been obtained to a greater extent in some countries and periods of the 20th century, but it has generally been incomplete and insufficient, transitory and not fully consolidated. Let us not forget how incomplete democracy has been: until a few decades ago women's suffrage did not exist. (Montaner, Muxi 2017, 214)

The condition of women has been very difficult in our capitalist system dominated by men for decades, it is only at the beginning of the 21st century that things begin to change for women with concepts such as equality, gender perspective. The latter arises from feminist epistemology to achieve equal participation between both sexes both in politics and in social life, but this is clearly explained by Marcela Lagarde in her book "Gender and feminism":

The patriarchal political condition of women.

The economic exploitation of women is the basis of their erotic, reproductive, affective, intellectual and cultural exploitation. It is therefore a source of power for men and all people (even women), and the institutions that benefit and obtain profits from the extraction of work, value, services and goods from women. Society also benefits because, through their work and other activities, women contribute to the growth and development of basic aspects and areas of the economy, society, culture and the political system". (Lagarde, 2019, 72)

Women have always been dominated by men in many aspects, they have been the ones in charge and designated to take care of the children as well as to be at home, while domestic work is not considered or recognized. They face tasks that are strenuous and that do not have rest, they serve as the center of union in the family, and their performance is related to the reproductive function.

The dominance of men over women:

Men have the power to include women in the social boundaries of the world and in their own lives. Men can take and leave women almost whenever they please, they can include or eliminate them from their homes, from their partners, from their families, from their lives, and of course from State institutions, as the almost exclusive management of men. If they include women in the social spaces of power, they do so as a condition of public obedience that, with its own rules and ways, corresponds to the private obedience required of each woman in a domestic, conjugal and family way". (Lagarde, 2019, 82)

Various theorists such as Pierre Bourdieu with his book "Male Domination", Abilio Vergara with

texts such as “Las Infieles” urban ethnography that accounts for the behavior of a group of women who face social norms and established codes. By breaking with them they are excluded and rejected by their own group.

The division between the sexes seems to be “in the order of things,” as it is sometimes said to refer to what is normal and natural, to the point of being unavoidable: it occurs at once, in its objective state, both in the thing!i (in the house, for example, with all its “sexed” parts), as in the social world and, in an incorporated state, in the bodies and habits of its agents, which function as systems of schemes perceptions, both thought and action. (Bourdieu 2000, 21)

It is also Blanca Valdivia who addressed the concept of androcentric urbanism in her texts as seen below:

The public-private dualism configures the space by segregating it according to these two spheres and assigning it specific functions (productive-reproductive), to which generic categories (male-female) are also attributed. However, this dichotomy has not been a historical constant, but has its origin in the beginnings of the capitalist system and is a consequence of the sexual division of labor. (Valdivia 2018, 66)

## Methodology

The epistemic framework made up of the ontological part and epistemology form the course to reach knowledge in an investigation in which there is an approach to the problem. Ontology studies the being from our own existence to everything that can be our reality and the haptic ontic that it represents by the entities that can materialize and touch, with the above it can be questioned how a space or the circumstances of life in the city, or as it refers to the space meaning concept attributed to Mario Camacho Cardona in his book “Semic space” addresses the aforementioned from a correality that explains how the same space, the same reality, the same circumstances can be significant in a different way between various individuals.

Cardona explains the following to understand the symbolic field, with several levels, such as:

- Ontic, with the qualities of matter, such as textures, colors, shapes, qualities of material, etc.
- Ontological, qualities of beings in their substance and their parts.
- Pragmatic, aspects of life and subsistence of beings and their relationships with physical and chemical aspects that allow them to live.
- Dialectic, within the Platonic dialectical conception of integration is a whole of “N” parts. Where the compositional dialectics will allow us to design the space and objects for the playful symbolic fields.
- Existential dialectics, by remaining in the time of objects. The same symbolic field requires a series of conditions that allow that permanence.
- Aesthetic, correlational estimates that allow assessment within the categories of: beauty, grandeur, majesty, etc. All the existing elements of the ludic field.
- Semantics, which will estimate the conventionalized socio-cultural conditions of society. (Camacho, 2006, p. 115)

Then, the signs rather than those that can explain how a set of circumstances, events or images give context to a different reality for each individual, so where to find the explanation for a phenomenon is complex because one’s reality is not the reality of the other being still apparently the same. It is for the above that the complex thought promoted by Edgar Morin is used, who approaches or proposes the investigation with different methodological approaches and principles based on the hologrammatic means going from the whole to the part and from the part to the whole, recursion, contradiction and the dialogue to generate knowledge and reach the truth. As Edgar Morin puts it, “I am in search of a possibility of thinking transcending



the complication (that is, the unspeakable inter-reactions), transcending the uncertainties and contradictions". (1990, 143)

In these questions to think and find answers, other methodologies are included, such as the urban ethnography of Guillermo Cantor Magnani, which contemplate actors, scenarios and rules studied from the space from the inside out. This methodology is applied through interviews and tours to recognize the cultural stains of the spaces, as well as the trajectories of the actors. When interacting and knowing its characteristics, semiotics and deep hermeneutics proposed by John B. Thompson can also be applied as a means of analysis. which has three phases 1) socio-historical analysis 2) form and discourse and 3) interpretation and reinterpretation.

Semiotics with concepts such as those of Luri Lotman mention a given semiosphere, an environment of significance that surrounds the individual from three important aspects: the signified, the signifier, and the object to be signified. From the above, it is possible to start working on a complex methodology that tries to respond to a social problem in Mexico in which women have been erased from history and made invisible in their activities and social participation dominated by the system and in many cases His actions are not understood today. It is difficult to understand why heritage is damaged? Why are monuments scratched? Why do marches take place? Why don't women go to work and make a national strike in 2020?

Discursive competence, also in the personal and idiosyncratic activity of memorizing one's own semiotic experiences, is an activity of extracoding. There are phrases and entire speeches that we no longer have to interpret, we have already experienced them in analogous contexts or circumstances. (Eco 2011, 214)

Women start a fight, break patterns, break the rules, confront women against other women who in many cases are policewomen designated by the state to contain women who fight. And in this contradiction explaining the phenomenon is profoundly complex. They begin to hear phrases like the following "a stone is more important than the life of a woman for society and for the Government" "they are offended that we fight, but they are not offended that they assassinate us", among many others.

The deep hermeneutics through its phases helps us to interpret a socio-historical context loaded with inequities, which multiply as texts in the streets whose monuments seem to be part of the paper of a book the speech goes around in the claim to the state to the authorities who should be in charge of not allowing abuse or violence. Interpreting and reinterpreting also represents a way of unlearning what has been learned and re-educating ourselves as a society in which we can understand the root problem without disqualifying it.

Measurement and analysis

In this research, several methodologies were included that make up a complex methodology, contemplating women as part of a unit that makes up more than half of the population both in the country and in various cities. We began with tours in the historic center of Mexico City after the marches of March 8 and 9 and it was possible to see damage to various monuments which had various messages through graffiti. messages such as "the police rape", "Mexico beautiful feminicide", "the state covers up rapists", "the police do not take care of me, my friend takes care of me" among many others.

Through semiotics we identify that space is the meaning of the struggle, and generates a semiosphere of expression before a system that dominates and exercises control based on submission and inequality. The cries of pain are heard and read in those canvases that are part of the urban landscape and the historical heritage that are part of the history of a country that does not allow the expression of freedom and justice. A country that subjects women, silences

them, and violates them physically, symbolically, and structurally.

The actors are those women marching, demanding justice, the stages are those marks of the place that for centuries were a reflection of the majestic architecture and economic power and the rules are set by the government where attacking Heritage is a crime punishable by law, but assaulting a woman, raping her or murdering her is part of our daily reality.

As of 2020, different groups tried to channel what was happening in a positive and artistic way to give messages to society of urban transformation. They did it through urban murals on the curtains of commercial premises in the historic center of Mexico City.

The expression and appropriation of the space of these groups is related to iconoclasm. Feminist groups claim the right to decide with green handkerchiefs, pro-life groups claim the right to be born with blue handkerchiefs and doctors pronounce themselves with the concept of "conscientious objection", reflecting a diversity of thought, where to agree with any posture is very difficult. Rethinking our reality, re-educating our societies, breaking paradigms and established norms, modifying learned behaviors seems to be an impossible task that requires many theoretical approaches, the help of many disciplines, and social and urban work.

Among the findings were several feminist groups that appropriated the space and some buildings, for example, the case of the National Human Rights Commission in the Historic Center of Mexico City that was occupied by a feminist group called OKUPA on 7 September 2020.

On March 8, 2019, as part of the commemoration of International Women's Day, the Palace of Fine Arts changed its social dynamics by being and becoming one of the meeting places for all women in the country. On March 9, 2020, the Palace of Fine Arts was the nerve center of the national strike of all the women in the country who decided not to work that day, it was a historic event that turned this space into a meeting place as a mark and seal of feminism.

The anti-Monument placed in front of Palace of Fine Arts represents those silenced cries and faces a building that represents an androcentric patriarchal system characterized by power and lack of Justice.

## Conclusion

The foregoing gives us an account of the existing reality that exists in the country, and that at this time is also part of a social claim, as well as a cry for help from many women who have experienced violence of many kinds such as domestic violence, sexual violence, psychological violence, physical violence, and all of the above as part of a structural violence that is allowed and accepted by everyone who makes it look like something natural, normal, and part of everyday life.

Promoting social change is easy, but generating it is extremely difficult. What used to be an important place of reference for Architecture, such as the Palace of Fine Arts, becomes a symbolic and social place mark.

During these works, a very important event was held at the Higher School of Engineering and Architecture that shows that not even the ancestral ball game is properly only for men, with this gender role paradigms are broken.

The result is related to the need for a reconstruction of more equitable societies with a better quality of life and according to this research work, a neologism called *social anastylisis*<sup>1</sup> is proposed, which considers women as a support column of society when symbolically comparing

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<sup>1</sup>Related to social restoration considering women as an important pillar of society where public policies for promote equity and equal rights between women and men

the damage to heritage with the damage suffered historically and manifested in recent times in a violent way, and that, like this restoration technique, requires methodical studies by different disciplines to find solutions, where their problems are considered fairer with laws whose purpose is to reintegrate them into the social fabric, as if they were stones for architecture.

Reviewing the historical past is an option to recover the identity as warrior women, in those cities where men and women complement each other as part of a system that promotes equity, rights and opportunities for all those who inhabit the space.

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**Figure 3.** On the left, a fragment of the genealogy of the Mexican princes. The emperors Itzcohuatzin and Motecuhzoma Ilhuicamina and their descendants. From the right side, a possible tlatoani woman of that time, approaches Atotoztli. Own drawings March 2022





**Figure 4.** Temporary murals at the back of Palace of Fine Arts. July 2020. Personal archive of July 2020.



**Figure 5.** Exterior of the CNDH Historic Center of Mexico City. Taken by the OKUPA feminist group, black block. Photograph taken on August 7, 2021





**Figure 6.** First female ancestral ball game held in the Mexican Republic in commemoration of International Women's Day in March 2022 and the 100 years of the ESIA IPN.



## The city of the dead: an in-vitro city. Rethinking Liège starting from cemeteries

Giovangiuseppe Vannelli<sup>1</sup>, Marc Goossens<sup>2</sup>

<sup>1</sup>Dipartimento di Architettura. Università degli Studi di Napoli "Federico II". Via Forno Vecchio, 36, 80134 Napoli

<sup>2</sup>Département d'Architecture. Université de Liège. Boulevard de la Constitution 41, 4020, Liège.

E-mail: <sup>1</sup>giovangiuseppe.vannelli@unina.it, <sup>2</sup>m.goossens@uliege.be

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**Abstract.** The contribution is rooted in the interdisciplinary research "Rethinking lastscapes Perspectives" carried out at the University of Naples 'Federico II'. Through different gazes, the current complexity of burial places is investigated searching for new forms and roles in the urban fabric. Out of the historical city centre, cemeteries are standing as cities surrounded by the contemporary urban fabric: the "city of the dead" is here proposed as an "in-vitro city". Multicultural societies are facing rapid changes while the progress in burial techniques and instances related to ecology and sustainability are arising. These are some of the reasons why the perception of the "city of the dead" is changing and their modern urban structures have to be rethought. Then, it is necessary to investigate the latter in relation to the "city of the living" considered in its urban fabric and its more recent urban elements. The recognition of new values in cemeteries is absolutely urgent for the preservation of these heritage but also for the urban quality of the surrounding neighbourhoods, generally marginalized and peripheral. Through the city of Liège, it will be shown why it could be possible to rethink the "city of the living" starting from cemeteries.

## Introduction

Nowadays cities are waiting to be redefined, waiting to find balances based on new relationships between humans and their environment. Therefore, the latter is considered as a landscape that is both lived in and shaped by communities. It is a landscape with which the inhabitants find intimate and deep connections. This landscape induces new practices by moving from the status of an object to be consumed to that of a subject to be considered and respected (Gemenne, F., Rankovic, A. and Atelier de cartographie de Sciences Po, 2019). It is fragile and ever-changing; it is acquiring attention and needs to be cared for (Besse, 2018). The landscape is regaining significance and on it a collective culture is being rebuilt today: it is now assumed as an inclusive landscape that becomes a societal project.

This change of dialectic implies a change of paradigm in the way of understanding, conceiving and managing the organisation of territories (Clergeau, 2020). The rise of modernist orthodoxy in urban planning since the 1950s has turned a blind eye to all other currents of thought, reducing the question of the spatial organisation of the city to a few rational principles of functional optimisation and infrastructure enhancement. The practice of zoning has sought to minimise all conflicts related to proximity between 'antagonistic' activities, but at the same time it has segregated parts of the territory by cancelling the links that guarantee the interrelationship of the materials that make up the city; in other words, the very condition of their existence.

On this basis, the contribution focuses on cemeteries by referring to the interdisciplinary research "Rethinking lastscapes Perspectives (R.I.P.)" carried out at the University of Naples "Federico II". The research aims at understanding and questioning the role of the "city of the dead" within the contemporary city (Vannelli, D'Agostino and Occhiuto, 2021). Those citadels represent a rejected heritage (Masullo, 2004) even though in the last century they have been encompassed by the contemporary city due to the dramatic urban sprawl dynamic. These phenomena, which have characterised more or less all the medium-sized and large cities of European countries (De Leo, 2006), are on the one hand the spatial consequences of the heterotopia concept theorised by Michel Foucault (Foucault, 1967) and, on the other hand, the premises to be assumed in order to reinvent the relationship with death from a social, cultural and, above all, urban point of view.

Taking into account several different values that can be outlined in them - besides the exclusively memorial one - cemeteries are considered emblematic places endowed with a strong potential in a perspective of spatial reorganisation of urban systems and redevelopment of the landscape. Thus, within this contribution, cemeteries are interpreted as cities and ecosystems: "in-vitro cities", morphological urban structures inhabited by both human and non-human beings and well representing the more complex "city of the living".

In order to understand the meaning of the cemetery intended as "an in-vitro city" and to verify on a real case study the potential roles of these heterotopias within the contemporary city, the contribution proposes a particular context of experimentation. As this contribution is part of the R.I.P. research but benefits from the collaboration of the Laboratoire Ville Territoire Paysage (LabVTP) at the University of Liège, the Liège metropolitan area – currently interested by the drafting of the Schéma de Développement Communal – is taken as a case study.

## Methodology

The bibliographical research and the study of past and present approaches and solutions in Western Europe (Ragon, 1981) enable a broader perspective to be adopted by providing a theoretical basis for the evolution of practices, funerary symbolism and the cultural significance

of cemeteries, as well as for their design (Franciosini, 2022). In this way, it is possible to set up a wider reference framework of the experiences carried out. In this sense, the research R.I.P. consists of three main steps: firstly, a broad socio-cultural and technical investigation in order to define a new possible common ground (Felicori, 2005); secondly, an exploration of several cemeteries across Europe considered relevant to the topic (Franciosini, 2011); thirdly, an in-depth analysis of the main case study in which to develop strategies and guidelines (Coutts, Basmajian, Merriam and Salkin, 2013).

The topic of burial spaces is questioned in relation to the current profound social and cultural changes (Omenetto, 2020). The liquid society (Bauman, 2000) of the new millennium is more and more nomadic (Makimoto and Manner, 1997) and multicultural (Strappa, 2005), both these factors lead to a significant modification regarding rituals (Han, 2021). Such changes related to the intangible legacy of cults, practices and rites are manifestly having strong repercussions on the built heritage (Bialestowski, 2012). Indeed, it appears that in contemporary society there is no longer space and time for death (Heathcote, 1999) and, as a result, care practices for both memory and places erected to represent it become increasingly rare, until they disappear. The phenomenology of this shift is embodied, on the one hand, in the state of abandonment and degradation that characterises entire cities of the dead and, on the other, in an understanding of the cemetery as a repository that materialises in architectural and landscape projects - often lacking in quality - built for the mere purpose of storing more deceased people. Beyond these socio-cultural conditions, and its architectural implications, the new technical possibilities in terms of burial practices also have remarkable impacts on the built heritage and its management: i.e. practices and proposals such as resomation, eternal reefs, boschi vivi, capsula mundi, etc. (Vannelli). Thus, only a multidisciplinary approach to research on the topic can enable the development of design scenarios and guidelines in which burial techniques and spatial conception of the memorial sites evolve together, in this sense the work carried out within the DeathLab at Columbia University is exemplary (Rothstein and Staudt, 2021). Therefore, with respect to these social, cultural and technical conditions, the design of burial spaces cannot but evolve by exploring new horizons and modifying the theoretical boundaries in which it has been confined for so long.

In this direction, R.I.P. research, in addition to focusing specifically on the case study of the cemetery system of the Poggioreale hill in Naples, investigates international cases in which to seek out hints of innovation that challenge the notion of the monofunctional cemetery intended as a "heterotopia of deviation", namely an enclosed and excluded "other city" (Foucault, 1967). Based on these two morphological conditions - closure and exclusion - in the research framework, cemeteries are understood as 'in-vitro cities'. Taking into account that in-vitro means "outside or isolated from the living organism and in a test tube or other artificial environment" (Agnes and Guralnik, 2008), this expression refers to two characteristics. On the one hand, it refers to the specific condition of isolation of a 'microcosm' that is self-sufficient even though it is a representative part of the organism - in this case, the city of the living - from which it has been ejected (i.e., *mit à l'écart*, in French). On the other hand, the innate vocation for experimentation is meant to be brought forward, facilitated by the presence of a reduced number of elements, albeit representative of the urban system in its complexity. Furthermore, the progressive denial of both of the above-mentioned characteristics - being outside or isolated and the existence of a 'test tube' - is assumed as what puts these places in a fruitful condition for the project. In this sense, it seems useful to focus on two fundamental aspects: firstly, the in-vitro city of the cemetery has its own complete and autonomous morphological structure that can be studied in itself; secondly, the in-vitro city, despite being placed *à l'écart*,



always has at least a physical connection with the “living organism” of origin. The road that leads to the burial site, which originally guaranteed its expulsion, today generally becomes the spatial premise for a re-evaluation of the cultural and sacral link that, even if weakened, holds together the living organism (the city) and the test-tube (the heterotopia).

With these premises, investigation through historical maps is of utmost importance in order to trace those direct links that played a significant role in determining the positioning of these heterotopias and hence to understand the evolution of these relationships. In addition to roads, urban walls, extra-moenia monasteries or other possible direct links that can be traced, indirect links - or regulatory systems - must also be sought because they also have conditioned position, form or relations with other elements (i.e., the geographic structure of the territory, urban fabric and possible phases of expansion, rituals related to the practised cult, etc.). Therefore, the descriptive analysis of the morphological structure of the city, its natural regulatory elements, its constitutive reasons and logics, and its mechanisms and dynamics of transformations allow an understanding of cemeteries evolution within the history of the city formation.

Beyond this, the combined use of descriptive and interpretative diachronic methods of reading morphological structures and characters through history, the highlighting of sensorial and perceptive values through individual and collective field work, and the understanding of narratives and connotations through documentary research, investigation and dialogue, open up the possibility of filling the existing gap between past heritage and present needs. These multidimensional approaches allow us to gain a deep understanding of the territory and the landscape in their dynamics of transformation, in order to subsequently test them in terms of future opportunities. Moreover, with the aim of understanding the recognisable and recognised intangible values in the area under investigation, wherever possible, also the tool of the survey is integrated into the methodology. Thus, observation, description and perception through the senses reveal cemeteries’ anthropo-spatial characteristics and qualities.

The methodology developed in this research also relates to uses. Beyond the function as a place for burial and commemoration, there are various uses detectable in and around the cemetery enclosure. From this reading derives a complex system of uses that hybridises sacred and non-sacred functions, activities related to funeral rites and others. This must be investigated in order to be able to select parts more available to be transformed - for instance, underused areas, both inside and outside the cemetery - or to identify possible “sparks” that can become pretexts for the project, triggers for transformation.

Therefore, with the aim of observing and describing the territory prioritising the availability for transformation, the study is conducted by first of all distinguishing within the cemetery the areas for each type of burial, since different spatial conditions and possibilities of use correspond to them. In addition to the uses described so far, there are two fundamental characteristics to be described and mapped that relate indirectly to the category of uses: the type of vegetation and the degrees of abandonment. Both parameters are interesting when investigated both in and around the cemetery as they frequently constitute the most available areas for the modification and reinterpretation of the cities of the dead. Plant heritage and abandoned architectural heritage are often the ones of which wider communities are able to recognise a latent and unexpressed value that requires design intervention as a trigger for a more open vision of these heterotopias.

In conclusion, a review of the main strategic plans and urban projects highlights the quite pervasive lack of consideration for these fragments of the urban *craquelé* (D’Agostino and Vannelli, 2018) within territorial strategies and therefore also of studies on their potential for urban re-composition. In this sense, the last two steps of the methodology are the most project-

oriented. On the one hand, the cemetery is analysed in the context of visions and strategic planning that are being drafted or adopted. On the other, the construction of new imaginaries is encouraged through site visits aimed at the construction of new auto-geographies. Inducing communities to observe places through different lenses and making them adopt a project-oriented attitude can determine a cultural evolution that may lead to the hypothesis of new shared scenarios.

The general methodology outlined so far is to be understood as a frame of reference that, in relation to each case, delves more deeply into or skips certain phases due to specific interests or unavailability. On this basis, a critical analysis is carried out by testing the city of Liège in order to highlight the potentials that cemeteries hold both as a place that takes distance from the city and as part of it. The purpose of this project is to open them up to new imaginations, to new ways of seeing these places, which until now have been considered as closed places.

The case study of Liège is approached prioritising morphological investigation (Gerber, Iseli, Kurath and Primas, 2021) as it is considered to be an emblematic case demonstrating the urban condition of the cemetery as outpost. This notion is proposed in relation to the multiple phases of the urban evolution of European historical cities in which the initial externality of these sites is denied by the urban sprawl phenomenon that has characterised urban areas over the last two centuries. The dichotomy city of the living and city of the dead is investigated in this logic and in order to understand the possible roles of these heterotopias in the contemporary world, starting from the detectable gap between the will of exclusion and the permanence of morphologically structuring connections. Thus, the Belgian case study clearly demonstrates the shift from “the cemetery as an outpost” to “the cemetery as a background” (*un arrière*, in French).

### Measurement and analysis

A combination of four factors have conditioned the establishment or resettlement of cemeteries in the urban area of Liège, have determined their role in shaping the urban form and have characterised the type of relationship they have within it, namely the promulgation of the first republican decree on cemeteries and the subsequent laws, the increase in urban sprawl correlated with the topographical specificities of the Meuse valley, the consideration of cemeteries as places to be distanced from the city centre and to be enclosed and finally, the specificities of the Belgian administrative division.

In accordance with the law-decree of 23 Prairial Year XII promulgated in 1804 by Napoleon Bonaparte, burials can no longer be organised around religious sites, within these sites or within hospitals (Iszatt, 2018). From then on, burials had to be performed exclusively in specifically dedicated spaces located at a minimum distance (35 metres) from the city walls. Cemeteries, organised in individual graves and respecting precisely fixed dimensions and distances, will be enclosed by walls at least two metres high and preferably placed on the highest ground facing north; from now on, “one goes up to the cemetery”. As a result, cemeteries were among the first acts of peri-urbanisation blocking off some lands at the beginning of the first urban extensions outside the city. The application of these measures radically altered the relationship between the city and the cemetery, which became a space set apart from urban life: a relegated space. Existing cemeteries that do not comply with the law will be closed and kept in good condition for five years before being leased by the municipality for the only purpose of seeding or planting. These were the first planned public actions for the (organic) regeneration of cemeteries. Then, in 1932, cremation was accepted in Belgium, and burial practices changed. These new ways of dealing with mortal remains diversified the landscape of

cemeteries and widened the range of their facilities.

The extraordinary urban growth experienced in the 19th and early 20th centuries confronted the municipalities of the Liège industrial basin with a scarcity of land suitable for construction. With its narrow and tortuous configuration, the valley results in a restricted flatland, also occupied by multiple branches of the river and its main tributary. The valley absorbs their fluctuations until they are brought together and channelled through major interventions from the 1850s onwards. The city had no choice but to move upwards. Cemeteries, in search of large, flat land with possibilities for expansion, were often the first to be displaced. They were pushed directly up onto the uplands, or with a first stage on the intermediate levels, creating an increasingly large gap with the historical settlements. This separation was accentuated by crossing the slopes. These cemeteries, the first to be established, are ideally located on the slopes overlooking the town, with their monumental entrance facing the path rising from the valley via the talwegs. These less steep paths will also quickly become the main directions of the urban expansion, also regulated by the constraining topographical conditions. Consequently, cemeteries are at the same time distant from the historic living centres, but linked to them by initially fragile umbilical cords which gradually became major elements of the urban structure. Cemeteries are gradually being surrounded by the increasing urbanisation. Although strategically located in the geographical centre of new neighbourhoods, they are actually placed in a situation of physical rupture with them.

The territorial layout and the diversity of Liège's cemeteries is also the result of the administrative regrouping under a single body of ten municipalities that were managed autonomously until the Belgian law on the merging of municipalities in 1977. In this framework, each local authority sought to meet its specific needs in its own territory. Thus, the former municipal area of Liège - accounting for more than half of the population grouped together over the course of time (136.000 inhabitants out of a total of 230.000, whereas the average of the others is close to 10.000 inhabitants, with 22.000 for the largest) - acquired two large cemeteries. The first one is on the edge of the plateau on the right bank and covers 40 hectares (Robermont cemetery) while the second one covers 20 hectares on the edge of the plateau on the left bank (Sainte-Walburge cemetery).

The oldest, Robermont Cemetery, was founded by municipal decision in 1797 (two years after the 1795 annexation to France and in anticipation of the imperial decree), taking advantage of the large walls surrounding a former abbey to prevent the proliferation of disease. Originally divided by hedges into three parts reserved for the three religions: Catholic, Protestant and Jewish, the cemetery was extended and developed many times. Despite the removal of the dividing hedges in 1874 and the abandonment of the geographical distinction of burials, the cemetery is still characterised by these differentiated areas, notably because of the specific orientation of all the tombs still present. The "Père-Lachaise" of Liège (Mezen, 2000), which is presented as an immense park, retains the traces of the different settlements and layouts influenced by the particular designs of their time and will perpetually house the most famous citizens.

The Sainte-Walburge cemetery was created in 1874, in particular to compensate for the lack of space due to the former cemeteries at the bottom of the valley were closed. It echoes its predecessor on the other side of the valley and gives a final resting place to other more contemporary personalities from Liège. It is designed as a large urban park, originally on a radial layout and in a second phase following wide, smooth curves supported by a large central avenue. This basic hybrid structure was completed as the extensions were made by adjoining satellite parts.

These two major cemeteries, made by addition, have become more complex over time, to the point where they have lost their legibility.

The cemeteries of the peripheral villages, which are much smaller in size, respond quite strictly to quantitative needs and aim above all to rationalise the land to the point of eliminating all forms of vegetation. Only the entrance building and a few funerary monuments of the most distinguished families emerge and break the general monotony in some places. Rows of poplars, cypresses or black locust trees – all species with a minimum width – replace the high walls, when they are not reduced to simple metal trellises which at least have the advantage of guaranteeing the visual permeability of these community places.

The peripheral municipalities on the right bank all experienced the same mode of expansion as Liège, rooting themselves in their historic core on the banks of the river and then moving upwards through the lateral valleys. The convex orographic feature of this promontory, which is located at the confluence of the Meuse and Ourthe rivers, leads to the natural convergence of these entities at the top of this foothill of the Herve massif, with their cemeteries as outposts, which are therefore concentrated in a geographically limited area.

Within a logic of overturning their landlocked state, these cemeteries on the right bank, including the largest one in Robermont, have been thought of as a network and are now an opportunity to restore coherence to the conurbation generated by this uncontrolled process. A series of other places characterised by the presence of the relief or resulting from the diffuse mode of development become as many complementary opportunities to strengthen this structuring chain of spaces (the former military fort of the Chartreuse, abandoned buildings, steep wooded hillsides, valley sides, byways, residual, enclosed or under-exploited land, ...). The neighbourhoods of the heights, which all belong to the same plateau, are then reassembled in their new communal entity, while maintaining a strong link with the communities that hosted their ancestors there. The activities associated with the cemeteries (within or outside the walls) also find new dynamics in this scenario, working in synergy with the other functions that animate this part of the city.

The same phenomenon can be observed on the left bank in certain sectors such as the Cointe promontory where the municipalities of Ougrée-Sclessin, Saint-Nicolas and Liège join, or in other towns or large municipalities that make up the Liège conurbation or where Liège meets them.

More generally, the pathways within the cemeteries are organised to serve the whole allocated land area, often by setting out a hierarchy of different paths. Some also have several entrances. These complex networks of paths, positioned in strategic geographical locations, thus offer the possibility of reconnecting the parts of the neighbourhoods that have bypassed them. However, it is necessary to open them up and thus reinstall them at the very heart of urban life, a concept that has been historically anchored in various cultures or accepted more recently by others. Intervening with certain specific architectural projects and reimagining a design for public space by integrating both the specific expectations and needs of the cemetery and giving it a more unitary organisation is certainly a promising path.

## Conclusion

Although, several re-naturalisations, differentiated management and landscape redesign operations have been already carried out in Liège's cemeteries, what remains is to bring these experiments – which have until now been carried out "in-vitro" – to the scale of the city. A first step could be giving to cemeteries a different status, i.e., of a public park equipped with many new and highly evocative places, and a place for social exchange with a strong memorial

and sacred charge. An integrated place where the worlds of the living and the dead meet and balance with nature. The cemetery thus becomes a real agent of urban and landscape re-composition for the long term.

Therefore, looking at the city of the dead as an in-vitro city allows one to recognise it as part of the city and as a field of experimentation that subsequently needs to be reintroduced into "the organism" to which it belongs, the city of the living. In the case of Liège, it becomes emblematic, moreover, how, if the phenomenon of urban sprawl is put in relation to the shift from "the cemetery as an outpost" to "the cemetery as a background", the relations between the city of the living and the city of the dead find an opportunity for profound rethinking. "The cemetery as a background" represents a key infrastructure for the contemporary city seeking directions for expansion. In this sense, the drafting of the Schéma de Développement Communal, operating at different scales, might go further toward the objective of regaining the relationship between valley and heights. In doing so, it is also important to enhance the project-oriented attitude of communities that, recognizing new values in cemeteries, can transform the current cultural evolution into the capacity of defining new future and shared scenarios.

Thus, it is considered that in order to design a sustainable urban form in Liège, within the framework of the Schéma de Développement Communal or other future planning and design means, the role of cemeteries cannot be neglected, even more so when put in relation to the many nearby spaces available to be transformed as underused areas and infrastructures. This system of multiple obsolescence should be both the premise and the pretext for a sustainable project and it is possible starting from cemeteries.

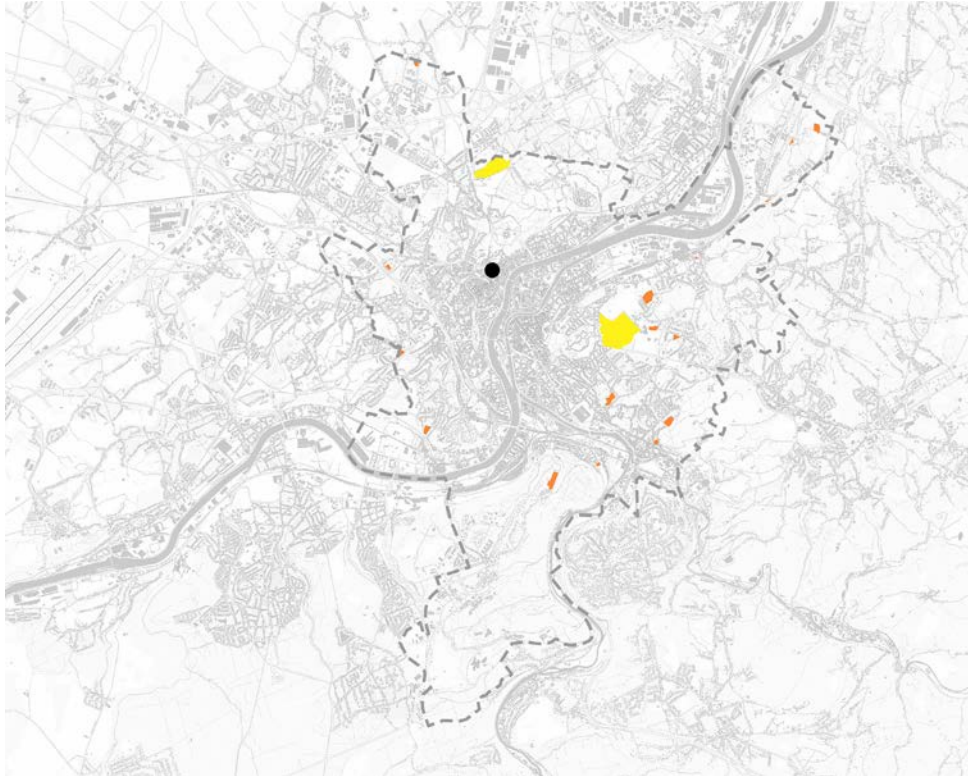
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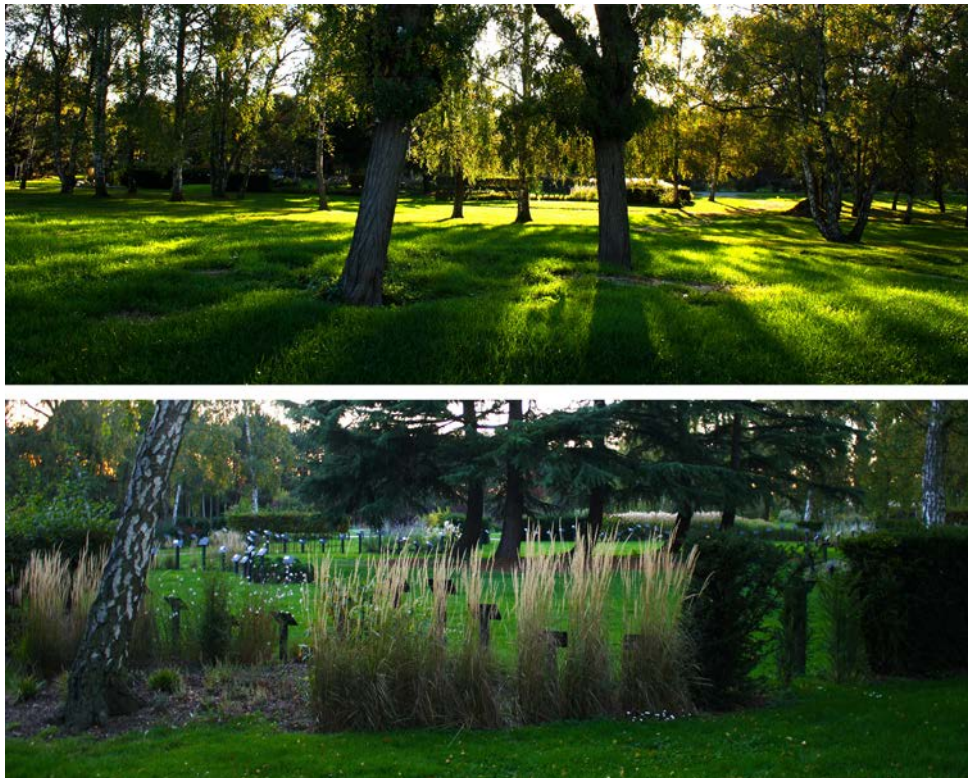


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## Illustrations and tables

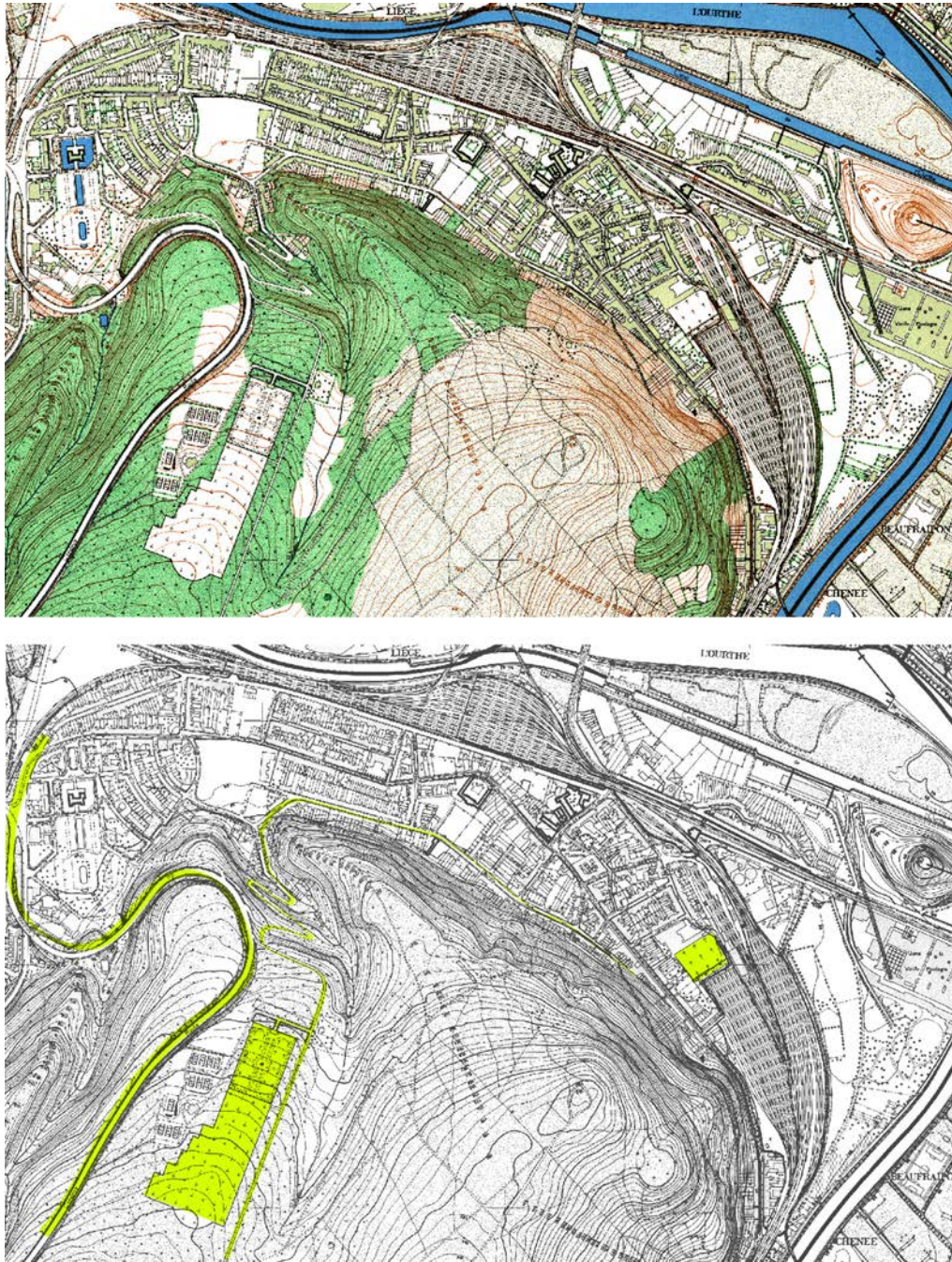


**Figure 1.** Liège: the city centre (black dot), Robermont Cemetery (in yellow, on the right bank), Sainte-Walburge Cemetery (in yellow, on the left bank), the cemeteries of the peripheral villages (in orange). Courtesy of Giuseppe Palmieri and Gennaro Vitolo.



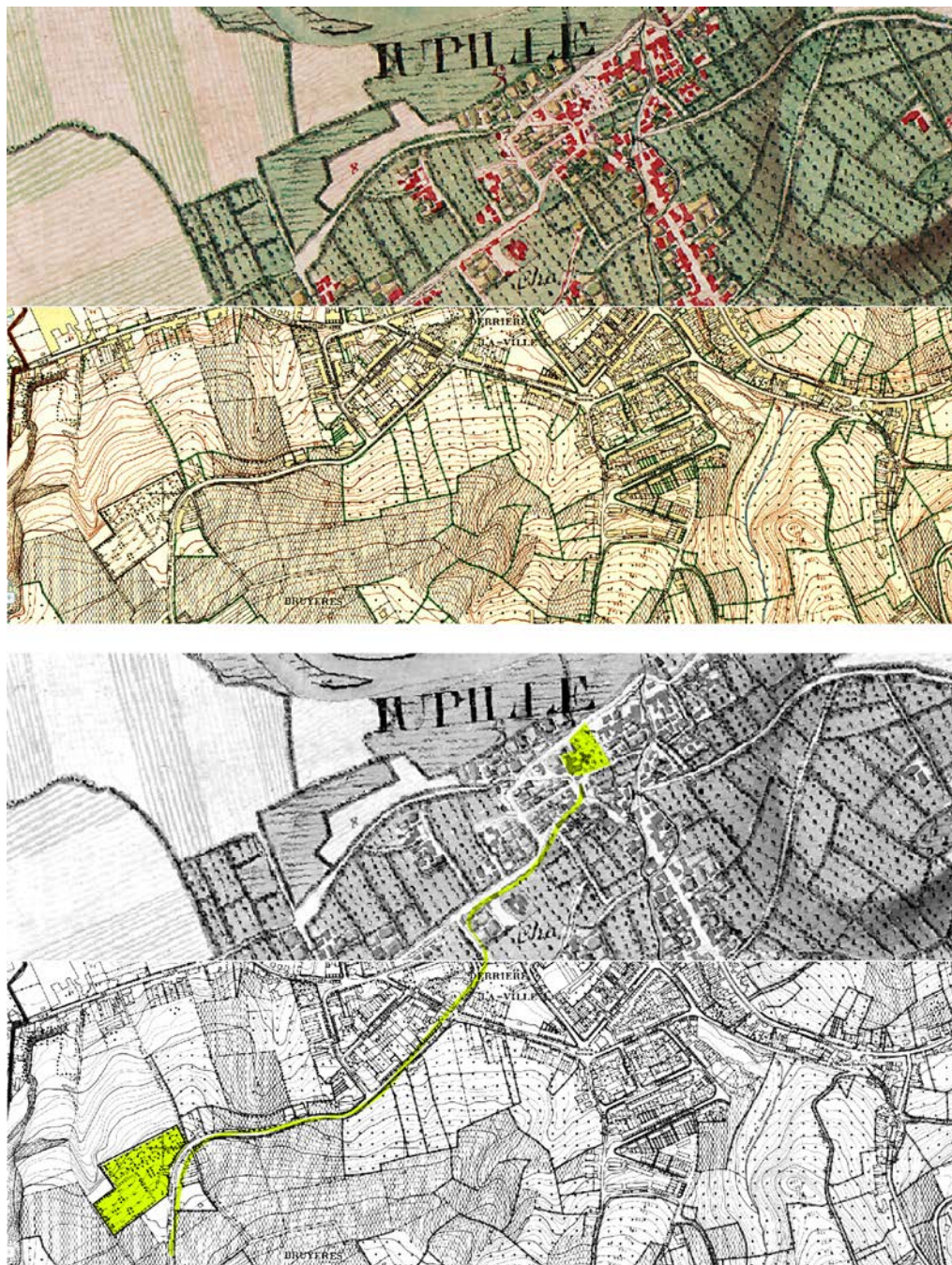
**Figure 2.** The cimetièrè paysager within Robermont Cemetery.





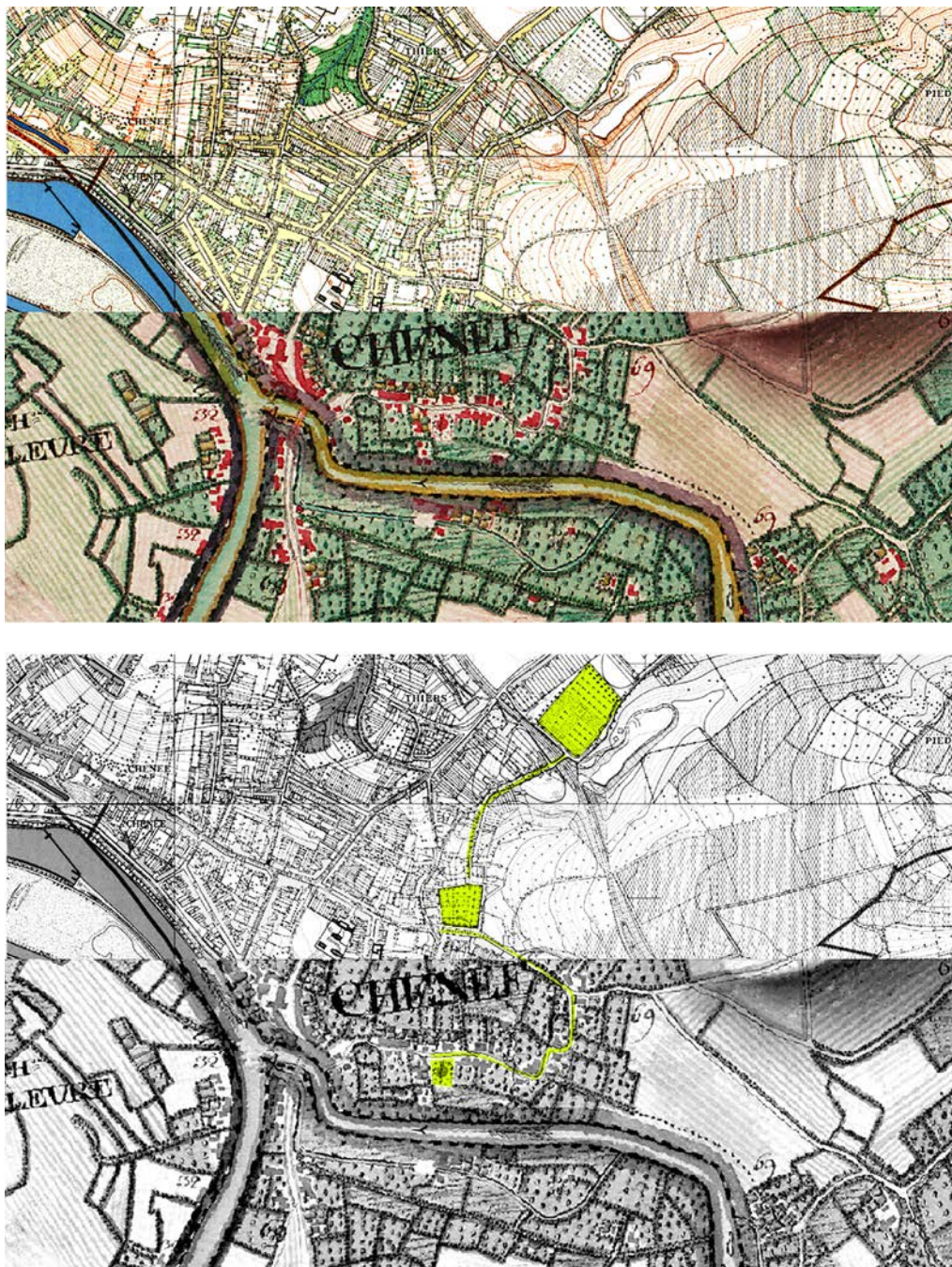
**Figure 3.** Angleur. On the “Plans du Ministère des Travaux publics” (Liège - 1953) are highlighted the historic cemetery close to the church (on the right), the narrow historical street that used to give access to the new cemetery (in the middle) and the most recent street (on the left) giving access to the cemetery. Nowadays, the cemetery’s main entrance is perceived as it is set “on the back” due to the relation with the original path





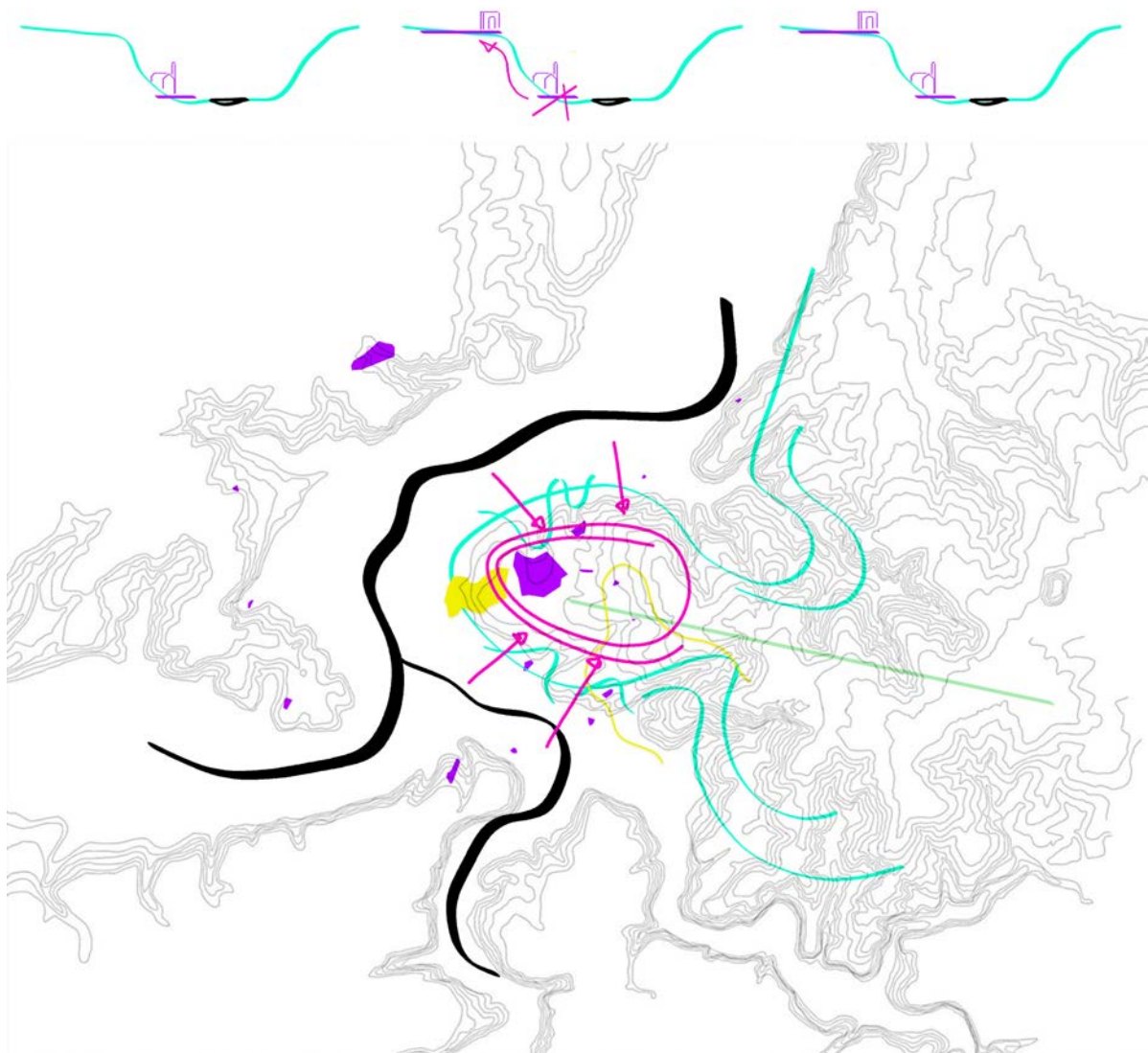
**Figure 4.** Jupille. Through the juxtaposition of the “Cartes de Ferraris”, Liège - 1777 (on the top) and the “Plans du Ministère des Travaux publics”, Liège - 1953 (on the bottom) it is possible to highlight the historical cemetery close to the church (on the top) and the street leading to the new cemetery (on the bottom).





**Figure 5.** Chenée. Through the juxtaposition of the “Plans du Ministère des Travaux publics”, Liège - 1953 (on the top) and the “Cartes de Ferraris”, Liège - 1777 (on the bottom) it is possible to highlight a three-steps migration of the cemetery: from the most ancient cemetery of Chenée (the smallest one) to the most recent one currently used (the biggest one).





**Figure 6.** Three schematic sections show the cemetery migration from the valley to the plateau (on the top). The right bank: rethinking Liège starting from cemeteries. The cemeteries (in purple) and the main abandon architectures and infrastructures (in yellow, la Chartreuse and an abandoned railway track) can be the structuring elements to rethink the urban growth on the plateau (on the bottom).

## Drawing as a multidisciplinary tool. A semantic experimentation in Venice

Chiara Vernizzi<sup>1</sup>, Chiara Finizza<sup>2</sup>

<sup>1,2</sup>Dipartimento di Ingegneria e Architettura. Università di Parma. Parco Area delle Scienze, 181/A. 43124 Parma

E-mail: <sup>1</sup>chiara.vernizzi@unipr.it, <sup>2</sup>chiara.finizza@unipr.it

*Keywords:* open space, urban survey, drawing, multilayer method, Venice.

*Conference theme:* Reading the Changing Urban Form

**Abstract.** *The paper suggests a scientific reading of a semantic experimentation in Venice. The method is proposed as a process capable not only of defining the quantitative aspects that characterize its physicality and morphometric qualities, but also capable of intercepting the elusive and invisible qualities that cities produce. The method is held together with the aim that drawing is a multidisciplinary tool that has been carried out starting from the urban experimentation through different workscales. The first reflection is conducted at the city scale: the focus is on public space with some consideration on its urban form and its historical urban process. Venice shows us clearly the role of geography as well as history, its transformation process and the relevance of its urban structures. This preliminary consideration helps us to find out the most consolidate urban fabric of Venice and the most important urban structure in the venetian reality. These reflections are transposed to a neighbourhood scale, Fondamenta dei Ormesini. The experimentation of the case study is based on thematic reading via urban survey and urban morphology. The methodological approach involves a lot of data and information that must necessarily be compared in order to reach useful results, through different level. The synergetic union of these information and the development of a dynamic, multilayer and transdisciplinary methodology allows to carry out a flexible system to reading this part of Venice. In the same way, the proposed process can be transposed to other parts of the city, or even to other urban realities.*

## **Introduction**

The need to image the city as a complex system starts from the awareness of its being a plural phenomenon, as an object of a long stratification process. Reading and understanding the nature of today's cities becomes essential to comprehend their dynamic, which implies also material and immaterial factors. Furthermore, observing and representing the relationship between built and not built space, it is possible to understand the basic elements of the urban structure. This approach, going beyond the traditional mechanisms of urban survey, aims to intercept those elusive and invisible qualities that cities produce and that are difficult to communicate. But it implies also the use of a morpho-structural approach, aimed at searching for rules and parameters that guide us to understand their intrinsic specificity. In this vision, it becomes necessary to select appropriate tools in order to define a multidisciplinary approach and the data in order to interpret the city in a plural, semantic and multifunctional logic. The complexity and the different scales of the city are therefore linked to the knowledge that the drawing proposes in its congenital synthesis of marked and unmarked elements (Barthes, 1967, p.10). Drawings becomes the operation capable of selecting the elements and of highlighting the qualities through a new interpretation. But it also becomes a tool able to capture other thicknesses of the city through direct and indirect knowledge. In fact, it is easy by walking through the streets, lanes and squares to realise how these are not defined only by their physical consistency, but become places in which different fabrics are structured, enclosed by volumes. Therefore, drawing becomes the key to understand the urban reality, depending on digital and on traditional representation, as dynamic tools to translate the relationship between quantitative and qualitative data.

This work explores Venice as the ideal laboratory to bring together the themes and methodology outlined above. Among the other water city, the case study of Venice is peculiar, non-typical and contain a multiplicity visions and systems of reality (Psarra, 2018). Venice is used as an experimental laboratory that has been carried out starting from the urban experimentation through different workscales. A work that starts from a general view to reach the particular, through the representation of the urban reality, that systematizes and parameterizes a single descriptive process between data collected, analysis and their scalar level of reading and transmission. In this sense, with the conscious limitations due to the vastness of the theme, we tried to understand how the built forms could influence some relational dynamics that ensue in space, but above all we tried to provide a method of narration of space, capable of compensating and provide answers to the dichotomous relationship between form and tool.

## **A multilayer e multiscale methodology**

Understanding the stratified entity hereditary from history and the dynamic process of the city is fundamental to observe the semantic configuration of its urban space. These signs contribute to the construction of urban grammar through forms and intervals for the definition of an operational methodology on the city, or on parts of the city (Secchi, 1986). The first operation was to elect its signs as possible elements of form and sense of the urban structure. In this vision, the structural and multilayer character of an urban morphological approach allows to implement the interaction and "signification" of the elements that makes the methodology truly effective. The theory that is sustained is not only that it is necessary to give priority to the concept of public space, but above all that its design derives from an intelligent understanding of the characteristics of the context to which it belongs. At the same time, knowing the historic city also means understanding the value of architecture that changes over time, based on educational laws dictated by collective values. The study of the laws that underlie the

transformation processes can be conducted, as we shall see further on, by the practice of urban survey and a critical selection of tools. Finally, the study of urban reality allows us to recognise the historical-processual character of the morphological structure. Understanding this logic, their structuring role within the urban fabric, is essential for understanding the corresponding processes and for documenting and transmitting their “structural” signs. From these words derives an opportunity of observing the city in its ‘morphological structure’ that involves all physical scales and implies the definition of a methodology capable of understanding the meaning of urban design, trans-scalar and trans-disciplinary, in which the theoretical apparatus is combined with the urban survey to translate the relationships between the forms and physical scales of living. The line of reasoning takes place through a structural process in which the interlacing of historical-theoretical investigation, the identification of tools and rules, spatial explorations and a primarily visual experience (Turri E., 2004) on the theme of open space have decoded to questions about the meaning of the urban structure. Consequentially, the research recognizes the open space of the city as a quality urban space: in this way Venice, the city of water par excellence, is selected for the core of a semantic experimentation (figure 1).

#### *Venice: a singular city*

The history of Venice image teaches us the anomaly and the atypical nature of its transformation process, that conditioning its character and its elements. Constrained by its physicality, its history, its liquid margins, Venice seems forced to immobility, at the same time the atypical semantics of the urban structure characterized almost by timelessness, which knows no possibility of expansion and internal upheavals. Everything remains inert, tied to the past that overflows from every stone on which it claims its rights. It does not have the dynamism of the automotive era, but rather a dynamism of its own. It is characterized by a space-time relationship commensurate with the pedestrian, whose only access is the long bridge that connects it to the mainland. The very strong natural characteristics of the site and the urban construction, constitute a sort of permanent structure, which - with some exceptions - does not grow by successive additions but by saturations, stratifications, substitutions of the pre-existing one. Moreover, Venice is “crystallised” (Erbani 2018, p.213) by an apparent absence of change, but on a closer look reveals a change in permanence, which is its strength and its fragility, a modification that remains in the stratifications and in the material and immaterial configuration. For all these reasons, Venice – as a prototypical city that may hold unique and holistic answers and came to represent the quintessential combination of place, buildings and institutions on its time (Psarra S., 2018, p.vii)- seemed a perfect opportunity for an experimentation. In particular, campi, calli, collective courtyards, fondamenta, are the main structures of Venice (figure 2), and also the very rich canal system. Among these urban spaces, Campi represent the cores of Venice’s urban life. They can vary in size: from small Campielli to larger squares. This type of aggregation is clearly visible in areas such as Campo San Polo (Vernizzi C., Finizza C., 2022), Campo San Giovanni e Paolo, Campo Marzio, Campo Santa Maria Formosa and so on, that have a square in the middle of the neighbourhood that serves as a collective meeting point. While the Fondamenta type constitute a significant element regarding urban expansion, it corresponds to the physical determination of the urban structure of the city and does not let it exceed the designed urban area. This aggregation system is clearly visible in the area of Cannaregio. Here all the neighbourhood units consist of a comb system with the fondamenta flanked by the canals. The history of the image of Venice teaches us that this system is the typical type of Renaissance and Modern Venice (16th-19th centuries), characterised by the

gradual prominence of terrestrial paths over water ones (Muratori S., 1961). The urban structure, in its fragility and irrationality, can be defined on the basis of a few cognitive levels. The first level of interpretation is attributable to the relationship between the island infrastructure system (rio-fondamenta-calle-campo-corte-etc.) and the settlement structures (serial building elements - non-repeated building elements in adherence or polar). The second, on the other hand, relates to the position of the parts of the city, which is nevertheless essential to the recognition and definition of the parts themselves. As briefly outlined this level is connected by the typical settling system of the history of the city.

*Case study selection: Fondamenta dei Ormesini.*

Operationally, the first approach is on the city scale. If we analyse Venice in a morphological way, we can observe the atypical structure of the city that is characterized by some elementary and self-supporting urban units, like little island: called insula. As agreed, Venice's urban structure is also characterized by different open space, by several urban form and by hierarchical relationships. For example, we can perceive the most common urban fabric: the quadrangular campo with a big void; the so-called bone type that is characterized by a main street and the secondary lane are orthogonally to it, then the Fondamenta type that is shaped by comb structure and linear-serial plots. We can also find other particular urban fabric like the one surrounded by fondamenta, the organic system that is a complex structure deriving from the combination of different small plots. And finally, the most extreme one that is domain by a polarity (convent, grande scuola) and characterized the layout of the whole plot. The second approach that this work displays is on the neighbourhood scale. The exploration is here conducted only on a typical settling system of Venice, analysed through direct and indirect experience: Fondamenta dei Ormesini.

The Neighbourhood of Fondamenta dei Ormesini represents the typical Fondamenta settling system. In fact, it belongs to Modern Venice (16th-19th centuries), and it is, also, characterized by the gradual importance of land paths over waters one. Even though the relationship between water and the main public space (Fondamenta) is very liveability. Also, the most representative buildings are allied on Fondamenta, and here only the plot is characterized by a mixed use of function (commercial, service, cultural and residential). The reason of the cases study selection has been detected due to the following reasons:

- The first one is the urban structure of the plot. In fact, the case study represents one of the most consolidated urban fabric of Venice. As we said, the Venetian urban fabric is mainly attributable to three typical settling systems (Muratori S., 1960): the 'quadrangular' campo type, the bone type and the comb type (figure 2).
- The second reason is the typology of the main public space that characterized the insula. In fact, in this case the public space is represented by Fondamenta: such as a linear square flanked by canals.
- Finally, the position of the case study in the urban structure because it is also the typical structure of the clogging processes of the urban fringe belts. In this sense this part of Venice represents the city of a programmatic expansion.

So, the choice of the case study is not accidental, but is linked to the desire to experiment with an urban reading the theme of public space (of water and land) as a strongly identifying factor. Thus, from an initial definition linked to the visual world (starting from the urban survey of morpho-typology) urban spatiality becomes programme, movement, and finally perception, experience and narrativity. The study, after a theoretical-critical reading key, identifies rules and operational tools aimed at the construction of a "toolbox" oriented to address possible



interpretative models (De Carlo L., Migliari R, Carlevaris L., 2012, pp.27-394).

#### *The work scales and the tools of the method*

The research defines a specific methodology to understand better the selected case study. As fixed above, the method is tasted on an empirical evaluation of one neighbourhood units extrapolated from the different venetian realities. This methodology considers a morphological approach on a bigger scale (1:2000) and an urban survey approach on a smaller scale (1:500) which considers both the behaviour with the environment and the behaviour of the buildings that compose the neighbourhood systems. In the first approach the study will be carried out with the help of QGIS to promote a comparison between the different thematic maps. On the other side, the CAD device will help us to provide a precise survey of the analysed area and to produce drawing that represent the neighbourhood system. In this sense, it is possible for to proceed in defining the characters through the horizontal level with the ground floor and the vertical level with the urban curtains. Briefly, the analysis will be detected according to the following phases:

- Phase 1. This first analysis consists in thematic maps with the use of QGIS, the conceptual model with the use of Rhinoceros and the urban sections that summarize the data collected previously;
- Phase 2: The second part consist in a smaller work-scale approach which is expressed in the Ground floor with the use of Auto-Cad and the Urban Curtain with the use of a Photogrammetry Model.

The succession of these two phases allows us to have answers not only on the geometric and dimensional data, but above all through the photogrammetric process of the facades, also the consistent of the colours and the materials. At the same time, it allows with a further leap in scale the abstraction of architectural detail elements, such as frames, decorations and characteristic elements.

#### **Tools and urban form**

The representation of a place, in the different workscale, involves a complex, strongly dialectical process, rich of semantic and symbolic components. The proposed reading model has been performed using several tools of urban survey. But making a critical survey means grasping the observed phenomena in its metric, geometric, dimensional, spatial aspects, but also chromatic and material factors. The choice of suitable tools helps to develop a correct process and to represent the experience of reality with a critical attitude. So, this approach suggests a reading method of reality in which each element has a different 'depth of information', given by the construction of thematic layers that incorporate not only data, numbers and symbols, but also qualitative information of the metamorphosis of the awareness of places. Considering all these features the urban survey takes place following a series of interlinked and concatenating operations that start from an initial analytical moment of mapping and knowledge. The second phase involves other tools to provide a metric verification and a comparison between the various data collected. Defining this synergistic process means collecting information regarding accessibility, thermal comfort, visual comfort, permeability, edges design, vital ground planes and the presence or absence of mitigating elements (water and greenery); other fundamental themes are linked to opportunity: activities and functions.

#### *Drawings, tools and phases*

Phase1. The first approach is the use of dynamic tools like Qgis that allows to keep together

quantitative and qualitative data, so we can collect a lot of information (height, porosity, typological and functional data). For example, we can acquire thematic maps that explain the relationship between different data. The morphological map of the selected case study shows the hierarchical structures of the paths. In this map we can observe how the functional map is connected to it. In fact, all the specialistic function (like service commercial function) lies on the specialistic route, called Fondamenta dei Ormesini (figure 3). Also, the map of floor number illustrate that the tallest buildings are located on this matrix axis. Automatically, we can say that these maps give us information of the horizontal and vertical level. The first interpretation tries to understand, through the morphological reading, the factors that most influence the real datum, which at different scales and degrees, provides quantitative and qualitative information. But morphological and environmental aspects also emerge with the conceptual model. In this sense we can obtain information on the articulation and the relationship between the building and the open space and also some information on microclimatic aspects, such as the study of the shadows. The experience presents itself as a stratification of signs, tangible and intangible, in part easily comprehensible by traditional tools of the urban survey -thematic maps, environmental sections (figure 4), spatial models - and, in part, derivable from the synergy of several integrated tools.

Phase2. The reading on the horizontal plane (figure 5) through the ground floors is attended by the vertical one, that is the articulation of urban sequences, functions and polarities that express and generate the attractive character of the city. Here Gehl's thought is clearly expressed when he affirms "Venice has everything: compact city structure, short walking distances, beautiful routes, mixed use, active ground planes, refined architecture and attention to detail, and everything on a human scale" (Gehl J., 2017, p. 10). As we statement, a direct observation of urban fabric, through the reading of the facades that shape public space, in the same way becomes a fundamental operation. The process starts with a geometrical model and the classification of the buildings with a code. Here the urban form imposes for the shoots the use of a boat (334 pictures) and also the urban form impose the use of RDF (a tool that correct the distortions of the photos). So, in this case it was not necessary the use of sophisticated tools like Metashape or the use of Laser Scanner.

Through the draw of the facades, in fact, it is possible to detect the physical forms of the city and read its historical and material consistency. We can obtain information of the photometry and the consequently transformation of urban fronts. In particular it is clear on the ground floor where the transformation process was massive (figure 6). Finally, we can obtain valuable information on its state of conservation and on the actual functions, but also dimensional data such as the height of the building and the historical period of construction or transformation of the tissue. Finally, it is possible to stamen that these two readings are attended by the interpretation through the image, a tool of thought, capable of holding together the physical and immaterial datum.

## Conclusion

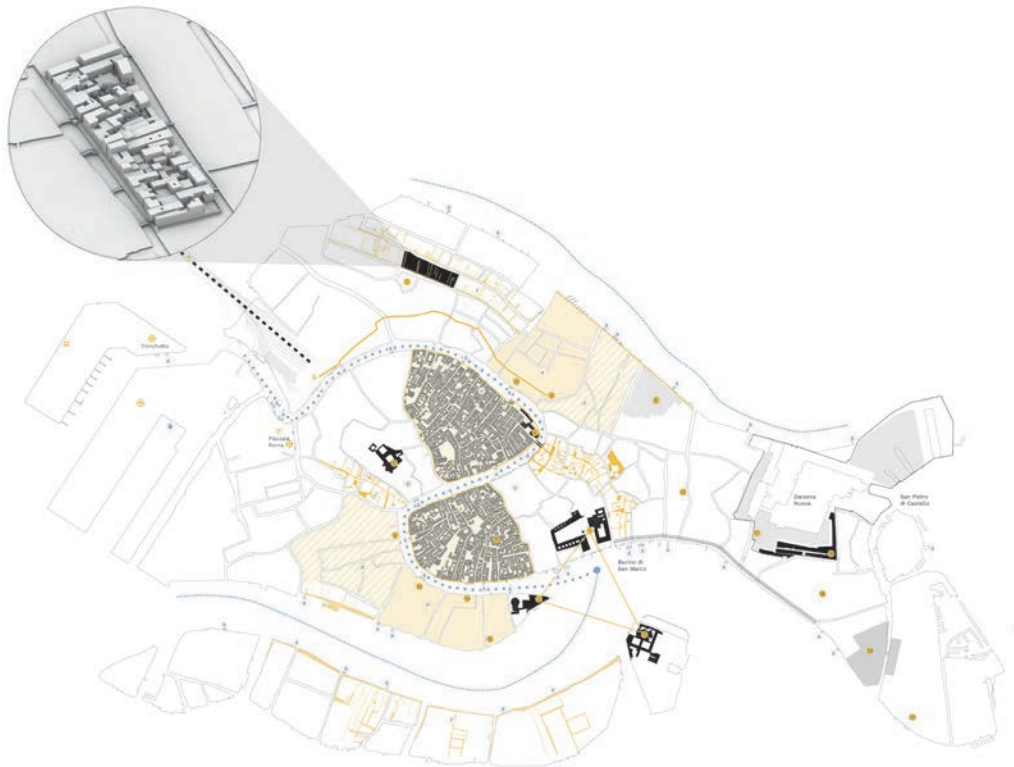
The study carries out a first experimentation of the influence of urban form on the selection of suitable tools for semantic readings. Despite a first experimentation on the city of Venice the proposed method shows new strategies capable of being transferred to other urban areas of Venice, with different formal characteristics. In this first approach on Fondamenta dei Ormesini, it is carried out a multi-scalar e multi-layer methodology. The work was presented from the large to the small scale, but also through different levels of reading. But it defines also that the

use of the tools is interlaced with the urban form, in this sense it also presents itself as a flexible and adaptable approach to different contexts. This means that first of all it is necessary to select the data (in order to map the data that help to understand the relationship of the case study), but also the tools in according to the urban form (like in this case the use of the boat for the photos or RDF to correct the pictures). Exposing the urban form of Venice has shown itself an opportunity to taste an experimentation through the adoption of new digital tools, able to synthesize the knowledge acquired and to experiment with new analytical methodologies. But the attention is oriented to the general application of the methodology not only to water cities but to the whole contemporary cities. In according with Lewis Mumford that saw Venice's urban structures as involving a series of bold adaptations, which had universal application (Mumford L., 1961) The synergistic union of different tools allows the development of a dynamic, multilayer and transdisciplinary methodology for urban analysis, very useful for control the regeneration and transformation processes of the contemporary city.










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## Illustrations and tables



**Figure 1.** Venice: the morphological structure of Venice and the respective neighbourhood unities taken as a reference for the following work. (Author Chiara Finizza)

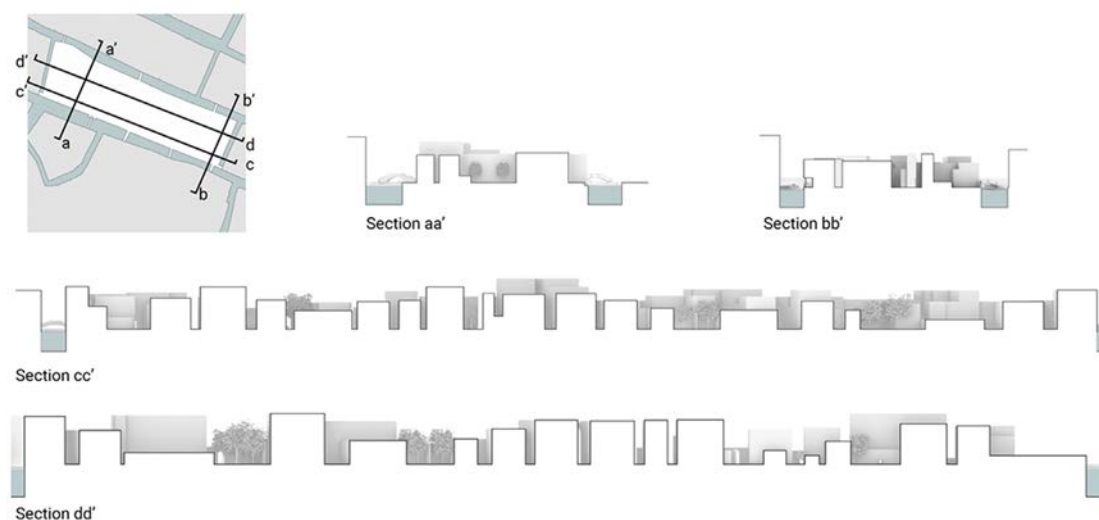
The most consolidate urban fabric		
 <p><b>Type I. Isola di San Polo</b></p> <p>This is the quadrangular 'campo' type that is characterized by a Parish and buildings around a large void. This space is often typified by a Vera da Pozzo.</p>	 <p><b>Type II. Isola di San Bartolomio</b></p> <p>It is the so called comb type, that is characterized by a Salizada or a Large Calle and the secondary structures are placed orthogonally: calli, courtyards, cariolelli.</p>	 <p><b>Type III. Isola di Calle Fabbri</b></p> <p>It is the typical type of Modern Venice, characterized by a linear-serial aggregation of lots with houses aligned on the Fondamenta and the street paths orthogonal to it.</p>
Typical urban element		
		
Critical selection of areas		
		

**Figure 2.** Fondamenta dei Ormesini: the comb system with Fondamenta as one of the most consolidated urban fabric of Venice. (Author Chiara Finizza)

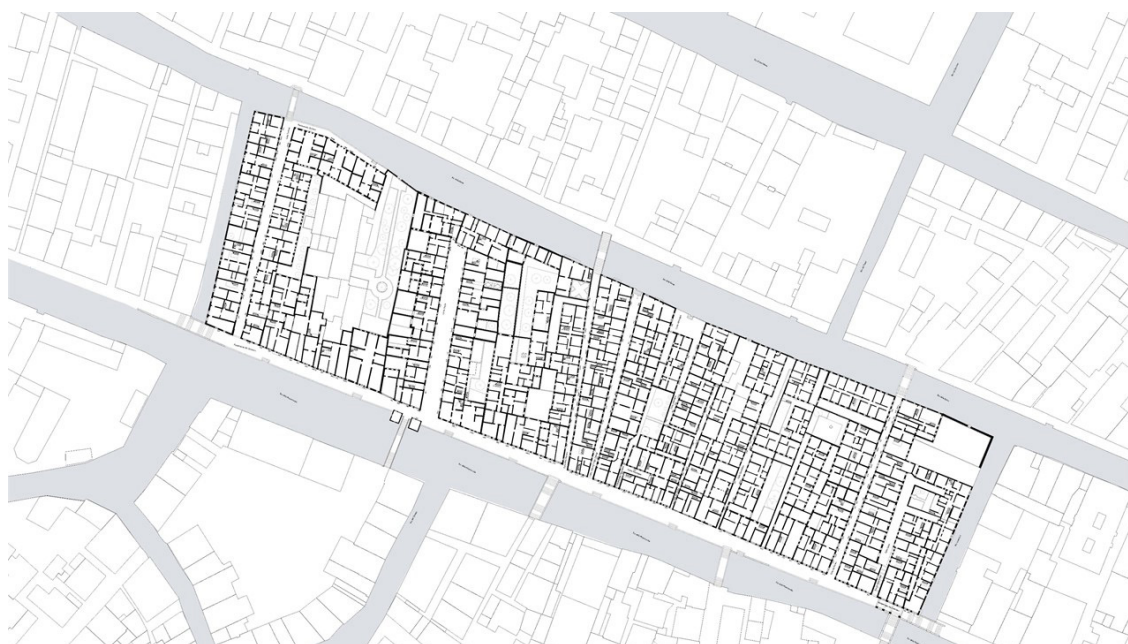




**Figure 3.** Fondamenta dei Ormesini: the thematic maps of route system, function and building height. (Author Chiara Finizza)



**Figure 4.** Fondamenta dei Ormesini: the urban sections show the different relationships



**Figure 5.** Fondamenta dei Ormesini: the ground floor drawing was done with direct and indirect observation. (Author Chiara Finizza)





**Figure 6.** Fondamenta dei Ormesini. All the process shows the real success of a transdisciplinary analysis methodology. The aim is not the ability to collect data, but in its ability to make them communicate with each other. (Author Chiara Finizza)

## More than viaducts: Three flyovers in Lisbon

Pablo Villalonga Munar

Departamento de Proyectos Arquitectónicos de la Escuela Técnica Superior de Arquitectura de Barcelona. Universitat Politècnica de Catalunya. Av.Diagonal 649-651, 08028, Barcelona, España. Ministerio de Universidades del Gobierno de España, funded by European Union -NextGenerationEU

E-mail: pablo.villalonga@upc.edu, +34 666871636

*Keywords: Lisboa, infrastructure, architecture, streets intersection, inhabited viaduct.*

*Conference theme: Reading the Changing Urban Form*

**Abstract.** *At the beginning of the 20th century in Lisbon, some regular streets of Avenidas Novas expansion overlapped with the existing sinuous streets on the valley (Proença, 2014). The intersections between new infrastructures in the air (Rua Filipe Folque, Avenida Fontes Pereira de Melo and Avenida Duque de Loulé) and the older on the ground (Rua São Sebastião Pedreira, Largo do Analuz and Rua Santa Marta), produced three flyovers with particular built environments.*

*More than viaducts, these case studies are approached here to explain their exceptional urban forms and values; sample's meetings of different times and orders of the city. Their urban and architectural form goes beyond responding to the infrastructural function, taking care of aspects such as the relationship with closer buildings, public space design, or the ways in which they are inhabited under their shadows (Vanore, 2002). From the small to the large scale, they may be understood from their partial details to their understanding as integrated pieces of the city. They could be considered extraordinary places of Lisbon (Monteys, 2017), where the contrast between different periods, between monumentality and every day, between what seems eternal and ephemeral around them, is materialized.*

*These cases are a sample of those studied in the thesis "Encounters with infrastructure" (Villalonga, 2020), highlighting how the encounter between infrastructure and architecture of the sedimentary European city is not only a source of conflict but also of contemporary project opportunities. These encounters concentrate on urban complexity, bringing together of infrastructure, architecture, and urban design*

## Introduction

Lisbon's topography produces an urban form that is characteristic and constantly specific to each of its places and corners. Hills, valleys, and viewpoints shape an infrastructural matrix of street layouts and a configuration of buildings and blocks deformed from their ideal typology. The way we move through the city is totally conditioned by this complex reality of the intersection between urban and architectural projects and the reality in which they are inserted.

This topographical condition has led to a large number of projects, both realized and unrealized, that specifically addressed the issue of infrastructural improvement with respect to the topography of the city. Throughout history, this concern has been reflected in projects for connecting areas of the city (Miranda and Henriques da Silva, 2017), sometimes inserted as an autonomous solution to the variability and rhythms of the topography-dependent city.

In this sense, it is important to highlight the unbuilt Preliminary Project for the Lisbon aerial avenue of 1888 (Parrea Grao, 1888). It was intended to connect three strategic points in Lisbon, the Alameda de São Pedro Alcântara with the hill of Santa Ana and the Largo da Graça. Its metallic structure forms an elevated viaduct that flies over the city, while its pillars fall over it. The image presented is directly reminiscent of the Luis I Bridge in Porto, with its arched metal structure over the valley of Avenida Liberdade.

This preliminary project is an extreme example of the overlapping aerial viaduct solution in the city. Lisbon is full of arches and structures connecting its different levels. This can be seen in the book *"Arcos e arcadas de Lisboa"* (Caeiro, 1991), where some of the arches that occur in the city are shown on a map. Between them, there are buildings, streets, or monuments that in their leap in the air generate an overlap and threshold. This is often the result of avoiding a topographical conflict or connecting levels more efficiently and directly.

The overlapping infrastructures retain centuries of history, sometimes falling like swords that cut through different times and spaces which, if it were not for them, would be disconnected. Observing the historical expansion of Lisbon through the layout of its streets, the city develops as an organism in trembling growth of diverse formal operations such as additions, subtractions, or overlaps.

## Methodology

This research started with a series of drawings made by tracing the axes of the infrastructures of various historical maps. These lines do not match precisely, as a result of how the old base cartography was produced by their authors. Although this may seem to be an error or a problem, it is actually indicative of the city itself. The overlapping of lines in vibration allows to detect more or less eroded areas. The weight of time is marked through the densification of certain lines, where the oldest places are more overlaid by traces of representations in an imperfect overlapping (Figure 1).

Within this nest of lines, there are moments in which intersections between lines from different times can be observed. These intersections give rise to various formal operations, such as additions, subtractions or overlaps. This is the case of the layout lines of the widening of Avenidas Novas on the rural routes in the valley parallel to Avenida Liberdade. The rectilinear streets of the modern widening project of the early 20th century intersect with the sinuosity of the street that develops following the topography of the valley.

This article deals with three of these intersections where infrastructures overlap with infrastructures, streets over streets, generating complex designed nodes. These are the intersection between the new infrastructures in the air of the 20th century expansion (Rua Filipe Folque, Avenida Fontes Pereira de Melo and Avenida Duque de Loulé), and those that develop on the ground

(Rua São Sebastião Pedreira, Largo do Andaluz and Rua Santa Marta). Their encounter produces three viaducts with a projected relationship with their built environment (Figure 2). They are approached through comparative maps, photos and drawings.

From a comparison of historical maps by Filipe Folque (1856) and Silva Pinto (1911), it is possible to observe the change in this area of the city. In the 1856 cartography (Viegas and Tojal, 2000), the buildings present are structured around the rural layout of Rua São Sebastião da Pedreira, Largo do Andaluz and Rua Santa Marta, surrounded by rural plots. In the 1911 cartography (Viegas and Tojal, 2005), the solitary irregular layout is surrounded and intersected by the new streets that extend the city over the territory. The topographical conditions of the site contrast with the ideal geometry of the city on which it is developed. The modern order of the straight line is imposed on the order of the contour of the lines on the ground.

Today the intersections are clearly visible, with the three viaducts as the materialization of the tension between the old layout and the widening of Avenidas Novas. As Professor Sergio Proença explains in his thesis “A diversidade da ruam a cidade de Lisboa. Morfologia e morfogénese” (Proença, 2014), some of the rural layouts are integrated into Ressano Garcia’s 1903 Avenidas Novas plan. Once again, topography is reflected in the shape of the city and in some of its urban elements.

In his thesis Professor Proença makes a classification of streets associated with specific topographical conditions such as: streets on ridge, streets in valleys, streets on slopes, streets on half slopes and “climbing- streets. These categories explain relationships with slope. From some of the streets, the variety of shapes of the matrix on which the city develops is illustrated.

### Three thresholds and one path

The three case studies are now discussed, focusing in the issues that determine the value of the case as an intersection. Their location, geometry, authorship and details are the guides to understanding their formalization as complex and contrasting encounters with their built environment. The name “Three thresholds and one path” refers to the articulation of the three case studies with the street that develops through the topographical matrix of the city, and its capacity to be a transition threshold between different segments of the same layout and between different temporal moments of the city.

The first of these is located in the lower part of the path. This is the intersection between Rua Santa Marta and the viaduct of Avenida Duque de Loulé (Figure 3). It is the result of the 1914 urban development project by Alberto Pedro da Silva (Silva, 1914). Unlike the other two case studies, this is not a viaduct supported by an arch. A metal structure supports the deck which contrasts with the stone walls of its lateral supports.

In this intersection operation, Rua Santa Marta was widened. The project includes an important detail, a staircase connecting the two levels. This is located on a corner, taking advantage of the widening that produces a public space. In the original plan of the project, the author’s approach to two scales stands out; the city with the street and the detail with the step of that staircase.

As we will see in the following case, the design of the intersection between the two streets at different levels recognizes the two infrastructural guidelines; that of the upper avenue and that of the lower street. This produces a deformation of the elements, affecting all the details of their materialization, such as the railings and the lampposts that crown the upper edges. This is significant of the level of care with which these intersections were built.

At the point of change between Rua Santa Marta and Rua São Sebastião da Pedreira, known as Largo do Andaluz, we find the intersection with the Avenida Fontes Pereira de Melo viaduct

(Figure 4). This was completed in 1900 by the Camara Municipal de Lisboa and designed by the architect Sabino dos Santos.

However, the current image is the result of various moments and modifications suffered during its history. There are two main time periods: the first moment between 1900 and 1950, when Sabino Santos' project solves the intersection between streets at different levels, and the second moment around 1955 when a third infrastructure intersects at this point; the Lisbon metro line.

In this case, there are several infrastructural intersections. The construction of the railway line produces the overlapping of a second viaduct that supports the open-air crossing of the metro trains. The sound of the locomotive bouncing off the walls under the viaduct on Avenida Fontes Pereira de Melo, adds to the noise of the cars crossing under and over it.

Going into the detail of the formal resolution of the intersection, the arch supporting the upper street follows the direction of the lower street, while the front facades follow the direction of the upper avenue. This produces a deformed tunnel specific to this intersection. The arched development is cut into an oblique plane at the façade. The façades and pilasters are deformed. This is repeated in the pedestals of the upper lamps, as in the previous case.

The intersection of the yellow metro line inside this viaduct tunnel produces a significant change in the spatial perception of the original space. While the proportion and image of the exterior façade is maintained, the slender proportion of the interior is reduced, increasing the feeling of compression when crossing at the lowest level. This is accompanied by the facades of the adjoining buildings, which face both the upper and lower streets, producing an effect of extending the height of the viaduct walls.

Following the route along the valley street towards higher levels, the Filipe Folque viaduct is found (Figure 5). This viaduct was built in 1943, the result of the development of a 1928 project (Costa, 1943). This included the integration of the São Sebastião da Pedreira fountain and the proposed program in its lateral spaces.

The project includes a strong approach to an architectural scale. Proof of this is how its elevations are carefully designed, even with carpentry details or decorations. The upper cornice of the viaduct stands out for the way it fits in with its sides and the pavement of Rua Filipe Folque. A continuous bench serves as a railing on both sides of the viaduct and aids the urban integration of the infrastructure. On the northeast corner, the residential building takes advantage of its relationship with the viaduct and the bench to generate a friendly entrance that widens the pavement, creating a small viewpoint to the São Sebastião da Pedreira fountain at a lower level. On the opposite corner, on the northwest side, there is access to another residential building. This time it is a private terrace, located above the fountain that forms a transition between the private building and the public space of the street.

Under the viaduct, taking advantage of the space generated by the change of level and the sides of the street, two spaces are designed to house the program. Following the alignment of Rua São Sebastião da Pedreira, the narrow spaces are ventilated and illuminated under the arch of the viaduct. Its interior ceiling is the viaduct's own supporting vault, which is also repeated in the exterior space.

Although separated by the street of São Sebastião da Pedreira, the two spaces form an ensemble for the same program. These spaces are the headquarters of the cleaning team of the Santa Isabel neighborhood. On the east side are the dressing rooms and lockers on the lower level, while the first floor houses a kitchen and dining area. On the other west side, there is storage space for machinery on the lower level and offices on the first floor. On the other side, the street becomes a meeting space for the workers, where they gather to chat, rest or change



shifts. This makes the exterior under the viaduct part of the same architectural entity. In addition, formally, the three spaces are also the result of the structural return of the infrastructure. On the side of these spaces, the São Sebastião Pedreira fountain is combined with a public space created by widening the side of the street. In the center of this space is a tree that minimizes the hardness of the stone construction of the whole complex. On the side façade of the viaduct is the city's emblem and a space related to the fountain. Therefore, observing the whole complex, not only the interior spaces but also the surrounding built environment, we can affirm that we are looking at an inhabited viaduct of Lisbon.

## Conclusion

The approach proposed through "Three thresholds and one path" explains the value of urban extensionality as a generator of intensely designed encounters (Figure 6). The cases explained are examples of designed overlaps from different times and orders of the city. More than viaducts, their urban and architectural form goes beyond the infrastructural function for which they were designed, taking care of aspects such as the relationship with nearby buildings, the design of the public space, or the ways in which they can be inhabited. This produces a diluted view of the disciplinary boundaries between architecture and urbanism, as well as of what is understood as infrastructure or architecture.

In the case study's materialization there is a contradiction or obstacle in their natural development of formalization. That's a reason to frame them as examples of deformed urban and architectural objects (Borie, Alain, Micheloni, Pierre, and Pinon, Pierre, 2008). In this sense, it is worth noting how in these situations, the relationship between context and form provokes a synthetic, deformed intersection of the encounter between two infrastructures with their own orders. In her book "Suoli urbani all'ombra dei viadotti" M. Vanore announced the phenomenon of what she calls "trasfigurazioni di una forma tecnica" (Vanore, 2002) announces the architectural potential of these urban places crossed by viaducts.

They could be considered extraordinary places in Lisbon, as Xavier Monteys classifies in his "Lisboa. Lugares extraordinarios":

"[...] lugares que son fruto del tiempo y de los accidentes, de las anomalías y de las correcciones y que por alguna razón tanto abundan en esta ciudad y que las distintas cartografías han ido recogiendo en el curso del tiempo." (Monteys, 2017)

The three flyovers explained here are a sample of a type of case studies investigated in the thesis "Encounters with infrastructures" (Villalonga, 2020), showing how the encounter between infrastructures and the architecture of the sedimented European city is not only a source of conflict but also of contemporary project opportunities.

In the conclusions of the thesis, some concepts are common to the different case studies, helping to understand the conditions for a project design approach to them. These encounters concentrate complexities of the city, bringing together infrastructure, architecture, and urban design.

From the small to the large scale, these places must be understood both in terms of their details and their role as urban articulators. Small-scale nodes resulting from the intersection of large-scale urban projects and realities. In these spaces, we find the contrast between different measures of time between those of infrastructures and architectures, between monumentality and the everyday, and between what seems eternal and ephemeral around them, is materialized.

The three cases have an arch and a viaduct as the common denominator of the infrastructure. The attention to detail is fundamental, being approached on an architectural scale and its integration into the urban landscape of the city. In this type of encounter, the conflict can be addressed by carefully fitting the urban elements and infrastructures. This proves the possibilities of project design in this type of urban phenomenon; they are more than three simple flyovers.

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Figure 1. Lisbon's overlapped layouts (1650-1755-1856-1911-2017). Source: Pablo Villalonga, 2018.



Figure 2. Historical cartographies of the case studies areas and diagram. Sources (left to right): Viegas, I.M. and Tojal, A.A. (2000) Atlas da Carta Topográfica de Lisboa sob a direcção de Filipe Folque: 1856-1858. Lisboa: Câmara Municipal de Lisboa, Departamento de Património Cultural, Arquivo Municipal de Lisboa.// Viegas, I.M. and Tojal, A.A. (2005) Levantamento da Planta de Lisboa: 1904-1911 coordenado por Júlio António Vieira da Silva Pinto e Alberto de Sá Correia. Lisboa: Câmara Municipal de Lisboa, Departamento de Património Cultural, Arquivo Municipal de Lisboa.// Ortophoto Google Earth Pro // Drawing Pablo Villalonga, 2018.





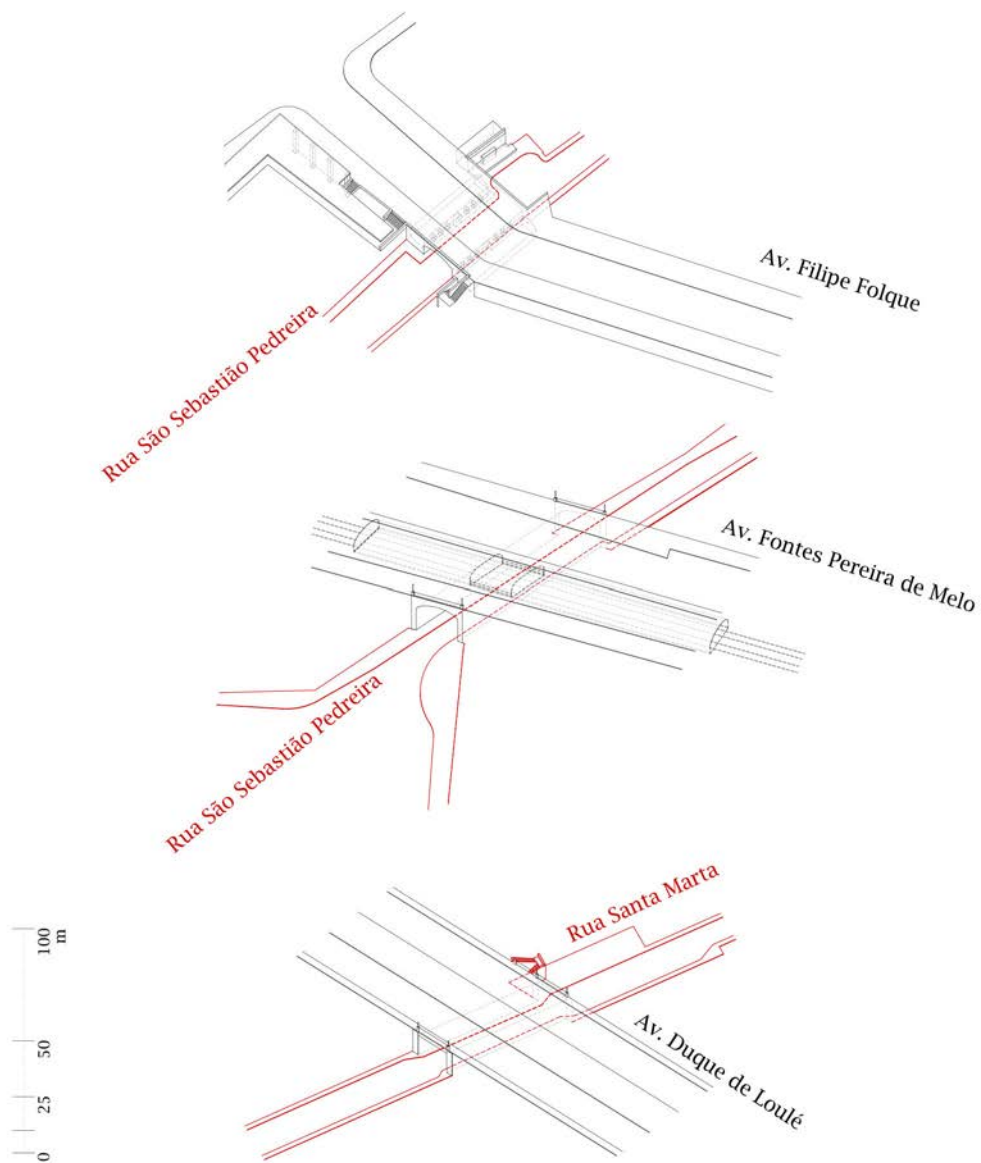
**Figure 4.** Viaduct of Av. Fontes Pereira de Melo. Source: Pablo Villalonga, 2018.



**Figure 3.** Viaduct of Av. Duque de Loulé over Rua Santa Marta. Source: Pablo Villalonga, 2018.



**Figure 5.** Filipe Folque Viaduct from Rua São Sebastião da Pedreira. Source: Pablo Villalonga, 2018.



**Figure 6.** "Three thresholds and one path": Axonometric drawing of the case studies. Source: Pablo Villalonga, 2019.





## Piazza dei Cinquecento Alberi. Interweaving uses and spaces for Rome's Central Station

Luigiemanuele Amabile<sup>1</sup>, Marianna Ascolese<sup>2</sup>, Alberto Calderoni<sup>3</sup>,  
Vanna Cestarello<sup>4</sup>

<sup>1,2,3,4</sup>Università degli studi di Napoli "Federico II", DIARC (Dipartimento di Architettura), Via Forno Vecchio 36, 80135, Napoli.

E-mail: <sup>1</sup>luigiemanuele.amabile@unina.it, <sup>2</sup>marianna.ascolese@unina.it,

<sup>3</sup>alberto.calderoni@unina.it, <sup>4</sup>vanna.cestarello2@unina.it

Keywords: Public space, urban design, infrastructure, urban regeneration, Rome  
Conference theme: Design a Sustainable Urban Form

**Abstract.** The design research developed for the new Piazza dei Cinquecento in Rome proved to be an opportunity to rethink, starting from the defining features of the urban layout, a strategic place; the chance to provide a new order and redraw one of the largest public spaces of Rome's city center, redrawing the hierarchy within its different landmarks. The guiding idea was to give a better comprehension of the access to the historic city, devising a clear subdivision for the ground of the new public infrastructure, inserted between two main arterial roads: via Giolitti and via De Nicola, potential mechanisms of a renewed experience of the square that starts from its edges and reaching towards its core. The renewed square – defined by the mineral sett pavement by the main station building and the garden of five hundred trees (cinquecento alberi) – appears to be a large carpet, where multiple uses interweave demonstrating the idea of shared space. Piazza dei Cinquecento, as main transport and pedestrian hub of the city, discloses an architectural stratification that is both horizontal and vertical in the powerful sequence of different infrastructural areas, their intersection with the system of green, buildings and monuments of historical, archaeological and cultural value that insist on the square.

## Between Ancient Gates

The proposal for the new Piazza dei Cinquecento has constituted an opportunity to explore some urgent topic of contemporary architectural design research regarding the rethinking of a part of the urban layout of the city of Rome, retracing its recent history and intrinsic artistic value as one of the most important points of the entire city, and one of the largest public spaces in Rome. The historical understanding of the area, the importance of the archaeological ruins on site, and different functional issue regarding logistics and infrastructure have defined the broad framework within which to develop a strategic proposal capable of considering both a series of urban questions on a wider scale and the more localized physical conditions existing on the margins of this complex area result of millennial stratification. The assigned site for the project sought to hold together the necessities of both of road and pedestrian flows and the issues related to an existing building as complex as the last version of the multifaceted Termini Station, as well as the recognition of a new gate from the station towards the city to be enhanced and incorporated into a whole new image for the area. These passages and crossings towards the ancient city, but also the shape of the site, the pre-existing relations between open spaces and urban facades over the last centuries, have posed as pretext for an in-depth exploration through the lens of architectural design research to instill a new urban idea in a complex context.

The area is particularly rich of numerous archaeological sites, the Baths of Diocletian, the Servian Wall, and a number of buildings and scattered ancient traces. The main transformations of the area began in the 16th century when Pope Paul V started work around the area of Largo Perretti. In Falda's Map of Rome (1676)<sup>1</sup> it is possible to see the first traces of urban modifications, with the transit of people and carriages near the southeast side of the Baths. These transformations were fundamental to later urban and landscape solutions. During the 19th century Nicola Maria Nicolai carried out work on the general reconfiguration of Termini Square. This is the earliest documented record of a green setting around the area of the Baths of Diocletian. Around the mid-1800s, Prince Cosimo Conti founded a national company to design railways, and in 1847 he obtained a concession from the regional administration to build the Rome-Frascati route. The first railroad opened to the public three years later, in the same moment of the inauguration of the Station, which at that time was located just outside Porta Maggiore. In 1860, the first core of the new station on the grounds of the Villa Montalto-Peretti-Massimo was built, an event that marks a substantial modification of the area. In 1862 the temporary Central Station was inaugurated, which was built by reusing part of the buildings of the former "Botteghe di Farfa", a complex situated on the eastern perimeter of the Baths. The railway facilities were only a few meters from the impressive Roman ruins. In Termini Square also the exterior areas had a particular attention, indeed, between 1865 and 1870 – under the pontificate of Pio IX – the first garden was designed by Germano Lugli, gardener of the Pincio. It was technically poor, because the few means available during the papal administration did not allow for better materials, yet it was quite extensive, and it reached as far as near the Baths with a rustic fountain in the centre that would later be used to house the Acqua Pia-Marcia exhibition in 1870. Despite these activities and transformations, Termini remained peripheral to the city: the temporary Central Station caused the surrounding spaces to become temporary as well. The administration decided to follow-up on the project for a new Central Station designed by Salvatore Bianchi. The new station was set back about ten meters from the temporary one consisting of twin

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<sup>1</sup>Vedi la pianta di Giovanni Battista Falda, Nuova pianta et alzata della città di Roma con tutte le strade piazze et edifici de tempj, Roma 1676, edizione Giovanni Giacomo De Rossi.

buildings – arrivals and departures – respectively parallel to and across Via Cavour. It started operation in 1875 while the construction of the fountain arranged in the centre of the exedra of the Baths took place in 1885 by architect Alessandro Guerrieri. Palazzo Massimo, another important building in the current situation, was built between 1883 and 1886. In 1887 Piazza dei Cinquecento was laid out, the name of which originates from the fallen soldiers of Dogali during the Eritrean War. In 1948 the square took on its present configuration. The old pavilions of Termini Station were demolished. The southeast side, defined by the main building of Termini Central Station, was inaugurated in 1950. It is the result of the collaboration of the two winning design teams of the 1947 competition: Calini-Montuori and Castellazzi-Fadigati-Pintonello- Vitellozzi<sup>2</sup>. The front elevation is 232 m long, clad in travertine marble laid horizontally, interrupted by the slits of the ribbon window. The rationalist design is contrasted by the reinforced concrete roof shelter, also known to the citizens as The Dinosaur because of the cantilevered profile of the section. Inside, the atrium and the ticket office connect the main square to the tracks, and side entrances of with Via Marsala and Via Giolitti. The increase in infrastructural services makes the square an important intermodal node, and so it becomes a bus and taxi parking lot. On the occasion of the Piano Particolareggiato of Piazza dei Cinquecento, in «Edilizia Moderna»<sup>3</sup> Francesco Cellini proposes a project to rethink the square as a public space for the City. Today, this huge void in the middle of the Italian capital, needs to come back to its original function of perfectly-tuned mechanism managing different fluxes of people and goods, yet at the same time set to become one of the great squares that characterize Rome.

### Human-sized Crossroads

Jan Gehl's studies and design research underline how streets and squares "constitute the very essence of the 'city' phenomenon". These aspects reveal how the first-hand observation of the place and also the rediscovery of a certain atmosphere – that has partly been lost – is inherent in certain cities (the recent idea of dolce vita, however latent in any image of Rome), are some of the essential conditions for identifying an open space with a profound *raison d'être*, reviving the great ideas behind the creation of a square such as Piazza del Campo in Siena. Ideas that not only refer to the physical conformation and the specific quality of surfaces and artefacts, but also to the improvement of the wellbeing of an area through the implementation of different uses. These that do not relate to a top-down definition of a program but enable the appropriation of space by the citizens, even if in a very dense crossroads built on many levels, capable of sustaining future relations among people.

The current Piazza della Stazione Termini works as a hinge between two important city streets: Via Giolitti and Via De Nicola, both very different expression of city life. Observed as elements of a larger system, they form the backbone of the entire design strategy that aims at defining a renewed experience of the city on a human scale. The guiding idea is to implement the comprehension of the access routes to the historic city, envisioning a clear subdivision of land use in the new Piazza: Via Marsala, the new car park on the railway tracks, and streets connected to it are intended as an infrastructural spine capable of absorbing road transport and traffic interchange. Via Giolitti, from Porta Maggiore, the ancient entrance to the city, joining Via De Nicola (imagined as a new tree-lined boulevard), becomes what Whyte and Appleyard described in the 1980s as a sociable street<sup>4</sup> and what Herman Hertzberger called a living-street<sup>5</sup>,

<sup>2</sup>Cfr. Nicolini, R. (1974), Il concorso per Stazione Termini, «Controspazio», 01; Piccinato, L. (1947), La stazione di Roma, «Metron», n. 21, pp. 2-7; Samonà, G. (1947), I progetti per il completamento frontale della stazione di Roma Termini, «Metron», n. 21, pp. 8-22; Trentini M. (2018), Il concorso per il fabbricato viaggiatori di Roma Termini del 1947. La cultura architettonica italiana del dopoguerra tra continuità e discontinuità, in «Piano b. Arti e culture visive», vol. 3 n. 1.

<sup>3</sup>Cfr. AA.VV., «Edilizia Moderna», n. 46, 1951.

<sup>4</sup>Cfr. D. Appleyard, M. S. Gerson, M. Lintell, *Livable Streets*, University of California Press, California 1981; William H. Whyte, *The social life of small urban spaces*, Project for Public Spaces Inc, New York, 1980.

a public space that generates a sense of community, social interaction and diversity of experiences: «The street is the river of life of the city, the place where we come together, the pathway to the centre»<sup>6</sup>. Via Giolitti is instead designed with a seamless ground that welcomes pedestrians. From Termini station, the street opens to a renewed system of enjoyment capable of holding together the large park of Villa Borghese to the east to the Parco del Colle Oppio to the south. The new Piazza dei Cinquecento – which is subdivided into two sectors of different sizes (the north-eastern, smaller, carriageable area and the south-western, larger, pedestrian area) – becomes the synthesis of the two: a pivot between the complex transport/infrastructure junction and a clear space dedicated to the pedestrian enjoyment of the historic city. The strategy for the rethinking the large public space is aimed at ordering, by giving it a clear hierarchy, the different heterogeneous conditions – monumental, historical/archaeological, environmental – present in this open space today. Following the initial action aimed at reallocating the system of mobility and pedestrian flows, the first architectural action was the insertion of a linear element capable of accommodating the required services and organising the system of public transport use, reconfiguring a new boundary to the north of the paved space, consistent with the large access canopy, The Dinosaur, to Termini station and with the built-up area on Via Giolitti. The new Hub and Terminal, directly accessible by Termini Station – without any interruption of pedestrian flows by roadway crossings – will be a founding element in the understanding of the spatial envelope of the new square, clearly highlighting its new edge. Starting from this element – a building working as a beam, suspended from the ground anchored only through few supports – conceived as functional cores (capable of absorbing both structural and logistic needs at the same time), the ground has been imagined as a continuous pavè, extending from the station's interior to the edges of the renewed public space, holding together the elements of the new project with the Servian Walls, Palazzo Massimo and all the buildings on Via Giolitti. To balance the architectural system defined by the large station canopy and the new Terminal and Hub roof, the project proposed to insert a new, green urban room in the centre of the perceivable open space. This equipped garden – main feature of the project, designed in consideration of the proportion of the space contained in Michelangelo's cloister – is imagined as a sequence of small green spaces, made and developed over time. This green space is fully integrated with what is built underground, and therefore able to accommodate the metro station's exits, public works of art and facilities. The idea of saving all the tree species already present on site and reconnecting them with new plantings to define a new shaded area with a specific atmosphere. The new horizontal hub, the pavè and the new green room constitutes the conceptual and strategic framework of the project proposal: three clear, recognisable and easily realisable elements (both in terms of economic sustainability and the organisation of the construction phases) capable, with targeted actions precisely measured and circumscribed in space and time, to reshape the great Piazza dei Cinquecento, making it a truly inhabitable space, human-scaled and multipurpose.

### **Piazza dei Cinquecento Alberi**

Florian Beigel liked to repeat when describing his projects, «Sometimes we say 'to design the carpet and not necessarily the picnic'»<sup>7</sup>. This lucid statement deals with the necessity of working within an existing urban fabric (the carpet) and continue it without any hesitation, and without necessarily adding any overimposing ready-made element (the picnic). Fate will, in a way, thread its way into those threads, letting the life of the city then flow undisturbed. In fact, the design proposal tries to collect the legacy of those testimonies of urban life that has been going on in Rome for thousands of years, relocating ancient strategies and contemporary questions into a new fabric, that can be a child of its but loaded with the memory of places. This design research tried to reinterpret the scale of the intervention site by intercepting existing parts in which to instil that sense of everyday, ordinary life, that throughout the millennia has condensed

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<sup>5</sup>Herman Hertzberger, *Lessons for Students in Architecture*, 010 Uitgeverij, Rotterdam, 1991, p. 54.

<sup>6</sup>William H. Whyte, *The social life of small urban spaces*, Project for Public Spaces Inc, New York, 1980.

<sup>7</sup>Beigel F., Christou P., *Baukunst 01*, Florian Beigel and Philip Christou, *The idea of City*, Ajand Limited, Londra 2013



the core of western civilisation and culture and the manifesto of the lesson inherited from the city of history, the stratified city of tomorrow. The new square has been imagined as a junction between pedestrian flows and, at the same time, as a place of being able to function as a large urban carpet for shared use. The architectural interventions intend to knot mobility and public space uses, defining an inhabitable collective space for everyone, citizens and travellers. The square is conceived through the juxtaposition of different layers, both horizontal and vertical: the first, that is underground, coincides with the existing metro lines; the second, intermediate, on which the ground plan operates, reorganising the main functional areas of the square, giving it a hierarchical structure and clearly defining the sequencing of the different spaces and the green system; finally, the third, that is, highlighting the compositional power of the buildings and monuments of historical, archaeological and cultural value that insist on the square. The size of the new square is divided, hierarchically, into three segments: the first, serving Termini Station, will be put in continuous flow with the passengers' hall, as a projection outward, a space for the main transit to the new public space and a connection with the main areas developed in and around the square itself. The second segment is characterised by a ground, in continuity with the first, described by the new Hub and Terminal the north/north-east, by the station to the east, by Via Giolitti to the south and by the large garden to the west. A true urban public space, this part of the entire area will be effectively recognisable as the Piazza dei Cinquecento, and the aim of the design proposal is precisely to give clear and perceptible recognition to this fundamental place in the city. The third and last segment has been imagined as a main ordering element of public space, more internal to the square itself, protected and enclosed by a system of long benches that encircle its edges. Constructed from an open mesh square grid whose overall dimensions are approximately 100 m by 100 m, the large garden in the square typologically and dimensionally recalls the basin of the nearby Michelangelo cloister of the Baths of Diocletian. The garden, imagined as a flexible device, by means of the replicable and expandable grid, will be able to model itself over time, including green areas, longitudinal and transversal crossing paths and part of the main accesses. The project envisages the maintenance of the existing tree species and the integration of new species in order to preserve the services and underground connections that are already present. The green areas are enclosed within a regular mesh, conceived as a means of control and rule for the development of the large new garden, generating a pattern of pathways and mineral areas. Recovering the memory of the ancient thermal vocation of the area, the insertion of a further layer made of water, emerging through a series of overflow fountains at different points of the paved space, helps generating an integrated green-water system capable of ensuring the general improvement of the microclimate inside the square, participating in the absorption of polluting emissions. The project, even in the definition of the detailed elements, objects and furnishings that punctually define the parts that make up this large regenerated urban basin, pursues the objective of working with a few inserts and useful elements to give a new orientation and geography to the square. When crossing from the station canopy, three public urban rooms are contiguous to the three major urban axes. One is oriented by means of a few but sharp signs on the ground: the two 30 m long stone benches encircle the edges of the large paved square dedicated to the crossing of citizens and travellers and to contain the portions of the pavè that could be covered in water, with slight differences in depth and intensity; the second system of longitudinal benches, smaller and scattered across green area, delimits the edges of the large equipped garden, containing all the permeable soil, the concentration of trees, and the equipped spaces; towards Via De Nicola a precise row of new trees define the last edge – more and more permeable – of this crossing sequence. The large, equipped garden tries by means of a 5x5 m grid, conceived as an instrument to manage the uncontrolled development of green areas, to set up changeable layouts of the new large urban green lung. Following the articulation of statues, stelae and sarcophagi arranged along the four wings of the Cloister of the Baths of Diocletian, rich in precious archaeological remains and embellished by the fountain with elements from Trajan's Market, the new garden's basin is also composed of a few fixed elements, circular podiums of stone or compact ground surrounded by slender benches at various heights, which interrupt the sequence of green areas at different densities and identify "oases" where to place a system of flexible seating that work with the possible insertion of small temporary stalls

(following the structural mesh of the overall layout) (refreshment areas to be given in management and private to ensure vitality and at the same time civic security of this new park) and guide the definition of new polarities of the equipped garden itself: the playground spaces to be set up, the area of the tall statue dedicated to Pope John Paul II, further possible parcelling out of the large green lung to be allocated to cyclical and seasonal events connected to the planned initiatives such as the possibility of creating temporary installations to enjoy sheltered spaces from the summer heat or the chaos of urban mobility and to participate in the initiatives taking place in connection with the hub's activities by promoting the work of the city's creative youth and expressing the public and authentically civic nature of the new spaces. To answer to this deconstruction, parcelling and disarticulation of the activities present within the square, which are piled up without any order, the project envisaged the insertion of a single, well-defined element capable of collecting and encompassing essential uses at the service of the station and including an area dedicated to the bike hub, directly accessible on foot once you leave the station. A new linear volume, a strongly horizontal beam building suspended from the ground designed to relate with the Termini station building formally and typologically (and harmoniously dialogue with its frieze) and with the Servian Walls, generates new architectural tension between these three elements.

## Conclusions

The project for the new Piazza dei Cinquecento invites to a new urban experience, directing the travellers' path across the square along an ideal axis that cuts the square longitudinally, through mineral and vegetal areas, to enhance and strengthen the connection with the Baths of Diocletian, which are today separated by excessive visual pollution and the chaotic arrangement of a multitude of elements, generating a renewed physical and perceptive relationship between the elements. Starting from the proposed large green space, the new Piazza dei Cinquecento could also lead to reconsider – far from the rhetoric of greenwashing – the name of the place itself, shifting from the adherence to a colonialist memory and back to a renewed environmental awareness: the new Piazza dei Cinquecento Alberi (Five Hundred Trees) represents an opportunity to reflect on the value of integration, of building with what the city already possesses within it and how to regenerate starting from the existing. This rebirth is thus understood in continuity with natural urban evolution. Tangible actions in which architecture is a support for urban life, a physical scaffolding thanks to which it is possible to orient but not order, to suggest possible uses, leaving the actual construction of space to the flow of life.

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#### Illustrations and tables



Figure 1. Model photo, scale 1:500



Figure 2. Model photo



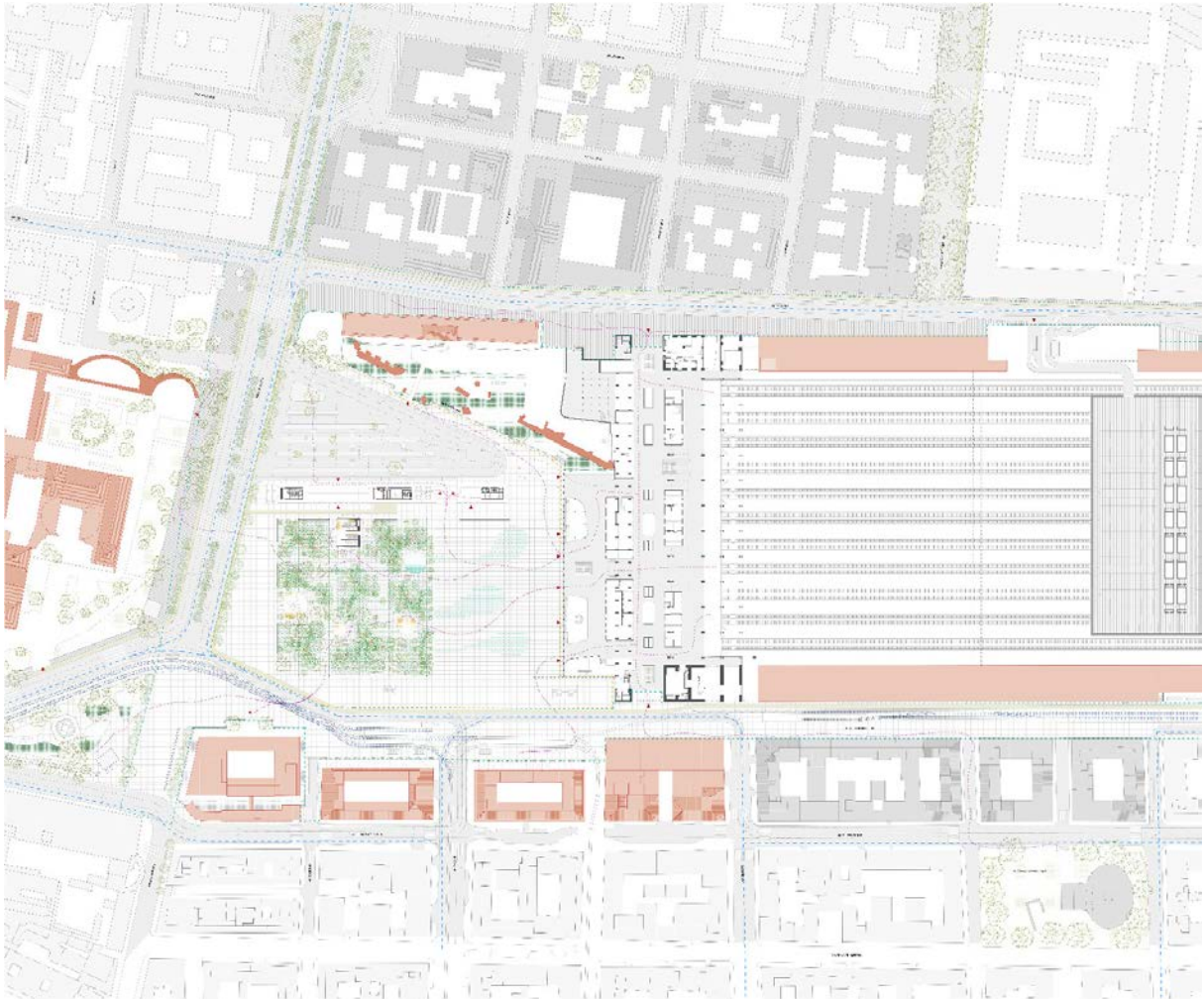


Figure 3. General plan



Figure 4. View from the Termini Station canopy



Figure 5. View from via Giolitti





## Patterns of Intention

### Project hypothesis for San Siro district, Milan

Francesca Belloni<sup>1</sup>, Francesco Bruno<sup>2</sup>

<sup>1,2</sup>Dipartimento di Architettura, Ingegneria delle Costruzioni e Ambiente Costruito. Politecnico di Milano. Milano. Via G. Ponzio 31. 20133

E-mail: <sup>1</sup>francesca.belloni@polimi.it, <sup>2</sup>francesco.bruno@polimi.it

Keywords: *Urban Morphology, Urban Regeneration, City in transformation, Urban Project, Settlement density*

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *San Siro district, located west of Milan, was built between 1930 and 1947. Although the district appears unitary and compact, in formal contrast with the surrounding city, the events leading to its construction covered a period of about 15 years and involved numerous architects.*

*Today the district is an all-round "case": it presents an advanced state of decay that the administration finds difficult to cope with, and it has become sadly famous for social problems of various kinds since it hosts a very high population density and inhabitants of different ethnic groups.*

*Although numerous social reactivation projects have been promoted in the last years, a strict planning reflection is necessary. If on the one hand, in fact, some have put forward demolition and reconstruction projects, others would prefer to rely on minimal maintenance. The urban project, however, must critically recognize the significance of tradition and test its concrete possibilities through an act of experimentation and knowledge able to read the needs for change in the urban form and integrate them within the current technical, economic, and social constraints.*

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### San Siro district as a case study

Commonly called Quartiere San Siro, the district consists of a large quadrangle converging on Piazza Selinunte and it is formed by the Quartiere Milite Ignoto, which corresponds to the west sector, and the Quartiere Baracca, corresponding to the eastern quadrant. Located west of Milan, it was built between 1930 and 1947 within a vast residential program. Although the district appears today mostly unitary and compact, in contrast with the surrounding city, the events leading to its construction covered a period of about 15 years and involved numerous architects, who had been working at various times without a unitarian masterplan.

A model of Milanese Rationalism, the district encompasses, declining it according to different settlement principles, the answer to the problem of public housing and shows the transition between the urban tradition of nineteenth-century heritage and the new instances of M.M.

Part of the Gabriele D'Annunzio district – now known as San Siro Milite Ignoto, which corresponds to the western sector of the large quadrilateral around Piazzale Selinunte – was designed by Franco Albini, Renato Camus, and Giancarlo Palanti (1938-1941), following the competition launched by IACPM (Istituto Autonomo Case Popolari di Milano) in 1932 for the Francesco Baracca district, which was meant to rise onto a nearby area northwards (Grandi, Pracchi, 1980).

The results of the public competition represent one of the starting points of this event and shed a light on the complementary cultural context. The IACP did not proclaim any winner, but Albini, Camus, and Palanti together with Kovacs were ranked second, ex aequo with Gaetano Angilella and the group composed by Alberto Morone and Fausto Natoli.

By analyzing the different projects presented, it is immediately clear how the new rationalist canons are openly in contrast with the nineteenth-century legacy, giving rise, on the field of the project, to proposals that attempt to mediate between the schematic application of rationalist principles and the traditional perimeter block development (Istituto per le Case Popolari di Milano, 1933). Among the many others, the most convincing proposal in this sense is certainly that by Enrico Griffini, Eugenio Faludi, Piero Bottoni, and Giovanni Manfredi: confirming the perimeter of the block, the insertion of low buildings helps in defining deep inner courtyards through which the architects solve the problem of the different orientations due to the trapezoidal shape of the block.

A clear endeavour to confirm the morphological structure of the Beruto Plan and the further urban plans, this project works anyway in a modernist direction, introducing elements derived from the experiments beyond the Alps, of which Griffini was aware, being at that time among the main Italian promoters of the Weissenhof housing models in Stuttgart and of the Existenzminimum (Griffini, 1932; Camponogara, Demartini, Ferrari and Poli, S. 2012).

Franco Albini, Renato Camus, Giancarlo Palanti, and Ladislao Kovacs work on a different level with a markedly rationalist proposal that presents in nuce the elements that will characterize the San Siro Milite Ignoto district, but also the well-known Fabio Filzi (1935-1938) and Ettore Ponti (1938-1941) districts. An embryonic formalization of rationalist ideas takes form, though in some ways mitigated by the introduction of a long building parallel to Via Harar, whose east-west orientation demands for the introduction of a balcony distribution, ideally anticipating the well-known building designed for the Harar district twenty years later by Figini and Pollini. Although the location and distribution principle are the same, the two buildings refer to different settlement ideas: the Harar district is built around a large open space, applying the German derivation principle of the *Mischbebauung*, while Albini, Camus, Palanti, and Kovacs work exclusively on the correct layout of the buildings inside a Berutian block. The introduction of the building along Via Harar is the last link with the settlement mode of the perimeter block

development that will be completely disregarded in the San Siro Milite Ignoto district, in favor of a construction freed from the relationship of dependence between streets and building curtain.

The project for the west sector of the quadrilateral of San Siro is in all comparable with that for the previous Fabio Filzi district, exemplary model of Milanese rationalism, with respect to which on the pages of Casabella-Costruzioni, Giuseppe Pagano will express himself in these terms: «open houses on all sides instead of the usual barracks with closed courtyard; houses made for the health of the inhabitants and not to act as a curtain to the street sidewalks; houses well aligned and rationally arranged instead of the well-known samples of the twentieth-century showiness» (Pagano, 1939). If the similarities between the two projects are obvious and relate to the policies for the workers' home implemented in those years in Germany, Austria or Holland, the authentic trait that distinguishes the two achievements is the kind of relationship between buildings and city and, of no secondary importance, the general dimension of the intervention. As regards the first point, the buildings are aligned and oriented according to the helio-thermal axis, thus complying with the development of the north-south axis of Viale Mar Jonio and Viale Aretusa, traced as perpendicular to Via Harar in the Pavia-Masera Plan in the early 1910s.

This axis introduces a rotation of the urban pattern with respect to the field's direction, oriented in parallel with Corso Sempione, and generates a gap of about 45 degrees that produces a sharp break with the rest of the urban structure. Although not considered in the general organization of the south and west sectors, such a caesura represents a design problem, as it is demonstrated by the planimetric articulation of the other quadrants, which presents hybrid solutions between the peremptory application of helio-thermal standards and the partial or total construction along the perimeter of the blocks. In this sense, the two trapezoidal blocks that make up the northern become particularly meaningful.

Added to all this, the considerable extension of the district on a total area of about 305,000 square meters makes it unique: the single intervention of the west sector (the one coordinated by Albini, Camus, and Palanti) occupies an area of 68,000 square meters, against about 14,000 square meters equal to the extension of the Fabio Filzi district. Further distinctive elements with respect to the Fabio Filzi district are the higher settlement density, obtained at the expense of open spaces, and the absolute lack of resources to carry out the intervention. On top of that, the morphology of the settlement and its specific relations with the surrounding city, has contributed over the years to the progressive marginalization of the neighborhood and its inhabitants from any form of urban dynamics, contributing to accentuate that «air of bureaucratic poverty» (Pagano, 1942) already evident immediately after its realization (Cognetti, 2015).

### The state of affairs

Today the district is an all-round "case". It presents an advanced state of decay that the administration finds difficult to cope with, and it has become sadly famous for social problems of various kinds since it hosts a very high population density and inhabitants of different ethnic groups – 6,110 dwellings accommodate about 12,000 people. «The 230,000 square meters of residential areas are divided into sixty fenced lots with 124 buildings (three to five floors high), 421 staircases and over 6,000 apartments. Some apartments have been sold, some are illegally squatted and others have been left vacant to be reconditioned» (Fianchini, 2011). Of the 6,133 total accommodations, 2,925 make up the Quartiere Milite Ignoto and 3,208 the Quartiere Baracca with more than 5,600 foreign inhabitants, 29.7% of elderly inhabitants and about 800 residents with mental disabilities (for updated data see the Mapping San Siro project online archive).

The acknowledgment of such obviously critical condition and its assumption as a state of affairs to work on, it is possible to identify three different approaches.

The first deals with the problem by implementing a kind of Realpolitik which would operate pragmatically, beyond any ideological presupposition. This is the strategy of ALER and Comune di Milano. The institutions rely on the allocation of resources to finance interventions, unfortunately always partial and sectorial, aimed at the «regeneration of San Siro and the improvement of the quality of life of the local community» through actions of «recovery of public residential buildings, social revitalization with social policies for inhabitants of the neighborhood and activities to combat lawlessness and spread a culture of legality» (see the Protocollo d'intesa per la Rigenerazione del Quartiere San Siro tra Prefettura di Milano, Regione Lombardia, Comune di Milano e Azienda Lombarda per l'Edilizia Residenziale Milano, 26th October 2021). A second strategy is then identifiable, closely linked to the first one due to its predominantly social nature. In recent years, in fact, many social reactivation projects have been promoted, which have proved capable of activating the neighborhood with interventions of 'urban surgery' and microubanism on the one hand, and participatory actions of cultural promotion on the other. These include the research-action project Mapping San Siro – promoted by the DASTU - Politecnico di Milano and coordinated by Francesca Cognetti, with the support of Liliana Padovani and other parallel programs, such as Green Living Lab San Siro or Caravansaray Selinunte San Siro promoted by the associations Temporiuso and Outis respectively.

The third approach, recently considered as an alternative for the solution of the San Siro "case", corresponds to the initiative of Massimo Roj and Gianni Verga for the "Rigenerazione dei quartieri ERP a Milano nel contesto del Piano di Governo del Territorio" (Assolombarda, 2021). Compared to the previous ones, this type of intervention acts at a different level, suggesting a radical change in the general urban structure. Echoing modernist utopias, it proposes the utter though gradual demolition of the district and its subsequent reconstruction, to ensure greater settlement density, lower land consumption and a significant increase in green.

Starting from a study carried out on the entire city, this analysis identifies some possible sample areas (Vialba and Quarto Oggiaro, Giambellino, Stadera, Sant'Ambrogio, Comasina, Corvetto and San Siro) among which San Siro stands out as the privileged point of application thanks to its barycentric position with respect to some key areas of recent and imminent transformation, such as CityLife and the entire area around the San Siro Stadium. Roj and Verga emphasize that the one presented for San Siro is not a project, but a methodological proposal aimed at demonstrating that enhancing the social housing areas is feasible, especially on the economic and financial level. The issue of urban regeneration and its transformation process is therefore addressed by tackling the problem from the point of view of urban economy and the possible margins of interaction between the public and the private realms, in line with many of the recent "regeneration" operations implemented in Milan.

This proposal is certainly notable for its operational scope, but it does not seem convincing in terms of urban structure and architectural relationships. Even starting from the assumption of not considering this proposal as a project, it is immediately clear how its different formalizations highlight the potential of densification while not considering the status of the city and its morphological possibilities, and even more, renouncing to assume the even only partial conservation of the existing buildings, thereby completely erasing the material heritage of the settlement and consequently the spatial and social memory of places.

At this point, a consideration of a strictly design nature could be useful to enrich the picture. In similar contexts, the urban project should necessarily be accorded the ability to test its own concrete possibilities, as an act of experimentation and knowledge able to read the urban



form and its transformation requirements in order to integrate them with today's economic, social, and technical constraints.

It seems to be necessary to investigate on how to measure the sustainability of such an intervention in terms of urban spaces and how this can be referred to the San Siro case study.

First, the objectives of the work must be clear and can be summarized in three points:

1. to preserve the neighbourhood recognisability, keeping as many existing buildings as possible;
2. to maintain or increase the urban density;
3. to build recognizable urban spaces with more free soil.

Moreover, by reiterating that nowadays economic and financial sustainability, social strategies, cultural integration, and possibly environmental sustainability, though fundamental for the urban project, are associated to a variety of policy areas and are consequently difficult to evaluate on strictly spatial terms. However, these parameters need to be measured against a given spatial conformation to identify the long-term disadvantages and benefits of the project. This necessarily means referring to a specific idea of city, putting the problem clearly and seeking a coherent solution.

It would be possible to mention many useful references to explain the case in terms of the general structure of the city and the block construction: just to quote the best known, the question is very similar to what is summarized in the 'schematic description of the growth of the modern development plan' by Ernst May (May, 1930, 34) or with the well-known drawing *La ville classée - les villes pêle-mêle* by Le Corbusier.

As a way of constructing the reasoning on the project, it must be added the use of analytical tools inherited from the tradition of urban studies which, in this case, consist in overlapping the current situation with the historical maps in order to find in the existing urban structure some of the reasons for the project.

One of the biggest problems of the neighborhood could be identified in the absence of physical – and therefore social relations with the rest of the city; this is largely due to the relationship between streets, morphology, and settlement density, in particular for the west and south sectors, but also for the southern portion of the east sector. The indifferent layout of the buildings according to the helio-thermal axis has excluded the roadside construction of the blocks, consequently exacerbating a problem generated with the Pavia-Masera Plan and the tracing of the north-south axis. However, even the dense and uniform row construction in accordance with the prevailing orientation of the block, where it is used, produces a disorienting urban condition for the indifferent uniformity. It should also be pointed out that, particularly in the west quadrant, the main spatial problem is the excessively close detachment between buildings, which does not allow any other type of space than the functional one at the entrance to the individual stairwells. The general plan and especially the urban profiles clearly show the terms of the problem.

The central north-south axis has also proved to be one of the morphological elements of difficult management in the relationship of the buildings with the surrounding city. For this reason, the choice of Roj and Verga to propose the construction of a boulevard at this axis seems to play against the project, despite the clear reasons for the axis, related to the greater caliber of the central avenue and therefore the possibility of building in height.

To complete the picture, it should be noted that the eastern portions of the east and northeast quadrants differ morphologically and typologically; in particular, the portion of the eastern quadrant directly overlooking Via Carlo Dolci has courtyard buildings that confirm the perimeter of the block. They were designed by Giovanni Broglio and the IACP around 1930, following a first competition launched in 1920 for the areas facing Piazza Monte Falterona. Some rowhouses

with private gardens on the northern side of the square date back to the same years as well. All this testifies to the original research for a marked typological articulation and contrasts with the uniform development of the blocks built subsequently in the southern portion of the quadrant. The typological and morphological variations, where present, are certainly a positive factor to avoid the construction of a new urban enclave and use instead the existing architecture to build through the project a new relationship with the city.

### **Architectural montages as urban project tool**

Starting from these hypotheses it has been deemed possible to utilize the architectural montages as a tool to measure and define the spatial structure and places and to explore the possibilities offered by other proposals in order to understand, without any ideological nor formal preclusion, what kind of structure, what type of urban project, what idea of city are compatible with the existing constraints and the established objectives. All this is meant by working on the same cartographic base and without any distortion of scale related to the projects used in the comparison.

If the montage of the CityLife project shows a correspondence of measurements due to the repetition within the city of the dimension of the Berutian block and its sub-multiples, here as there, also reveals a lost relationship with the urban structure. The same consideration seems possible with regard to the proposals of Roj and Verga which, beyond any linguistic choice, show that the formal basis of the whole layout has a controversial nature compared to the city. However, it is precisely these first two montages that reveal the possible ways of thinking about settlement density, which is one of the conditions imposed by the sustainability of the intervention in economic terms.

The IACP Mac Mahon district – built in 1908-09 and designed by Giannino Ferrini – shows the possibility of overwriting the rationalist model with the perimeter blocks construction, typical of the nineteenth-century city, though referring to a character of enclosure with respect to the surrounding areas. Similar considerations can be made from the montage of *Aufteilung und Bebauung eines Baublocks... mit schweren, inneren Wohnstrassen nach Gemischter Bauweise*, 1910 by Bruno Möhring, Rudolph Eberstadt and Richard Petersen, who, like Mac Mahon, alludes to the possibility of a mixed-use settlement with different buildings heights. The montage of *An ideal diagram from Amsterdam Sud Plan* by Heindrik Petrus Berlage, on the other hand, indicates that, beyond a possible morphological affection for this type of urban configuration, is necessary does not reduce the complexity of the settlement and identify in the existing urban framework the substance of a possible construction.

The montage of Plan Voisin produces similar considerations as well as showing that, as in Le Corbusier's experiments, the high-rise buildings may represent an alternative to the way of building the block, highlighting once again the need to strengthen the relationship between buildings and streets. The Lafayette Park in Detroit and the *Résidence Le Parc* in Meudon-la-Forêt provide a convincing mode of operation. While deconstructing the typical block of nineteenth century, the one identifies in fact a precise organization of the settlement through the mutual disposition of low-rise houses in relation to high-rise buildings, while the other demonstrates how it is possible to identify spaces inside the blocks – courts and courtyards variously articulated, without using the courtyard type in its traditional configuration.

### **Conclusion**

Though apparently obvious, given the complexity of the problem, the so far developed considerations demonstrate and reveal that any study of urban morphology is only able to

offer an operational answer, and only through this kind of response a precise disciplinary status can be claimed. To investigate the complexity of contemporary urban phenomena, it is required not just the ability to cooperate between different disciplines, but above all a consideration of a spatial nature, able to reconnects to itself needs and constraints, solutions, and possibilities. The history of the city through the projects shows how it is necessary to bring all kinds of intervention, especially at the urban level, to their morphological basis. Although the risk of falling into an abstract dissertation is high, it is considered necessary to use such tools with the aim of operating an addition to a text already written. In this way the project is interpreted as a process of change within the city, starting from its tangible condition, wanting to recognize in the approach before than in the project itself a sort of settlement sustainability, both morphological and spatial. At this stage it could be considered as a thought in general terms in order to get finally to the architectural definition of the project, which will then be the real test bench of the entire research, both from the point of view of the specific case and in general as a mode of consideration and knowledge.

Back to the question about the possibility of measuring the sustainability of an intervention in urban terms, it is necessary to underline how the different trends in the contemporary cultural panorama are often read as alternatives and their complementarity with each other or with the existing city is hardly ever hypothesized. For example, the critical reconstruction of the block in the Berlin and North-European way, often implemented in the form of an explicit return to the nineteenth-century city, is read in total opposition to the most fashionable mainstream trends of CityLife or Porta Nuova. Both of these modes of intervention seem, however, to have produced, in different forms and beyond the linguistic connotations or the vitality of the places, separate islands within the urban structure. If we consider them applied to a social problem such as that of the regeneration of working-class and ultra-popular neighborhoods and if we read them from a long-term perspective, both alternatives appear to be at risk whenever compared to the city and the housing problem. The same could be said, albeit for other reasons, of a possible re-proposal of the rationalist model.

The afore mentioned reasons are behind the title of this essay, Patterns of Intention, which refers to a well-known book by Michael Baxandall and his general exhortation to critically analyze the process leading to the formulation of absolute judgments, reading them in relation to the past and to any form of contemporary conditioning.

As Baxandall suggests, it is in these cases – more than in others, that the urban project must critically recognize the meaning of tradition and explore its concrete possibilities, by abandoning monolithic visions in order to open up to settlements that are hybrids in some ways, able to combine differences, with the final objective of accepting the city in its whole complexity and fragmentation, interpreting it as resource and not as negative constraint. This would result in an act of experimentation and knowledge able to accept the instances of urban formal change and to interpret them in the light of technical, economical, and social constraints. The attempt is therefore to open the urban structure with the aim of defining spaces characterized by a greater articulation and definition than those currently existing; urban spaces able to return the complexity of a rich and articulated structure, that goes beyond the simple functional construction of the street/house relationship, characterized among other things, in this specific example, by an alienating monotony and harbinger of negative social implications. Existing buildings may however be a resource, in an attempt not to erase the physical consistency of the neighborhood, whereas their partial maintenance could help define courts, streets, squares, that is to articulate the typical complexity of heterogeneous urban forms, introducing all those elements of complexity which characterize of the traditional European city.

Bearing in mind Roland Barthes's teaching at the end of his inaugural lecture at the Collège de France in January 1977: «There is an age at which we teach what we know. Then comes another age at which we teach what we do not know; this is called research» (Barthes, 1981).

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**Figure 1.** Scheme of some spatial elements existing within the urban structure: the layout of the Beruto Plan (in red), the north-south axes from the Pavia-Masera Plan (in purple), and the fields orientation (in green)





**Figure 2.** Overlay of the Pavia-Masera Plan (1910-12) on the current Schwarzplan of Milan: general plan and detail of the San Siro district



**Figure 3.** San Siro district: typological survey of the typical floor plan



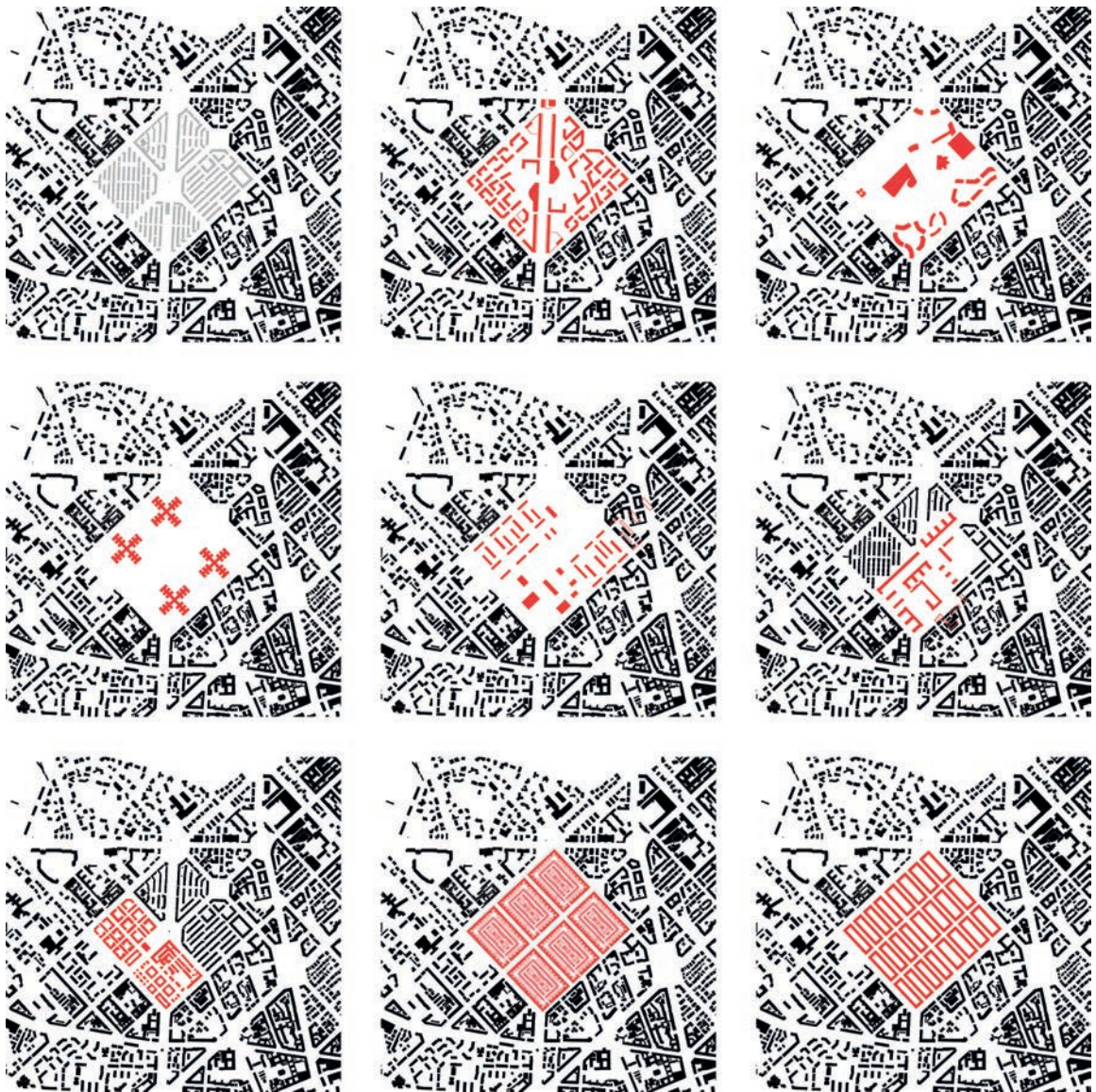


Figure 4. San Siro district: architectural montages as urban project tool



Figure 5. Project proposal for San Siro district





## A modern and ancient way of making a square

Nicola Campanile

Politecnico di Bari, DICAR (Dipartimento di Scienze dell'Ingegneria Civile e dell'Architettura)

E-mail: nicola.campanile@poliba.it

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Conference theme: *Design a Sustainable Urban Form*

**Abstract.** In his book *"The Architectural Composition of the City"*, Andrej Bunin, a 20th-century Russian theorist and urban planner, considers the Campo dei Miracoli in Pisa to be a paradigmatic exemplum of a specific way of forming a square: the ensemble. The ensemble indicates the grouping of a certain number of buildings, identifiable as distinct volumetric units, held together by a precise compositional law that governs their arrangement and the reciprocal relationship of proximity. A type of "open" square that is built through the grouping of volumes, whose definition of the border does not seem to be what characterises the idea of a public place, but rather the ensemble of distinct architectures united by the recognition of the value of the centre. This is an important lesson in order to become aware of a mode of urban composition that can be recognised precisely in certain manifestations of ancient Greece, one thinks of the experience of the Greek acropolis systems and even more so of the urban phenomenon of open "agorai", but which also assumes an interpretative posture of a way of composing the urban in the 20th century.

A certain thought has produced with respect to composition by tension between distinct volumes a stigma, pointing to this compositional mode as destructive of the idea of space.

This is clearly not the case: some of the most paradigmatic architects of the 20th century – Le Corbusier, Mies van der Rohe, Leonidov – have produced very profound research on this way of composing. In this sense, the contribution aims at investigating, through the examination of three exemplars of the aforementioned masters, certain ways of forming the architectural ensemble, recognising the conditions of possibility and the techniques of composition.

## Introduction

As is well known, the comparison between the historical centre of Parma and Le Corbusier's project for the centre of the French city of Saint-Dié, proposed by Colin Rowe and Fred Koetter in *Collage City* (Rowe and Koetter, 1979), is preparatory to the demonstration of the two alternative and radical ways of constructing urban space. Through the powerful tool of the "figure-background" plan, Rowe and Koetter apply the dyad proposed by Heinrich Wölfflin (Wölfflin, 1917) in the aesthetic field of "closed form-open form" to the analysis of urban morphology.

The result is the famous depiction of the urban centres of the two cities: on the one hand, the centre of Parma can be read as a "closed" form, i.e., to use Wölfflin's definition of this category, «a figuration that [...] reduces the picture to a well-circumscribed image, which in every part refers back to itself». The city of Parma can be understood as a unitary volume, a "fullness" in which the public and uncovered space of the city – the streets, the open spaces, the squares – is in a close relationship with the covered space of the building, to such an extent that it can be understood as a void effect of a subtraction, an "excavation" implemented in the compact materiality of the built-up area.

On the other hand, Le Corbusier's project for the centre of Saint-Dié reflects the concept of the "open form", the principle of which resides in the tension, still quoting Wölfflin's definition, «in each of its parts to go beyond itself, to appear unlimited, although a hidden delimitation always exists and it is the one that confers a character of completeness in an aesthetic sense». The centre of Saint-Dié breaks away from the idea of the excavated volume and indicates, as an alternative way to reach the finiteness of urban space, a systematic topological relationship between distinct architectures, which are characterised by being at the same time bodies endowed with a formal absoluteness but capable of building a tension of proximity with other bodies, thus giving value to the space that separates them.

As can be seen from Wölfflin's definitions, the modes of closure and opening rationally converge in the definition of a figure that has "a character of completeness in an aesthetic sense". In this sense, the representativeness of the urban space and the related problem of its delimitation constitute the founding core of the question at hand. In this sense, the interest in the problem of the formal definition of public places in the city and the ways in which to define their spatial limits (and by translation their limits of meaning) are resolved in the urban theme of the piazza. As was the case with Parma and Saint-Dié, the public place par excellence – the piazza – has already received a systematic codification according to the way it is composed, in the two radical and opposite possibilities of "closed piazza" and "open piazza". If for the former one can still associate the image of the excavation, or even better of the enclosed space, to formalise the idea of gathering, the latter links to this idea the topos of the "field of relations" (Capozzi and Visconti, 2012).

The "enclosed" square is usually associated with the urban type of the forum, where through the act of enclosure a physical delimitation circumscribes, in the city, a certain portion of space and makes it a "place". One thinks of the forum of Pompeii, an enclosed and uncovered "urban room", defined as an empty space delimited by the perimeter of the portico, on which the public buildings facing onto that empty space stand. But think also of the system of the imperial forums, an exemplary concatenation of this urban type, such as the synthesis of the public enclosure offered by the piazza of Vigevano, up to the French codification of the Place Royal.

The "open" square is expressed not so much in the architectural definition of the perimeter delimitation, but in a topological ensemble of distinct architectures united by the recognition

of the value of the centre. In this kind of composition, the architectures are grouped together without prejudice to the distinctions that connote their individuality (Giedion, 1968). Such architectures are distinguished in their autonomy because they correspond precisely to defined and stable architectural types. What is important is the way they gather and take tension, configuring a space between them that guarantees their finiteness and completeness. The “open” square is thus constructed as an urban public place in itself that also describes the variety of the city, by means of a scalar procedure that theatricalises the complexity of the urban through the tumultuous perception, but at the same time governed by a powerful rationality, given by the grouping of its distinct bodies.

The Acropolis of Athens is a certain example of this second urban type. It is a group of distinct architectural units that are clearly identifiable and named – the Propylaea, the Parthenon, the Erechtheion – which are composed, without agglutinating but only through positioning strategies, on a basement layer – in the case of Athens, the summit plane of the natural rock – that “discards” in elevation with respect to the surrounding space.

Specific to this essay, the mode of composition of urban space that favours the “open” form through the juxtaposition of distinct volumes will be investigated, identifying it from now on with the term ensemble.

### **The fundamental conditions of possibility of the ensemble**

The term ensemble is widely misused for those building ensembles that define residential systems, and thus related to the theme of the house (Klein, Hamel, McLean, 2011). Instead, it can be understood more fruitfully as one of the principles of urban composition that, through the definition of architectural singularities and the tension of space between them, is capable of giving meaning and form to public places and new centralities for the contemporary city (Meriggi, 2007).

The ensemble is not, as we mentioned earlier, a new theme: it is connected with the ancient notion of the arrangement of isolated things, namely collocatio as categorised by Alberti: «collocatio ad situm et sede partium pertinent» (Alberti, 1450). Although Alberti intended the category of the architectural collocatio only to be experienced empirically, at most intuitively, and for which «it is easier to sense when it is unsuccessful than to clarify what is the right way to achieve it», the aspiration of the present essay, the synthesis of a doctoral research still in progress, is to provide greater awareness with which to attempt to advance research on this mode of composition.

However, before addressing the problem of collocation, some fundamental forethought on the problem of ensemble configuration is necessary. As mentioned in reference to the Acropolis exemplum, the ensemble is connoted by being an open figure, the result of a grouping of distinct architectures. These architectures, then, given their necessary distinguishability, must preliminarily guarantee the solidarity of the ensemble through the exact definition of the architectural type underlying their forms. This is an essential first condition for governing this type of composition. In well-known ancient and modern examples – such as the Piazza dei Miracoli in Pisa or Egon Eiermann’s design for the Kaiser-Wilhelm-Gedächtniskirche in Berlin, as well as Mies van der Rohe’s Federal Centre in Chicago – it is the aula, tower, stoa and basilica plan types that clarify the formal autonomy of the individual architectural “pieces” in the first place (Neri, 2012).

According to this analytical approach, one should no longer observe these architectures as “separate things” but rather as “related things”, held together first and foremost by their common condition as autonomous architectural bodies (Kaufmann, 1933), thus allowing

secondly access to the examination of the positioning strategies determining the ensemble figure.

One could summarise, then, that the definition of the architectural type is a necessary but not sufficient condition for the explication of the urban type given by the ensemble composition.

This analytical procedure does not so much intend to dwell on the study of individual architectural types, having indeed taken the exact typological structure of individual architectures as a prerequisite, but rather on the combinatory possibilities of forms. The system of combinations that gives the ensemble its role as a structure (of an urban type) establishes relationships between the forms that constitute this architectural ensemble.

It will therefore be necessary to undertake a preliminary analysis concerning the identification and abstraction of typical forms that recur in architectural ensembles, sorting them not only by genre but also by hierarchy. The forms we wish to discuss must be characterised by their "genericness" as defined by Peter Eisenman (Eisenman, 2005) with the concept of "generic form": «The expression "generic form" is understood here in the Platonic sense, as a definable entity endowed with its own intrinsic laws [...] The generic form [...] has by its very nature intrinsic dynamics that must be understood and respected if any grammatical use or interpretation of a given solid is to be attempted».

The nature of the generic form makes it possible to associate it with the notion of the Platonic solid, reflecting the possession of those geometric properties that permit the configuration of polyhedra from the identification of congruent regular polygons such as the equilateral triangle, the square, the pentagon, etc. Among the properties of solids proper to Euclidean geometry, of interest here is an initial articulation that, in the purely architectural context, can be implemented for the categorisation of these forms: one can thus identify in the first instance "centric" and "directed" forms.

By "centric" forms one must mean all those solids constituted by the iteration and composition of one or two regular figures, through which there is an identical vertical and horizontal development. The tetrahedron, the cube, the cylinder whose height is equal to the diameter of the base, are some of the solids that can be obtained through this type of configuration. The characteristic feature of the centred form consists in the equivalent weight given to the vertical and horizontal directions, favouring neither development.

Directional shapes differ from "centric" shapes in that, instead of the equality of horizontal and vertical, the alternative development of one of the two directions takes over. Thus, all those right-angled prisms that can be traced back to assembly operations of two or more "centric" solids belong to this family. Superimposed centric shapes, for example two stacked cubes, give rise to a geometric solid in which the regular matrix is still recognisable, but where one of the two directions of development, in this case verticality, dominates. Depending on the direction assumed by the assemblage vector, such forms will be specified as "horizontally directed forms" or "vertically directed forms".

Within the casuistry of directed forms, it is possible to identify three sub-species that play a particular role in the logic of the ensemble (Fig. 1). It is possible, *sub specie architecturae*, to name them the "gallery", the "enclosure" and the "podium". Their formal genesis will be mentioned, followed by an explanation of why their presence plays a special role with respect to centred and simply directed forms.

The "gallery" still envisages as a compositional procedure the assemblage of centred forms, just as it does for each directional form, but only following the horizontal development. It is, moreover, a formal category that also differs substantially from 'horizontally directed forms' in that, compared to the latter, the horizontal development is quantitatively predominant with

respect to height, to the point of being configured planimetrically as a line.

The “enclosure” follows, like the gallery, the horizontal development, but its genesis is no longer imprinted solely by a horizontal translation vector, but rather by the combination of a horizontal translation vector and a rotation vector. The roto-translative transformation imparted to the initial centric form defines the enclosure as a closed figure: starting from this fundamental condition of closure of space, it can alternatively be configured as a broken line, in the case of a figure with edges and open, or as a polygon in the case of a closed figure (within a practically unlimited casuistry that involves the most regular square form up to any irregular polygon). Even a curve, open or closed, can configure an ‘enclosure’, by virtue of the absence of translational motion and thus a transformation of the centric form due solely to the rotation vector.

Finally, the “podium” is a figure generated by the combination of two horizontal translation vectors. Assuming as a reference an x,y,z Cartesian plane, an initial generic centred form and two translation vectors oriented along the x- and y-axis, the result of the transformation imparted by the two vectors to the centred form will be a figure whose width and length will be of predominant order with respect to its height. This is the case for the surface, which can therefore architecturally translate into the podium element with respect to the gallery and the podium. The gallery, the enclosure and the podium are forms that share the intrinsic property of delimiting space. These bodies have the common role, alternatively or sometimes simultaneously, of separating the indefinite space – be it the natural space offered by a site in the countryside or the urban one in the case where the context is the city – from the ensemble’s “field of relations” (Costanzo, 2007), imposing themselves as physical limits on several levels: the gallery constrains only one boundary of the field, the fence generally limits three, while the podium guarantees total constraint by defining the entire extent of the field, thus placing itself in equivalence with the concept of pictorial background in art theory (Kepes, 1944).

The task, therefore, that the gallery, the enclosure and the podium have in the logic of the ensemble is to give a figuratively accomplished basis – as indicated by Wölfflin – to the ensemble of bodies. In other words, these forms tend to “configure” the ensemble, while the “all-round” bodies that stand in front, inside or above them, respectively, have the role of “determining” the internal tensions through the procedure of collocatio. The act of configuring appropriately presupposes a figuration, that is, the performance of an ordering role of the tensions arising from the collocatio, endowing the overall figure with a physical substratum with which to make evident, measurable, intelligible, the relations of distance that take place between the autonomous bodies. It is precisely the act of “configuring” that one can recognise, for example, in the presence of the Cemetery within the dispositional logic of the Pisan Campo, a gallery that makes it possible to measure, through its bulk, the distances between the Baptistery and the Basilica, such as the altimetrical relations between these two covers and the leaning tower. A similar role can be found in Athens, for the physical substratum that acts as a podium, and therefore as a “backdrop”, to the figures of the Parthenon and the other pieces that make up the Acropolis.

### **A technique of ensemble composition: the “counterpoint”**

Having understood the necessity of the gallery, the enclosure or the podium – or in general of an architectural piece that assumes the role of physical limit of the composition – in order to give manifestation to the ensemble, we will now turn our attention to the ways in which the “all-round” pieces are positioned in the field, determining the figure of the ensemble. Specifically, the analysis will focus on one of the few and finite techniques of ensemble composition. It can be named “counterpoint”. To this end, the field of investigation will not be



limited to the architectural sphere alone, but the analysis will also touch on certain experiences derived from the other arts, such as theatre and painting.

In Sergei M. Ejzenštejn's research on "staging" (Ejzenštejn, 1963-1970), there is an interesting passage in which the director recounts an experiment he conducted with his students on a scene from the play *Le Père Goriot*, based on the novel of the same name by Honoré de Balzac. The scene refers to The arrest of Mr. Vautrin, the villain of the novel who, under a false identity, is unmasked by the police inside the boarding house Vauquer and, revealing himself to be the escaped convict Jacques Collin, rails against the audience of people present at the boarding house at the time before being taken away. The problem posed by Ejzenštejn to his students concerned the exact spatial arrangement of the characters – Vautrin and the audience of people – such that the idea of the dramatic contrast between the arrested convict and the circle of decent people was fully realised.

A first proposal, in which Vautrin is placed at the centre of the circle of people, is discarded by Ejzenštejn as inappropriate for generalising the theme of the opposition. The other four configurations reported by Eisenstein in his writing (Fig. 2) are argued by the director as more appropriate to the type of scene. They are, to a certain extent, also similar to each other: there are always two types of characters: an individual – Vautrin – and a group – the audience. This distinction is always evident in each of the four scenes. By never placing the individual next to the group, or worse, in the centre of it, the theme of opposition is only brought to the fore through a positional strategy. The individual and the group are always placed against each other, leaving the centre between them free to be charged with the tension released by the position of the characters. Then, of course, within this constraint, the individual character can arrange himself with variety in relation to the group: above a staircase, on a lower plane, but the tension generated by the opposing way of arranging these two types of figures is necessary for Ejzenštejn to generalise this compositional technique.

In the field of art, fertile structural analogies can be found in Giorgio Morandi's research. In general, the field of art obviously presents more points of contingency with the sphere of architecture, and Morandi seems to be one of the most prolific authors in whom to trace a connection between the counterpoint technique highlighted in Ejzenštejn's theory of staging and the elements of architectural and urban ensemble composition described above. It is no coincidence that Morandi's work is almost entirely centred on the still life theme (Maiorino, 2019). Still life is, in fact, a pictorial theme that aims at the perceptive transformation of the "object" into a "thing", emphasising the difference between these two terms as offered by Remo Bodei (Bodei, 2009).

In his paintings, the first "move" performed by Morandi is to have the objects placed on a table. The presence of the table holding things on top of it allows this element to be associated with the condition of possibility of the ensemble given through the podium.

Morandi's second move, which can be seen in many of his still lifes, is to arrange a series of bottles against another object, usually a cup or jug that is much smaller in size than the objects in front of it. It is, therefore, the relationships between the positions of the two types of objects that generate a tension in the space between them, which would not occur if we left, for example, only the bottles or the jug. But by means of a spatial arrangement that includes both types of objects, one peremptorily facing the other, opposing each other on the common base of the table, the space formed between these bodies takes on the value of a place, which retains a sense of being so thanks to the compactness of its whole.

Starting from these assumptions, two architectural projects will be analysed, both of which can be summarised as "open squares". The first is the completed project by Mies van der Rohe for

the Toronto Dominion Centre. The second is the Headquarters of the People's Commissariat for Heavy Industry, an unrealised project by Ivan Leonidov planned for Moscow on the northern side of Red Square.

In Mies design for the Toronto Dominion Centre (Fig. 3), the strategies of configuration and determination of an ensemble outlined above can be found. First of all, the composition rests on a podium, which constrains the positioning possibilities of the pieces within the "background" configured by the polyline of the plinth. On it stand two towers and a hall, thus two well-defined architectural types, one single and the other doubled, generically assumed to be one "centred form" and two "vertically directed forms". The arrangement of the towers, forming the group, placed in orthogonal order as opposed to the single piece of the classroom, seems to pursue the will to generate a tense space, a place, solely through a "staging" of the theme of opposition entrusted solely to the positional strategy of the individual autonomous bodies, as similarly evidenced in Ejzenštejn's research.

The Toronto Dominion Centre, again, is a project that explicates the theme of juxtaposition through the use of masses, attributing to the architecture the quality of convexity, of the "pure prism" as named by Le Corbusier in his four compositions. Thus, not only by their position, but also by the effect of their volumes, the momentum given by the height of the towers is counterpointed, as sought in Morandi's still lifes, by the low, but wide volume of the hall.

Ivan Leonidov's project for the Headquarters of the People's Commissariat for Heavy Industry (Dom Narkomtjazzproma) seems to be an exemplary project of the ensemble composition, if only for its synthetic capacity to hold, in a few moves, all the reasoning so far set out (Fig. 4).

In this sense, the reading that will be given of this work will focus on two thematic focus: the base as a constructed synecdoche of the aggregative strategy of the Moscow ensemble, and the rules that structure the arrangement of the forms on the base, echoing Morandi's lesson.

The project can be "disassembled" into four types of architectural pieces (Fig. 5): a plinth, four elements that inhabit it – specifically three towers and a hyperboloid volume –, a gallery and an enclosure, also resting on the plinth, to act respectively as a backdrop for the towers and the hyperboloid volume.

In Leonidov's project, the plinth delimits, through its thickness and extension, a region of space by connecting the distinct architectures of the whole through a common denominator. The form of Leonidov's podium seems to derive from the specific conditions of the site, defined by the two urban voids of Red Square and Teatralnaya Square, and punctuated to the north by the bulk of the Bol'shoj Theatre – at Teatralnaya Square –, to the south by St. Basil's Cathedral, to the east by the Kremlin walls and to the west by the Kitaj-gorod quarter. The measurements of Red Square are taken by Leonidov to fix the shape of the "colossal monumental stylobate" (Lanini, 2021), which then follows its entire length, doubling its width. Its position, tangential to the Square, and its size, such that a large part of the Kitaj-gorod would have to be demolished, allow it to stand both as a further edge of the Square, reverberating from the opposite bank the walled surface of the Kremlin, and as an appendage to Teatralnaya Square.

The position and forms of the architectures which inhabit the plinth participate in the objective of connecting the two squares: if the bulk of the Bol'shoj is contrasted by the isolated volume of the hyperboloid – rightly oriented according to the square by the enclosure which delimits it –, on the other side it is the group of three towers, held together by the gallery which acts as their backdrop, which enters into the "chess" game of Red Square.

The role of the enclosure and the gallery, in this case, is of a lower order than that of the base, in the sense that through their positions is entrusted the task of holding together respectively the dialogue between the hyperboloid and the Bol'shoj, on the one hand, and the relationship of

the three towers with the Square, on the other (Fig. 6). Holding together this double order of relationships is the counterpoint technique that sees the group of towers arranged against the low volume of the hyperboloid. The “tumultuous” effect of disorder in the composition re-enters the realm of the intelligible through the re-construction of this compositional strategy.

## Conclusions

Leonidov’s project, like that of Mies, is aligned with that Modernity which at the beginning of the 20th century and from then on structurally conditioned the making of architecture. The two projects fit without difficulty as further pieces, subjected to design verification, of the idea of the “open city” underlying the most important manifestations of the Modern Movement. They are, moreover, projects that look back to antiquity, insofar as, although at completely opposite latitudes, they establish fertile cross-references with that typically Greek way of constructing public space, where topology enters fully as a structural element of the composition. A mode of constituting the public places of the city in which both the definition of a centre and the explicit desire to establish a relationship with distant nature assume equal importance. A way, one could therefore say, both modern and ancient, of making a square.

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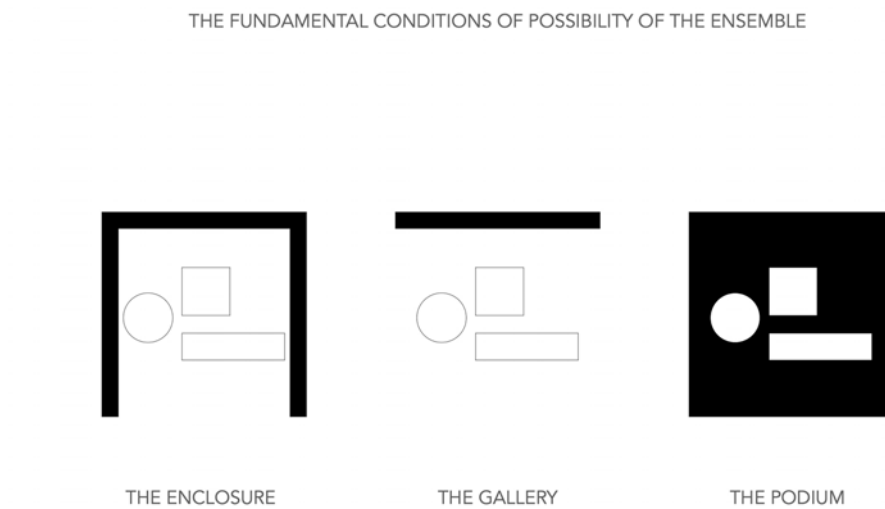
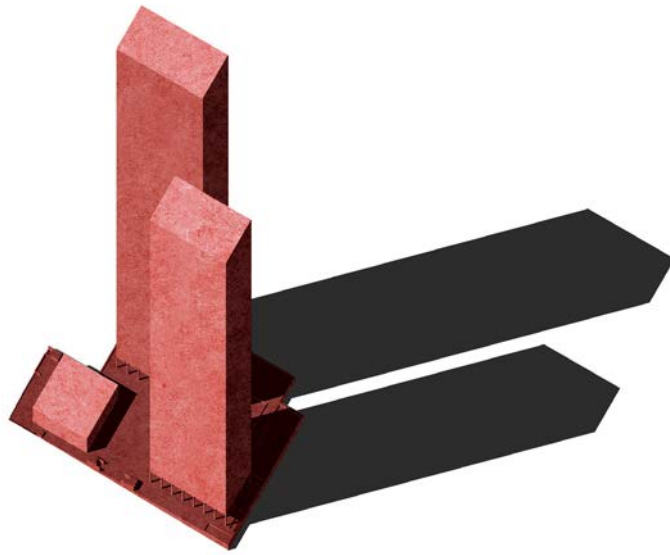


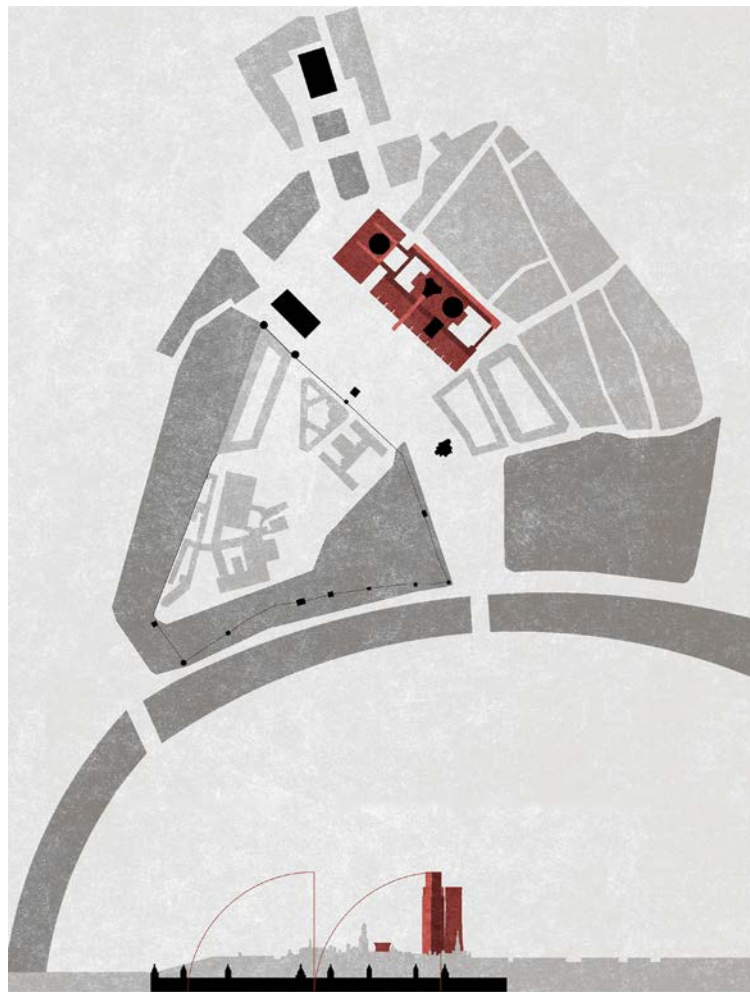
Figure 1. The fundamental conditions of possibility of the ensemble. Author's drawing.



Figure 2. Construction of the scene The arrest of Mr. Vautrin. From Ejzenštejn (1963-1970).

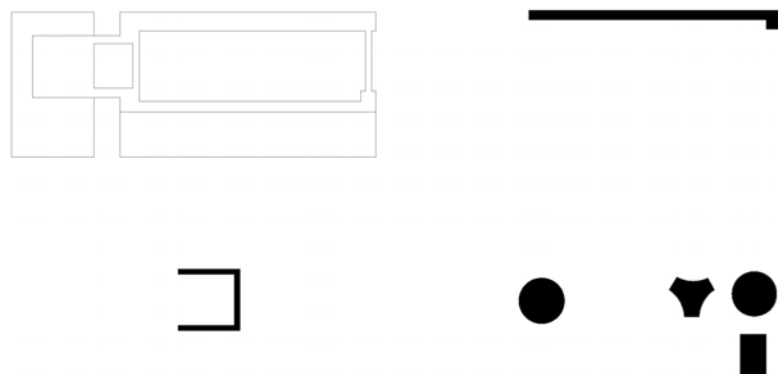


**Figure 3.** Axonometry of the Toronto Dominion Centre by Ludwig Mies van der Rohe. Author's drawing.

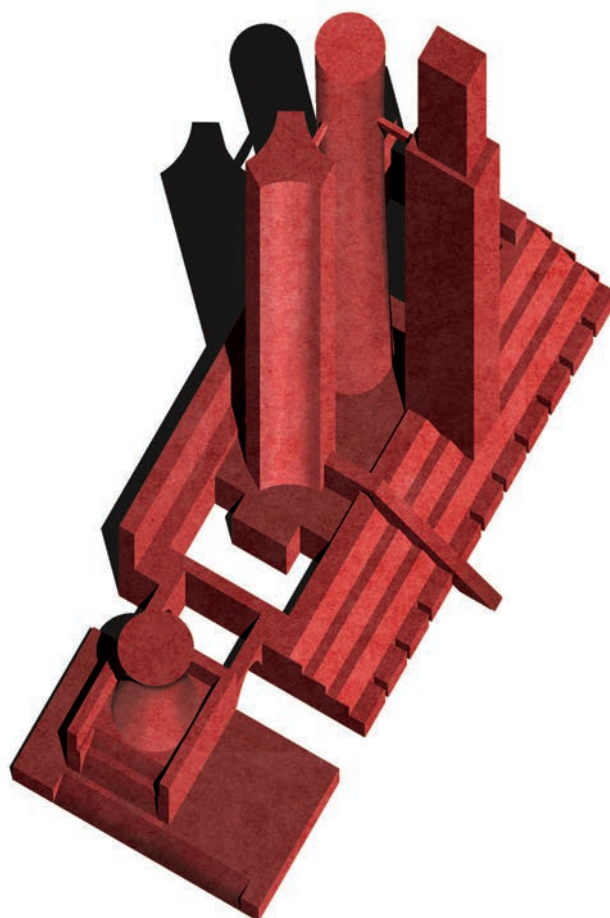


**Figure 4.** Planimetry and elevation of the Dom Narkomtjazzproma by Ivan Il'ich Leonidov. Author's drawing.





**Figure 5.** Analysis of the Dom Narkomtjazzpoma by Ivan Il'ič Leonidov. From top left clockwise: the podium, the gallery, the autonomous volumes, the enclosure. Author's drawing.



**Figure 6.** Axonometry of the Dom Narkomtjazzpoma by Ivan Il'ič Leonidov. Author's drawing.



## Urban morphologies for the 'thinking hand'

Paolo Carlotti

DiAP - Dipartimento di Architettura e Progetto - Sapienza Università di Roma.

E-mail: [paolo.carlotti@uniroma1.it](mailto:paolo.carlotti@uniroma1.it)

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Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *The paper draws inspiration from Caniggia's research on the graphic interpretation of urban forms and the study of urban stratification evident in restructuring processes. It aims to contribute epistemologically to understanding urban form, presenting a graphical depiction of the culture of a place and the time it was created, intricately tied to the original foundation and natural landscape of the area. This study aligns with research in Italy, rooted in the historical underpinnings of cities and initially shaped by Giovannoni's thinking. Over the past century, numerous other experts have engaged in interpreting urban texts, transitioning from thoughtful contemplation (in Pallasmaa's terms) to project implementation, including architectural design.*

*Figures like Rossi, Tavora, Siza, Rogers, as well as Aymonino, Monestiroli, Muratori, and particularly Caniggia, have notably contributed to developing and translating research using the architect's tools. Their diverse approaches to studying urban forms in cities and territories now allow us to explore intrinsic meanings and semantic suggestions found in transformations and subsequent geometries resulting from varied concepts of urban 'organisms.' These principles, which have fundamentally shaped the original form, primarily cater to functional conveniences in utilizing and engaging with natural spaces. Today, they offer valuable insights for defining the objectives and structure of architectural and urban designs.*

## Introduction

In 1978, Aldo Rossi, in 'Architecture of the City,' highlighted geographers' understanding of the intricate relationship between geography and urban development. However, Rossi critiqued their perceived lack of emphasis on the evolutionary perspective in their analyses (Rossi, 1978). He emphasized the holistic nature that encompasses the entirety of history, advocating a return to studies focusing on urban morphology and building typology. During that period, these studies were seen as deterministic projections in architectural projects. Many were engaged in examining the fabric of historic cities, aiming to resolve issues emerging from the disciplinary crisis of the 1950s and 1960s, which were overly intertwined with academic structures. Urban morphology studies, as Tafuri (Tafuri, 1982) noted during the 1982 conference on Muratori, played a crucial role. These studies recognized historical moments of shared understanding and convergence among those contributing to laying the groundwork for research on the city's form. Presently, we can view these contributions with more detachment, as they are less influenced by the civil and political circumstances of history. These developments can be contextualized within an international framework. For instance, figures like C.O. Sauer, as early as 1925, defined 'organism' as a system of relationships and urban phenomena within natural spaces. This metaphor of the 'organism' was particularly embraced by Muratori (Muratori, 1967) and his school to elucidate metamorphosis and systemic growth among elements and systems. However, this concept encountered specific opposition. Wright also employed the concept of an organism, emphasizing the interconnectedness between its parts and the entirety, take back by Marti Aris concerning the organic relationship between artifacts and human culture. Aris, however, points out that the branches of the phylogenetic tree, unlike those of a biological organism, remain continuously intertwined. This notion delves into the entirety of urban phenomena expressed in the city's form, increasingly intertwined with the overall process of urban history. It draws nourishment from geomorphology, Proxemics, and Anthropic geography research, delving into the original forms of constructed spaces, rural building designs, and the broader territory.

*"The reading of the space of our past, insofar as it is possible to know it, reveals an essentially continuous harmony: sober, modest, without vanity, without ingenious pretensions, without spectacular contrasts, the organization of Portuguese space has taken place maintaining a constant characteristic that Reinaldo dos Santos defined as 'romantic', referring (...) to the spirit that unites our forms."* (Tavora, 2021)

Presently, it's evident that this research isn't solely focused on cataloging forms; rather, its aim is to delve into the underlying reasons that have propelled and shaped the geometric configurations within cities, ones that have interchanged and overlapped throughout time. These configurations are reflections of social interactions among individuals, manifesting both in architectural structures and across territorial expanses. They represent compositions and forms ingrained within a process, as elucidated by Tavora's teachings, necessitating consideration at both architectural and urban scales (Tavora, 2021). These forms encompass the fabric necessary for a project that extends beyond the confines of the architectural object itself, continuing into the space it inhabits within the broader urban organism. This evolution embodies a transformative process that *"tends more towards evolution than conservation and that in evolution, monuments (architecture ed.) are preserved and represent the driving forces of development itself"* (Rossi, 1978, p. 59).

Following a crisis in the 20th-century historicist architectural culture, there was a pursuit for

compositional solutions found in Giovannoni's ambientism and Theodor Fischer's Heimatshutz (as discussed by Tafuri in the Modena conference). These approaches navigated the interplay between inherited forms and the freedom to create new ones. They aimed to understand the generative principles within architectural culture, moving beyond mere figurative invention to a more unforeseen renewal deeply entwined with the norms of industrial production in contemporary society.

Research seemingly detached from urban morphology, yet closely related to interdisciplinary studies blending architecture and geography, investigated natural and anthropic forms within various regional contexts. Works such as Demangeon's rural house, Pagano's 'Architettura rurale Italiana,' Tavora's 'Questione della casa portoghese,' and subsequent studies on rural dwellings in Algeria, Libya, Russia, among others, bridged the gap between anthropogeographical studies and architectural and urban research.

Proxemic studies yielded significant findings on typological features, landscapes, settlement systems, building techniques, and lifestyles. They also delved into critical observations on ancient paths and foundations, offering insights for integrating tradition and innovation in architectural design.

Figures like Tavora, Fisher, Sauer, Rossi, Muratori, Caniggia, and numerous geographers (citation needed) considered history and geography as fundamental tools to transcend the present in architectural design. Eugenio Turri in his text 'Anthropology of Space' emphasizes this link, asserting the need for deeper exploration of the concepts of landscape and territory, terms often conflated and the subject of ongoing debate. Turri distinguishes between the two, noting that humans, as actors in ecosystems, operate within the territory—a space where they act, live, and produce, constituting a concrete, objective dimension (the built environment). Individuals and societies are intrinsically tied to this territory, forming vital, utilitarian, and emotional connections as it holds their fields, homes, places of worship, and more. *"Landscape, on the other hand, is the visual perception of that territory (...) through the works that the individual or the society of which he or she is a part have placed in that physical space that constitutes as the scenario, the theatre of their acting and living"*. In his analysis, Turri emphasizes concrete, geometrically measurable actions: individual or collective efforts that, over time, impose modifications, layering works tied to meanings or productive needs on outdated instances. The study of landscape and territory necessitates tools that unveil various constituent layers amidst the passage of time, revealing the diachronic actions contributing to the current configuration.

Among the myriad studies on urban form attempting to translate into signs and diagrams, Gianfranco Caniggia's theses and theories stand out within Italian architectural culture of the 1960s and 1970s. While Muratori's plates of Venice and Rome captured the dynamic evolutionary image of historical cities (Fig. 1), Caniggia merits credit for focusing on recurring types and synchronous and diachronic variants in both urban fabric and typology. His invaluable contribution lies in developing drawing tools for reconstructing the transformation process, later indirectly utilized in modern and contemporary fabrics by scholars like Castex, Moudon (Fig. 2), Laroche, Gauthier, and others.

Caniggia's exploration of graphic expressions of transformations within the city, which he terms "paths of restructuring," reveals how these redefine the city's order, hierarchies, centralities, and nodes. Often achieved at the expense of older fabrics or through transforming elementary typologies into new specialized units, these changes exhibit regenerative impacts on urban spaces, distinguishing recent transformations from older ones. The emergence of relationship axes between nodes, referencing different networks, and the introduction of new route grids



(Fig. 3-4) modify previous layouts, sometimes coalescing or diverging from inherited ones. Applied to contemporary cities, these studies have reshaped the depiction and organization of urban forms. Anne Moudon, in her recent work (Moudon, 2019), extrapolates the concept of 'restructuring routes' to the contemporary American city, highlighting how it reorganizes urban orders by introducing a Supergrid. Phenomena previously delineated by Aymonino in his study of Paris and observed in cities like Rome, Madrid, Vienna, etc., showcase restructuring axes that introduce a "Supergrid" and "superblocks" (Moudon, ...) reshaping existing layouts or significant portions thereof, sometimes retaining original geometries while reconfiguring pre-existing land compositions. (Fig. 5a e b).

### **Exegesis of an inherited urban text**

Studies of this nature appear to align with Rossi's assertion that '*in evolution, monuments are preserved and serve as driving forces for development itself.*' It becomes apparent the substitutive and specialized roles that certain routes have played in linking centralities established by significant architectures (such as palaces, convents, etc.) and the resulting impact on urban blocks initially composed of basic fabrics.

In the historical fabric of Rome, specifically encompassing the districts Parione, Campitelli, Regola, and Ponte from the 16th century to the present day, notable historical paths have overlaid the previous urban layout (Fig. 6). For instance, Via Giulia, in conjunction with Via della Longara, Via di Santa Dorotea, and Sisto Bridge since 1485, delineated the borders of a supergrid akin to those seen in modern cities. However, this structure evades easy detection (Fig. 7) (A. Moudon, ...) due to irregular block shapes and diverse orientations. This supergrid comprised slightly broader pathways initially intended to facilitate pilgrim traffic. This logic appears similar to the one governing Roman transformations post-Italy's unification, where new routes and a network of super-isolates redefined the city's essence. Transformations followed a sequence wherein margins gradually specialized to become centralities.

Another illustration is evident in the city gates, originally marking the boundary of the settlement but transformed through expansion and the doubling of built-up areas into squares and new centralities, opposing the prior ones. Two vivid and representative examples of this transformation are the basilica in Vicenza (Fig. 7bis) and the Palazzo Madama in Turin (Carlotti, 2018). Initially, simple gates within walled perimeters evolved over centuries into castles and eventually palaces—shifting from margins to centers, such as the pomerium of the Castra Taurinorum, becoming one of Turin's most significant squares.

This sequence is observable in multiple instances, a 'code of transformation.' It's a gradual mutation punctuated by episodic discontinuities, synchronically and diachronically enacted at specific junctures in civil history (Turri E., 1974). This metamorphosis, what we could term as urban acupuncture, holds regenerative potential today.

### **Syntactic rules to rewrite the city**

Morphology, from this perspective, can offer insights to restructure the apparent confusion depicted in the city's graphic representation. It unveils connections and events that underlie the process of urban form transformation, evolving from a mere sequential accumulation into a structured hierarchy and a complex organism.

To conclude this brief reflection, I'll illustrate two project examples carried out within the master's degree laboratories at Sapienza University of Rome, involving instructors specializing in surveying, conservation, and design.

The project's aim was to reinterpret the archaeological ruins of the "Controporta," formerly

situated on the city's edge and now demolished. It sought to revive the architectural memory by regenerating forms and functions for a site that currently holds significant urban centrality. The proposed intervention envisioned a regenerative acupuncture approach at Porta Maggiore (Fig. 8).

The subject of this exercise was the counter door of Porta Maggiore, constructed in 402 AD by Flavius Honorius, epitomizing late antique imperial military architecture. A walled structure, serially placed just inside the walls, added and integrated with them, held a marginal function and inherently lacked the capacity to serve as a nodal point for the city beyond its transit function. It functioned as a gateway between the settlement's interior and exterior. Demolished in 1838 during the papal rule of Gregory XVI, today, its form is only recognizable to those engaged in Porta Maggiore's history. It presents a two-sided wall section where the exterior and interior have shed their defensive characteristics to resemble those of the imperial era.

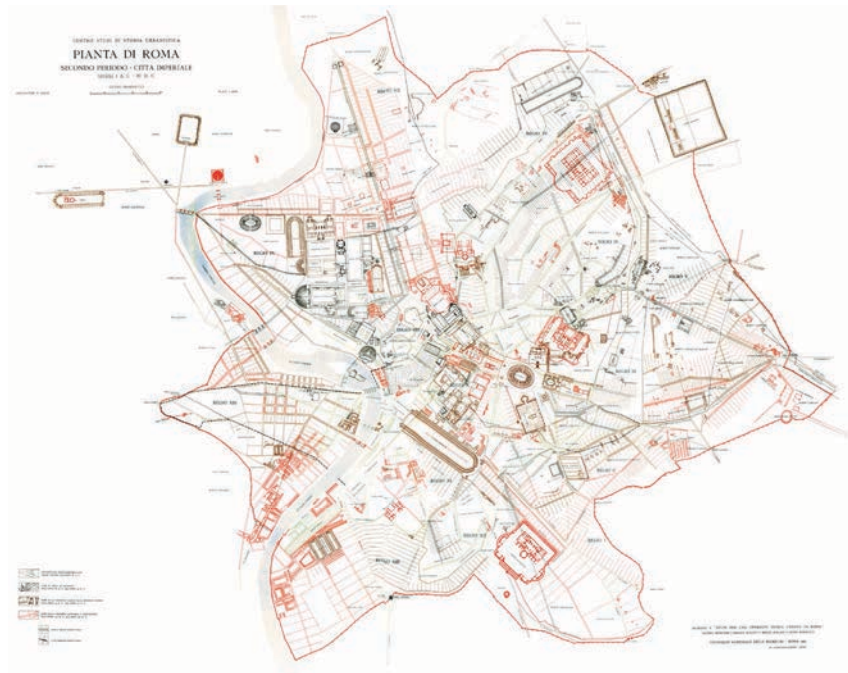
Since Italy's unification, Porta Maggiore and the surrounding settlement have transformed from a peripheral location to a local hub. However, it now contends with heavy traffic that obscures its historical significance, diminishing its newfound role as a center shaped by the city's development.

Hence, the project's objectives: restore balance while emphasizing the site's memory, highlighting the distinct character between the interior and exterior defined by the walled perimeter. Additionally, it aims to transform the existing simple intersection of paths into a new urban space—a space for meaningful encounters surrounded by significant historical context. The proposal aims to reintroduce the counter-door, reclaiming its volume and assigning it a renewed purpose: a square with dual identities. On one side, it serves as the focal point of new construction, featuring a 'volume' dedicated to contemplating the archaeological remnants and occasional artistic representations. On the other, it presents a green space enveloping the door and the pomerium strip, extending to the urban gate of San Giovanni. (Fig. 9-12).

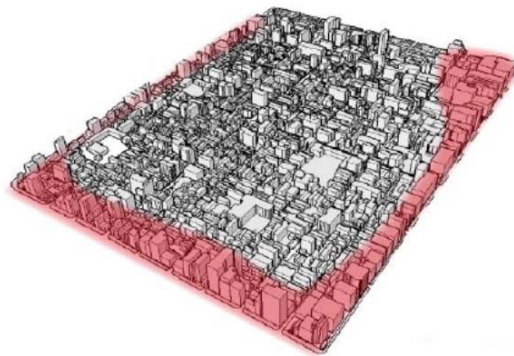
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## Illustrations and tables



**Figure 1.** Studi per una operante storia urbana di Roma / Saverio Muratori ...[et al.] ; [a cura del] Centro studi di storia urbanistica Tavola Secondo periodo – Città imperiale; Edited by: Marinucci, Guido ; Muratori, Saverio ; Bollati, Sergio ; Bollati, Renato; Centro studi di storia urbanistica; Consiglio nazionale delle ricerche; Roma, 1963.

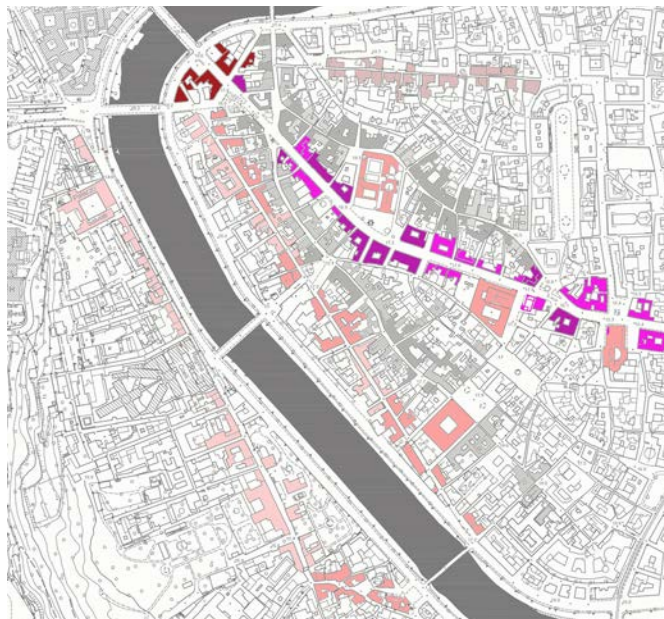
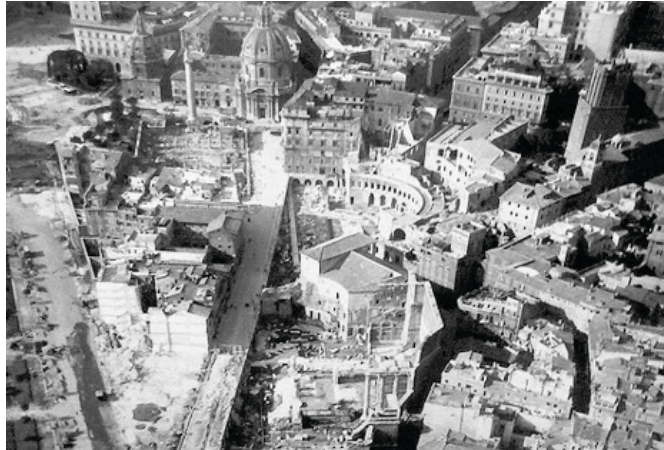


**Figure 2.** Superblock in Kyoto. Moudon A., *Introducing Supergrids, Superblocks, Areas, Networks, and Levels to Urban Morphological Analyses*, UM, vol 7 (2019)





**Figures 3 and 4.** Santa Maria della Pace e chiesa Nova a Roma, Fasi di trasformazione



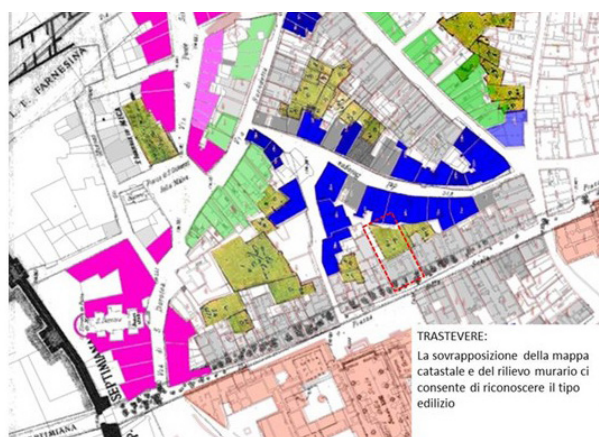
**Figures 5a and 5b.** Via dei fori imperiali (XX secolo), via Giulia (XVI secolo) e corso Vittorio Emanuele (XIX secolo): Restructuring routes



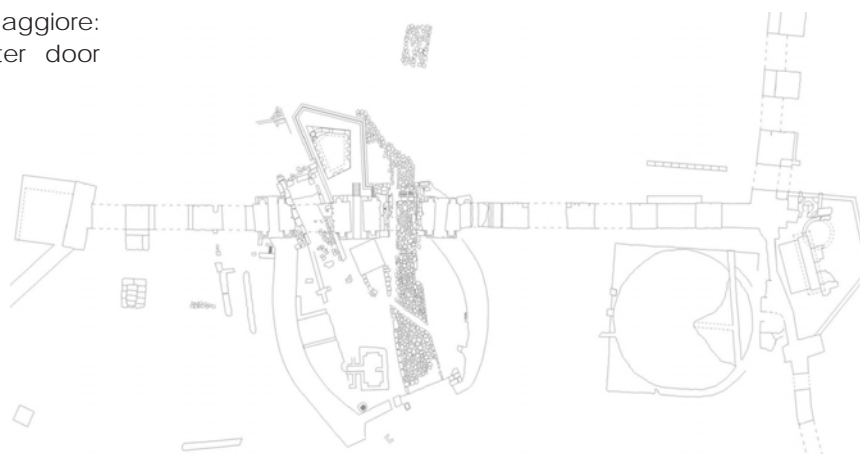
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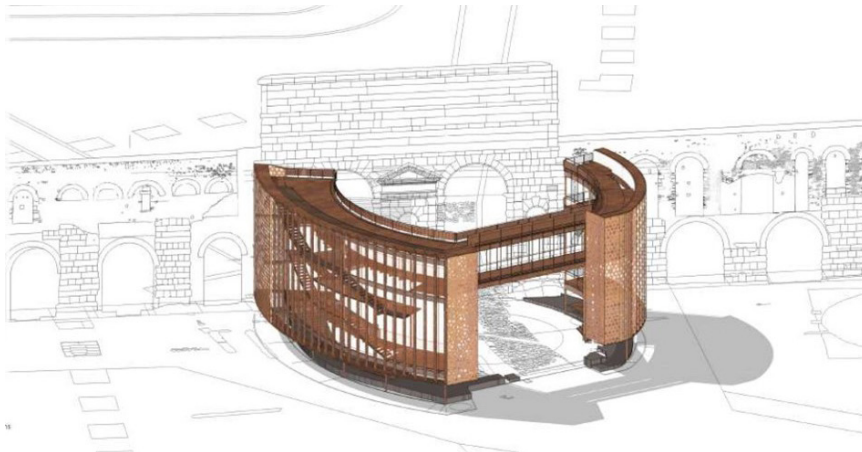


**Figure 8.** Porta Maggiore: relief of the counter door area



**Figure 9.** Porta Maggiore: proposed landscaping





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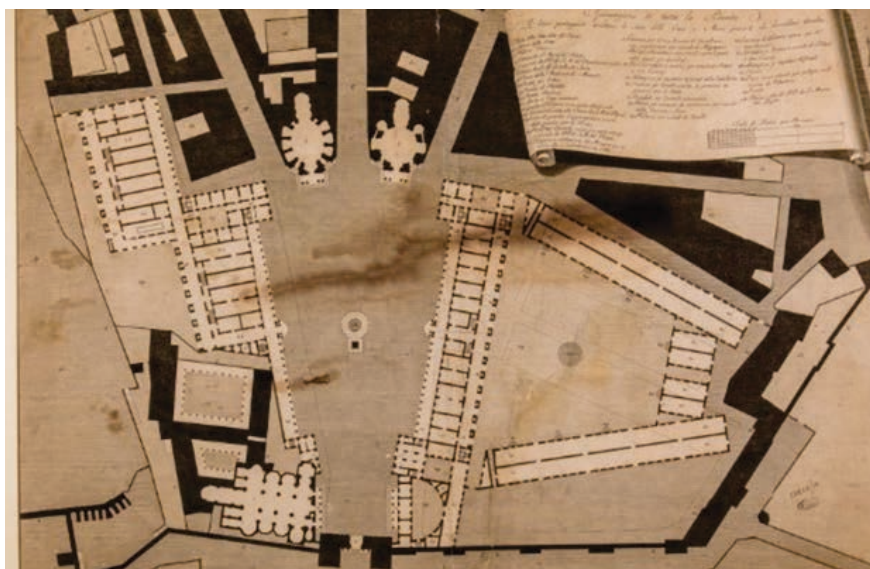


Figure 12. Piazza del popolo, Valadier: project to transform the area face to the Maggiore gate.

## The city between nature and artifice. Space and form of Prague river's settlements

Domenico Chizzoniti<sup>1</sup>, Yuliia Batkova<sup>2</sup>

<sup>1,2</sup>Dipartimento di Architettura, Ingegneria delle Costruzioni e Ambiente Costruito. Politecnico di Milano. Milano. Piazza Leonardo da Vinci, 32. 20131

E-mail: <sup>1</sup>domenico.chizzoniti@polimi.it, <sup>2</sup>yuliia.batkova@polimi.it

Keywords: *Urban Morphology, Urban Design, City Growth*

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *"Prague can never have a true centre, for the simple reason that it is not one but at least six cities, united by decree only in 1784". Nature and artifice represent the dialectical polarizations that find their effective and complete representation in the physical construction of the city. The notion of nature is often replaced by the generic term "environment". This relative inadequacy in expressing the two polarizations around the idea of the city characterizes our urban civilization and can be understood as the expression of frustrations and fears in the implicit misunderstanding between the necessary presence of nature and the indispensable role of artifice to define the space of the human dwelling. The urban morphology of the city of Prague is made of autonomous and complex events. These episodes, which now build an apparent unified urban structure, represent the area where mythological and legendary stories unfolded. While analyzing the case study of the city of Prague, the contribution, referring to the sources of the culture of urban design, focuses on the logical connections that have structured over time the ideal of nature and that of artifice in the formation of the contemporary city through reading its basic elements. This case study, through the concrete evidence of some design experiments, intends to demonstrate the role of nature where the meanings of sustainability, ecology, environmental culture etc., seem to be contained in the dialectical polarization between constructive act and conservation of the environment, between Nature and Artifice.*

## Introduction

A conscious manifestation of architectural design has always occurred from the identification of reliable tradition within the historical development of the city. Thus, it is necessary to proceed rigorously and selectively in evaluating all the tools that the history of the city can provide for the architectural project. In this respect, recognition in the history of an urban settlement of some constants which can take on is unarguably essential, even necessary for the design discipline. These places are operational elements along the course of the spatial history of a city. What makes these spots available for design is their apprehension as areas of knowledge, which are not strictly architectural, thought grounded in the discourse over the complexity of the architectural phenomenon. Nor this approach takes into account only urban history in a strictly disciplinary sense. Instead, it is concerned with the multiple areas of knowledge that have interfered with the physical structure of the city. Thus, according to this premise, as a rule, settlement history plays a prominent role and is interpreted not as an allusive component, but rather as a structural impetus in both architectural and urban design.

In the case of Prague, rediscovering the authentic urban character would be closely linked to its sense of an island settlement, predetermined by historic circumstances. Above all, the city was a cradle of one of major Jewish ghettos in Europe, dammed within the closed confines of the jurisdiction, assigned to its unique community, separated from the rest of the city. This marginalization of the Jewish ghetto in Prague, despite the physical separation from its urban surroundings, has established a physiological dependency on the arrangement of the "cities" of Prague, albeit in its administrative autarchy: "Prague can never have a true centre, for the simple reason that it isn't one but at least six cities, united by decree only in 1784" (Peretta 1997). This evaluation of a "city made by parts" means not only recognition of the internal history of the Jewish ghetto as it has been structured through time, but returning to the global historic discourse, which shaped the discontinuous evolution of the whole city.

The urban morphology of the city of Prague is made of autonomous and complex events. These episodes now constitute an apparent unified urban structure, where mythological and legendary stories unfolded. The morphology of Prague, where different histories and facts at times complementing, at times crisscrossing each other, cannot be read once detached from time and space. In this context, the unique geography and specificity of urban evolution have largely determined the history of the political and social events of the city. One of the major prerequisites of the urban form was a geographic factor, which largely represented the Vltava River, crossing the city. Throughout the evolution of Prague, this natural presence acted as a static fact, giving rise to the urban history of the capital. Around the waterfront, the hills of Hradčany and Petřín, with the Letná "Plateau" were formed. It created the western bank of the landscape, where around the 19th century, the construction of Prague Castle started. On the east side of the opposite bank, where the slope of the land forms a natural amphitheater with the Vítkov hill, was formed another promontory - Vyšehrad. This natural closure was a place where another fortification was erected (the Vyšehrad Castle). The construction of these two castles was to determine the future development of the settlements along the riverbank, divided by Vltava (Fig.1). If the two castles constituted the most important elements of the fortified settlement, a settlement formed in natural closure (no less important than the castles itself, first recorded around the year 960), is located on the right bank of the "Vltava" River. This part of town attracted lively businesses that soon developed a market square, close to the princely court of Týn (with the rotundas of St John's and that of the Church of the Holy Cross), and now represents the historical centre of Prague's Old Town: Staré Město (Fig.2): "[...] and it is not by accident that the north-west quadrant of the Staré Město would become the Jewish



city, also known as Josefov after Josef II who made it less segregated toward the end of the eighteenth century, though it would become a part of Prague itself only in 1850. Since 1942 it has, inevitably, been little more than a skeleton [...] " (Peretta 1997).

In this context, it is relevant to refer to the concept of "autonomous settlement development". This concept, closely related to the idea of insularity, is present throughout the history of Prague. The definition of insularity falls within the general articulation of spatial entities. Various studies have been devoted to the terminology of this word and the identification of possible interpretative paradigms. Different combinations of physical and empirical data with modes of making, narrating, or describing the physical facts (or even the interweaving of spatial data with its experienced) are reflected in the various types of this term. However, typically insularity is tied to a geographical concept that calls on two inseparable notions of physical geography. The first one, concerned with a place surrounded by water, applies to Prague and is verifiable at the physical level. The second idea of insularity as compared to other areas is often adopted in its negative sense, as serves to amplify the meaning of island, defining areas whose isolation is not less acute but can indicate special or different identities compared to surrounding territories (or even situations that break or stop a certain behavior or phenomenon). As claimed by the "geographers of insularity", it is not only physical data that defines the structure but also human activities, which weight to the degree of openness of insularity. Geographers insist that this insularity, understood as a "range of possibilities" of a territory or settlement, be constantly compared to something other than itself. The idea of insularity, therefore, does not correspond only to the definition of physical island, but also identifies areas, which defer at physical and social or cultural levels from the whole, which is surrounding them. This second reading of the term is relevant in describing a relatively persistent constant throughout the history of the Czech capital.

The contrasting nature of these "islands" results in identifiable elements. It should be specified that the concept of island, while appearing very simple, is in fact quite complex. Further analysis reveals the multidimensionality of this term, which itself is a metaphor. In each case, the different islands of the City of Prague have played either a central role or a role of marginalization. "Insularity" is, therefore, a relative notion. The urban structures under consideration in this work are not autonomous systems, but rather developed under the influence of broader economic, social and cultural trends, to which they show alternately open — or closed-minded reactions. In other words, what distinguishes the island — at least the island that is relatively small — is surprisingly not its "isolation", but its permeability from the exterior due to an open structure and fragile, vulnerable borders.

### **The invariants: urban parts as permanent city character**

Reconsidering the morphological and typological structure of the island of Ghetto in Prague, as a part of evolving urban whole, does not necessarily mean arbitrarily restoring the layout of the ancient structure of the Jewish quarter in a more or less conventional (and therefore stylized) form. This attitude may lead the design through the interpretation of history as a repertory of forms. In this case formal languages, although contextualized in their original location, can be considered as architectural standards grounded in subjective individual tastes. Moreover, the approach is not meant at celebrating the myth of history through the lucrative poetic around individual episodes, considering identification of the subject of the project with exclusively in its past. In this way, this procedure would not differ, at least on a purely logical level, from some historical agnosticism attitudes of apathy toward the past. Such attitudes can produce architectural objects, grounded in conceptual ambiguous allure of high design, which, in the



long run, are translated into a voiceless presence of a pure sign without meaning. Alternatively, in these places settled by a history of deep cultural value, it is necessary to reconnect the moment of design to that of knowledge, especially in the context such as the old neighborhood of the Jewish Ghetto. Here, after the demolition of its walls and the distortion of its design, the arrangement of the urban structure is hardly recognizable. Nevertheless, the social and cultural identity persists regardless of the transformation of the place.

These spatial principles of historical formation are investigated here. Facts of urban formation and transformation are recognizable in the evolution of context, starting from the typological dimension and related to the morphological structure of the whole city and the structural characteristics of the territory. They represent a ground for the investigation and design of individual episodes.

The task of architectural design in this regard is potentially concerned with both internal and external driving forces of urban context and its evolution. It is essential to regenerate a united path that, even if discontinuous and erratic, is nevertheless able to propose intentions that are cognizant of reality and return them to architectural practice. An essential component of such an attitude is the demand for research that recognizes, even partially or subjectively, the importance of urban facts invariant in the evolution of the city. These permanencies, regardless of philological rigor, are to be found not only in the evolution of the physical structure of the city, but also in social and cultural operations; for example, those with unified aims in systems of sharing between economy and production, or between culture and social emancipation.

In the case of Prague, for instance, essential knowledge would concern the hierarchical arrangement of collective and representative structures of the ghetto, as one of the strategic areas of the settlement. The location of the ghetto was a result and a prerequisite in shaping the users' behavior, either their habits in going to their places of worship, their needs to use social or health service facilities, or their ritual attendance of educational establishments. It also relates to a strategic arrangement of the individual activities, stratified into building structures, which occupied the space through a layout that provided the maximum accessibility to public and commercial activities, located on the ground floor, and the more private activities located on the upper floors of the buildings. Finally, the specificity of the evolution of the "gated community" is related to the interpretation of the struggle, generated by the urban density and thus the shortage of space. That situation was mitigated through a principle of cyclic interchange of the functions, for which the occupation of the individual spaces occurred as an interchange of activities, some to be carried out during the day and others during the night, depending on different productive, social and even cultural needs (Fig.3).

### **The ghetto island and the physiognomy of the city**

"At times, the mysteriousness of Golemstadt spreads to the whole of Bohemia, a borderland, a crossroads exposed to all winds, at the central point of Europe, where — according to Musil — the ancient axes of the world intersect" (Ripellino 1973).

The city of Prague has produced, throughout its history, a unique level of fascination in foreign visitors. "The fascination of Prague, the life of Prague has no end", said Ripellino in the final notes of his *Magic Prague* (Ripellino 1973).

Many authors that describe Prague, its secret places, the magic of the alchemists, the legend of the Golem, have witnessed its history and its spells. The city comes alive through the stories of Kafka, the meetings of Apollinaire, or Kundera. From the writing of Chateaubriand to the works of novelists such as Bohumil Hrabal, Gustav Meyrink, Jan Neruda, Vitezslav Nezval, Rainer Maria Rilke or the travellers' tales as Ingeborg Bachmann, Albert Camus, Paul Celan, W. G.

Sebald.

These considerations go beyond the characters of the individual architectural episode. In the conception of the city as an artefact, as a work of art, they imbue a particular significance on the specific structures, which exceeds the physical dimensional and figurative limits to give back a unified value symbolically extended to the whole city: "[...] city of three populations (the Czech, the German, the Israelite) and, according to Breton, the magical capital of Europe, Prague is above all a breeding ground for ghosts, an arena for spells, [...] A trap that, if caught with its mists, with its evil arts, with its toxic honey, never leaves, never forgives. [...] A city through which eccentric commandos of alchemists, astrologers, rabbis, poets and acephalous templars wander. Of baroque angels and saints, of archboldesque puppets, of puppeteers, of tanners, of chimney sweeps" (Ripellino 1973). The urban analysis is still one of the most significant tools in recognizing a unified framework for the design elements. However, it still has the limitation of having to measure its actions against standards internal to its investigation, by taking elements of continuity or permanence, through the selection and sometimes the analogic repetition of the explored physical facts. Conversely, the survey proposed here is more complex and extensive, and the case in question, although limited, proves this point. In this specific research area on the island of the Jewish ghetto of Prague, there are wide convergences, ranging from human geography to local history, from the social sciences to economy, to architectural history and even to the myth. The mythological construction of the Golem, as the legend of the Philosopher's Stone — a symbol of alchemy, able to heal the corruption of matter — has been more effective in the evolution of the Jewish ghetto than many other structural influences. This mythological construction has deeply affected the individual and collective behaviour of the ghetto community, as well as the physical construction of its space and rituals in its places of worship, although it is not scientifically accepted by the rational exploration of urban history. In this experimental reconstruction of the island of Jewish Prague, we have proposed to evaluate the intention to regenerate through single episodes an image of the lost city, which is perhaps no longer possible to find in its unity, but which is possible to evoke throughout single existing and planned episodes that belong, above all, to its myth. What has been analysed here makes it possible to illustrate how the approach to the theme of the project has followed a rigorous investigation, starting with an analytical recognition of the architectural conceptual structure and its specific issues. In this case, the problem is represented by the proposed design theme: the attempt to assert the strong historical and cultural identity of Josefov by recovering dismissed areas identified within the urban fabric of the historic neighbourhood (Fig.4). This theme is also an opportunity to consider the urban design of the entire site of the ghetto, from a viewpoint that also involves a reorganization of some existing facilities and the reinforcement of cultural context.

The research was carried out with the aim of developing some suggestions at the urban and architectural scale (Fig.5). This strategic vision would act as an exemplary approach to the design theme, aimed at recovering identity in Josefov through the reuse of small, dismissed areas within its fabric. The planned scientific activities were organized into different phases and divided by specific tasks. A first phase of the work involved the collection and study of information regarding some important architectural resources on the context. This step was supported by research and analysis of cartographic, iconographic and bibliographic materials, which allowed us to explore aspects concerning the urban history, the structure of the settlements, the particular context of the application and its physical characteristics.

This survey was followed by the preparation of thematic maps that allowed to identify, through significant historical sections, past transformations of the neighborhood urban fabric and

the various phases of human settlement within its confines. This first phase of the research work aimed at organising a collection of information showing the extent and characteristics of the Josefov phenomenon within the city of Prague. A second phase of the work involved an on-site investigation, the main objective of which was to survey the settlement structure of the neighbourhood and, in particular, to analyse certain conditions existing within it (such as the physical context, monuments, the main collective structures and public buildings, accessibility); this phase made it possible to identify the potential of the site, its physical characteristics, the structure of the settlement and its peculiar aesthetic features. This survey was followed also by an analysis of the potential project areas that could be reused (distinguishing between those still operating and those dismissed), and the formulation of hypotheses for a possible functional re-organization or the definition of potential new uses. In an attempt to define a functional programme, this phase was also intended to identify tools and criteria for intervention to be adopted in the design phase in each specific application context according to the characteristics of the site itself (e.g., the grafting of the new structure onto an existing structure, the replacement of part or all of the structure with the new planned activity).

The adopted strategic choices allowed us to identify small areas inside the Josefov Quarter, which proved to be suitable for the experimentations carried out by our research. Each of these places poses related questions; related to the following characteristics: morphology (unused areas along with the infrastructure that crosses the neighbourhood or in close relationship with relevant infrastructure such as streets, rail and waterways, such as the Vltava River); representation (most selected within a residential zone); architectural character (these are areas that belong to the historic urban fabric of the neighbourhood).

The possible points for intervention are located in two open areas adjacent to the St. Agnes convent (Klášter Sv. Anežky České), between Kozí Street, U Milosrdných Street, Františku Street and next to the Vltava River. The first zone is temporarily occupied by an outdoor sports facility and a parking area, while the other is completely free. Continuing along Dvořákovo Nábřeží, along the Vltava River, another open area adjacent to the Na Františku hospital is located between the streets Dušní and U Milosrdných. Finally, a fourth area is situated next to the Staronová Synagoga between Pařížská Street, Břehová Street and Maiselova Street in the heart of the old ghetto (Fig.6).

Having defined these potential points of application, it was necessary to make clear the role of architectural design within this framework. Most importantly, it was crucial to understand how the architectural project can work to promote the identity of the "urban island" at this point only theoretically identifiable in Prague's urban fabric. On this aspect, a form of conceptualisation of the architectural project comes to the rescue which, independently of the individual figurative options, succeeds in leveraging its iconic nature, its vocation as a work of art linked to a memory.

This critical attitude towards the project has often inspired content and forms derived from a cultural context, in which forms have taken on a symbolic value (iconological or iconographic). It often occurs that in particular contexts and in a given historical period, the permanence of symbolic elements interacted positively with the artistic and architectural results. In other words, architectural culture, (at least that which considers the urban context as a positive resource), has historically adopted a critical methodology. This method goes beyond referencing direct sources and takes on an experimental approach that is less empirical and more intuitive, influenced by perceptions, to arrive at an interpretation of a possible reality. In this particular aspect, architectural design can play a role in trying to make these absences present, bringing the project to a conceptual threshold, returning a form of critical awareness to the relationship

between historic and new construction.

A second issue concerns the potential of the dismissed sites identified within these “urban islands”, and the way they should be re-thought to once again give identity to the context. This second aspect is more related to a certain creative, experimental attitude of the project, which is particularly incisive and clear concerning the inductions of the strategy of simple preservation, invoking a more complex approach to design action that relies on the enhancement not only of the individual artefact but of the entire context. The most common trait in these cases is a strategy that induces a historically impeccable reconstruction but with the limits and contradictions of false historical reconstructions. We have already seen this type of experiment, especially after the Second World War when many European cities such as London, Berlin, Dresden, and Warsaw, seriously damaged or completely destroyed, used the uncritical, conservative principle of “where it was, as it was” to guide their reconstruction.

## Conclusion

The anxiety to preserve — or even to recreate — the destroyed heritage was so strong that it led to exact and artificial replicas of that heritage: a kind of manufactured and “in vitro” creation. The case of Prague, however, is represented as a curiosity in the circumstances of architectural research. This led to an approach that became concrete not through linear derivations of the act of composition — from the design of the architecture according to the typological model, to the definition of the details — but through discontinuous progressions, dialectical inductions, and even through intuitive actions that have no certainty and no evidence, but that reconstruct an image mediated by an allegorical and metaphorical code. Thus, this is not simply about a figurative aspect, but also about a program of activities and strategic functions that have the aim to regenerate the original identity of the urban culture of this part of the city.

To conclude among the questions raised by this study concerns the preservation of the various cultural identities in the city. In general terms, the expressions of diversity — social, economic, and also cultural — have contributed to the historical formation of a heterogeneous community in which autonomous and historically independent settlements have each become carriers of a local tradition. These can still be recognized today inside the city, in its various neighbourhoods, and in its various urban areas.

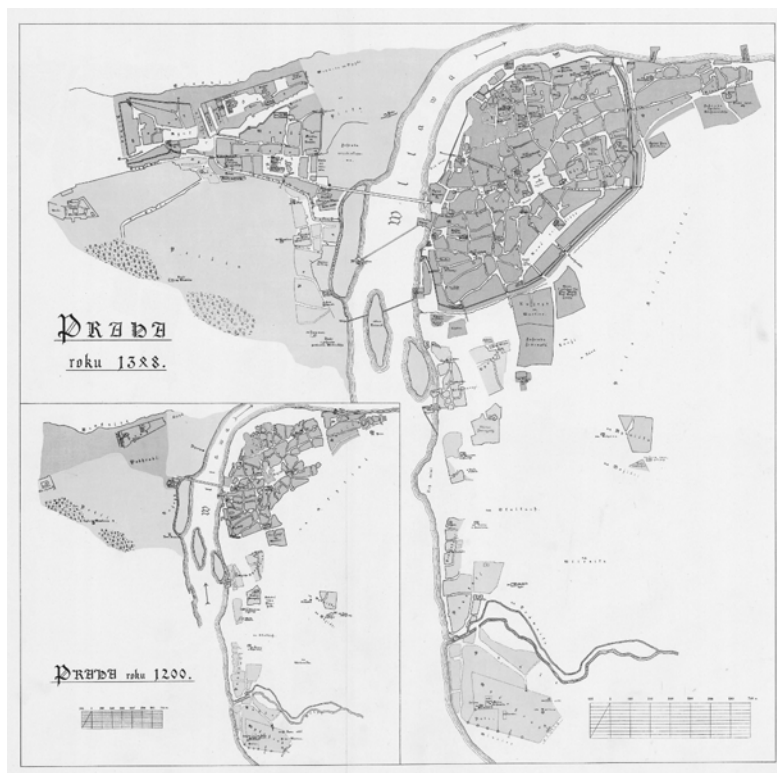
The goal of this work is to verify, case by case, how to make it possible that the architectural forms become a symbol (tool) in an advanced management of the city. This settlement strategy (even with small structures in secondary areas) is started through the dislocation of particular typological-functional structures. These precedents must be available for creative combination of new behaviors and figurative innovation, in order to counteract the homogenizing territorial and cultural processes typical of the post-reconstruction and post-economic boom periods. This research aims at preserving and recognizing the cultural identity of the Jewish community within the city, using a specific strategic vision that begins with the reconstruction of these cultural remains and the recovery of small urban fragments, within and on the edges of this urban island.

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### Illustrations and tables



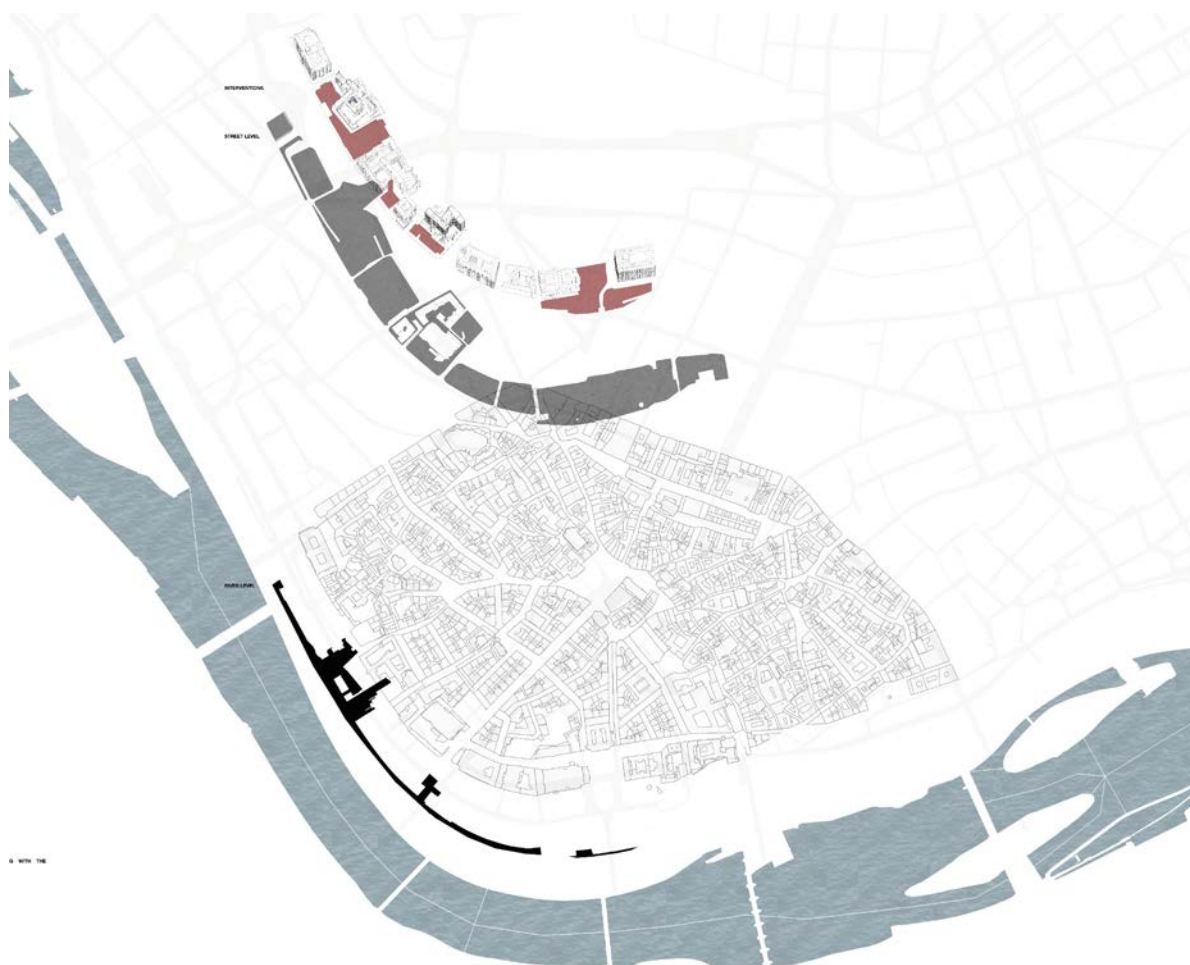
**Figure 1.** Maps of Old Prague for the years 1200 and 1388 published in: Tomek W., (1892) *Prague* (Czech Academy of Emperor Franz Josef for Science, Literature and Art)





**Figure 2.** Staré Město in the Juttner plan of Prague, 1816. Municipal Library of Prague

**Figure 3.** The Ghetto of Prague in the context of Staré Město. Joseph Daniel von Huber, 1769. Picture Archives and Graphics, Wien



**Figure 4.** Exploded axonometric of the Prague's waterfront with the project interventions. Students elaborations



**Figure 5.** The Old Town of Prague in XIV, XVIII and XX centuries, in the context of present urban state.  
Author's elaborations



**Figure 6.** Possible points for intervention in the context of the Old Town of Prague. Author's elaboration

## Urban morphology and anthropogenic heat flux. Case studies in Barcelona.

Helena Coch<sup>1</sup>, Agnese Salvati<sup>2</sup>, Antonio Isalgue<sup>3</sup>

<sup>1,2,3</sup>Escola Tècnica Superior d'Arquitectura de Barcelona ETSAB, UPC, Av. Diagonal, 649, 7th Floor, 08028, Barcelona

<sup>2</sup>Departament de Física, UPC, Pla de Palau, 18, Edifici NT1, 08003 Barcelona

E-mail: <sup>1</sup>helen.coch@upc.edu, <sup>2</sup>agnese.salvati@upc.edu, <sup>3</sup>antonio.isalgue@upc.edu,

Keywords: *Urban Heat Island, Anthropogenic Heat, Building Energy Use, Urban Microclimate*  
Conference theme: *Design a Sustainable Urban Form*

**Abstract.** Anthropogenic heat emissions from buildings and traffic have a crucial impact on the urban heat island (UHI) intensity, contributing to increasing urban air temperature during both the daytime and the nighttime. The relative contribution of buildings and vehicular traffic depends on urban morphology. Some key parameters are: Coverage (GSI), Floor Space Index (FSI), Network density (N), carriageways area, and buildings typology mix. The objective of this study is to compare the anthropogenic heat from traffic and buildings in four different urban textures of Barcelona with varying building density, urban form, and typology mix. The anthropogenic heat from traffic is calculated using measurements of the traffic flows in principal and secondary roads of each urban texture and considering typical values of fuel consumption in urban context. The anthropogenic heat from buildings is calculated from annual measurements of gas and electricity consumption of domestic and non-domestic buildings in Barcelona, considering the spatial distribution of such two typologies in the four urban textures analysed. The results show that buildings play a dominant role on anthropogenic heat generation compared to transportation in urban areas. The relationship between the two anthropogenic heat fluxes and the aforementioned urban morphology parameters are analysed and discussed. The results allow to draw new insights on the relative weight of urban morphology on anthropogenic heat generation and UHI intensity in Barcelona.

## Introduction

Anthropogenic heat generation in cities is one of the causes of urban heat island intensity (UHI). The UHI is the climate phenomenon responsible for a local increase in air temperature in urban areas compared to the surrounding rural areas (Oke et al, 2017). In Barcelona, this phenomenon is responsible for a significant increase in building cooling demand (Salvati et al. 2017a).

The UHI intensity is the result of the interaction between the complex urban surface, solar radiation, water, and wind flow. Compared to rural areas, cities absorb and retain more heat during the day. This is due to the predominance of impervious surfaces, the complexity of urban geometry and the presence of additional sources of heat, such as transportation systems and buildings' heating and cooling systems (Oke et al, 2017).

Urban form plays a dominant role in UHI in the Mediterranean context (Salvati et al. 2021, 2019, 2017b, 2016). This can be explained by the fact that urban form and building density are linked to many causes of the UHI. A dense urban fabric absorbs more solar radiation than open urban forms, due to the trapping of multiple solar reflections between urban surfaces. At the same time, building density reduces the nighttime cooling rate of urban areas, due to the reduced sky view factor and wind speed between buildings. Furthermore, an increase in building density also entails an increase in anthropogenic heat generation, due to the intensification of the energy use for transportation and buildings (Isalgue et al. 2007).

The interaction between urban geometry, solar radiation and wind flow has been studied in several cities, located in many climate regions (Oke et al. 2017). Conversely, the relationship between urban density and anthropogenic heat fluxes has been less investigated. Studies can be found for UK cities (Smith et al. 2009, Hamilton et al. 2009), tropical cities (Yuan et al. 2020) and hot-arid cities (Luo et al. 2020). In the Mediterranean region, Pigeon et al. (2007) have analysed the anthropogenic heat flux in Toulouse. However, none of these studies has investigated the relationship between urban morphology and anthropogenic heat generation. The objective of this study is to assess the variation of anthropogenic heat fluxes in different urban textures of Barcelona and to identify the relative contribution of buildings and transportation. The anthropogenic heat fluxes are correlated to urban morphology parameters of the urban textures to investigate if significant relationships exist between them.

## Measurement and analysis

The study is based on the analysis of four urban textures of Barcelona: la Dreta de l'Eixample, Sants-Hostafrancs, Gracia, and Barrio Gotico (Figure 1). The four urban textures represent recurrent urban patterns of the city. The analysis comprises different techniques to quantify density-morphological features and anthropogenic heat fluxes of such urban textures.

The first step of the methodology consists in the density-morphological characterisation of the four urban textures. This is done by adopting the Spacematrix (Pont and Haupt, 2009) approach to quantify key density characteristics: Coverage (GSI), Floor Space Index (FSI) and Network density (N). The GSI indicates the relationship between built and non-built space in the urban area and it is given by the ratio of the building footprint area to the base land area (A). The FSI is a measure of building intensity in the urban area, given by the ratio of the gross floor area (F) – the sum of all surfaces, measured per floor – to the base land area. The density of the network N is given by the total network length (in meters) divided by the base land area. N indicates the concentration of road networks in an urban area. The morphological analysis of the urban textures also considered two additional indexes: the percentage of carriageways area and the percentage of non-domestic buildings in the urban area. The percentage of carriageways



area is calculated as the ratio of the non-built area dedicated to motorized transportation (including parking areas) to the base land area. The percentage of non-domestic buildings is given by the gross floor area of non-domestic buildings (commercial and office) to the total gross floor area in the urban texture. All such indexes are calculated from GIS databases of the cadastre of Barcelona, updated to 2022.

The second step of the methodology consists in the calculation of the anthropogenic heat fluxes. This is performed separately for transportation and buildings. The calculation of the anthropogenic heat from transportation (AHT) is based on the following equation (1):

$$AHT = (V_{\text{vehicles}} \times E \times d \times H_c) / 100 \quad (1)$$

Where AHT is the anthropogenic heat flux in W/m<sup>2</sup>, V<sub>vehicles</sub> is the daily vehicle flux (number of vehicles per day) on each road, E is the average fuel consumption by each type of vehicle (litres per 100Km), d is the distance travelled within the urban texture (m) and H<sub>c</sub> is the heat of combustion of gasoline equal to 31 MJ/l. The average fuel consumption of different types of vehicles was set to 9 l/100Km for cars, 6 l/100Km for scooters, 13 l/100Km for vans and 86,8 l/100Km for buses. The daily vehicle flux was measured on two or three typical roads of each urban texture and then assumed to be the same in the other roads with the same hierarchy, according to maps provided by the municipality (Ajuntament de Barcelona, 2017). The measurements were taken over 15 minutes during three times of the day: 9:00 am, 3:00 pm and 8:00pm (Burgos Ortiz, A. L., 2022). The spot measurements were used to calculate the daily average vehicle flux in each type of road based on the daily traffic profile for the city of Barcelona (Ajuntament de Barcelona, 2008).

The calculation of the anthropogenic heat from buildings is based on measured data of gas and electricity consumption over a calendar year. Such data were available for domestic and non-domestic buildings in Barcelona for the year 2008 (Agència Local d'Energia de Barcelona, 2013). The annual energy consumption divided by the gross floor area of domestic and non-domestic buildings in Barcelona provided the annual energy use per square meter of each building typology:

- Energy Consumption Domestic Buildings (ECB<sub>domestic</sub>): 76.5 kWh/m<sup>2</sup>
- Energy Consumption Non-domestic buildings (ECB<sub>non-domestic</sub>): 252.4 kWh/m<sup>2</sup>

The anthropogenic heat fluxes from buildings (AHB) were then calculated as follow:

$$AHB_{\text{domestic}} = (ECB_{\text{domestic}} \times F_{\text{Domestic}}) / (A \times 8760) \quad (2)$$

$$AHB_{\text{non-domestic}} = (ECB_{\text{non-domestic}} \times F_{\text{Non-Domestic}}) / (A \times 8760) \quad (3)$$

Where AHB is the anthropogenic flux in W/m<sup>2</sup>, F<sub>Domestic</sub> is the gross floor area of domestic buildings, F<sub>Non-Domestic</sub> is the gross floor area of non-domestic buildings, A is the base land area and 8760 is the number of hours in a year. In such a way, the daily anthropogenic heat from transportation and buildings could be compared.

### Urban morphology analysis

The Figure 1 shows the selected urban textures and compares the percentage of built areas, carriageways, and pedestrian areas in each of them.

La Dreta de l'Eixample is the urban texture with the highest percentage of carriageways (20%), followed by Sants-Hostafrancs (19%). The other two urban textures have less open space reserved for motorized transportation in favour of a higher share of open space just for pedestrians. The percentage of the carriageway decreases to 11% in Gracia and to 6% in Barrio Gótico.



Another interesting result of the morphological analysis regards the network density  $N$ . This value is minimum in Dreta de l'Eixample (0.014) and maximum in Barrio Gotico (0.03), highlighting that a denser road network (with a higher value of  $N$ ) generally results in a lower ratio of the open space dedicated to motorized transportation, in favour of pedestrian areas.

The comparison of the Spacematrix indexes in the four textures provides information on the ratio of urban space occupied by buildings (GSI) and the building intensity (FSI), which accounts for vertical density. According to the results, all textures are dense and compact, as more than half of the urban area is occupied by buildings. The maximum GSI is found in Barrio Gotico (69%), followed by Gracia (68%), La Dreta de l'Eixample (58%) and Sants-Hostafrancs (53%). However, in terms of building intensity FSI, the densest neighbourhood is Barrio Gotico (4.36) followed by La Dreta de l'Eixample (3.81), Villa de Gracia (3.14) and finally Sants-Hostafrancs (2.71). Comparing the results of Gracia and La Dreta de l'Eixample, we can see that the urban form of the latter, resulting from the development of the famous Plan Cerdà, allows a very high building intensity while preserving a good amount of open space (42% in Eixample as opposite to the 32% in Gracia).

Finally, the distribution of building typologies is quite different in the four urban textures (Figure 3). The percentage of non-domestic buildings is 42% in La Dreta de l'Eixample, 39% in Barrio Gotico, 34% in Sants-Hostafrancs and 17% in Gracia.

### **Anthropogenic heat flux from transportation and buildings**

The traffic flows measured in the typical roads of each district and the anthropogenic heat fluxes from transportation and buildings are summarised in Table 2. The results show that building energy consumption is responsible for the biggest share of anthropogenic heat generation in cities. The results also show that anthropogenic heat from transportation (AHT) varies less than anthropogenic heat from buildings (AHB) in the four textures analysed.

The highest generation of AHT is found in La Dreta de l'Eixample (13 W/m<sup>2</sup>) and Sants-Hostafrancs (10 W/m<sup>2</sup>), while it decreases in Gracia (7 W/m<sup>2</sup>) and Barrio Gotico (5 W/m<sup>2</sup>). The reduction of AHT in Gracia and Barrio Gotico can be explained by the characteristics of the road network in these districts, which is made up of one-way narrow roads with reduced traffic-flow and many pedestrian areas. Conversely, the roads of Sants-Hostafrancs and La Dreta de l'Eixample are wider and with more intense daily traffic flows (table 2).

The anthropogenic heat from buildings (AHB) is much higher than the AHT in all four districts. In La Dreta de l'Eixample, AHB (53.8 W/m<sup>2</sup>) is about four times the AHT (12.9 W/m<sup>2</sup>), while in Barrio Gotico AHB (51.4 W/m<sup>2</sup>) is more than 10 times higher than AHT (4.8 W/m<sup>2</sup>).

The domestic AHB shows a small variation across the four urban textures: from 18 W/m<sup>2</sup> in Gracia to 14 W/m<sup>2</sup> in Sants-Hostafrancs. Conversely, the non-domestic AHB largely varies in the four urban textures and accounts for the biggest share of the total AHB in all cases. La Dreta de l'Eixample is the texture with the highest generation of anthropogenic heat from non-domestic buildings (38 W/m<sup>2</sup>), followed by Barrio Gotico (35 W/m<sup>2</sup>), Sants-Hostafrancs (23 W/m<sup>2</sup>) and Gracia (12 W/m<sup>2</sup>). This is the result of the different percentage of non-domestic buildings in the four urban textures, accounting for 42% in La Dreta de l'Eixample, 34% in Sants-Hostafrancs, 39% in Barrio Gotico and only 17% in Gracia. These results highlight that AHB depends not only on total building intensity (FSI) but also on the mix of building typologies.

Figure 4 shows that a very good relationship ( $R^2 = 0.975$ ) exists between anthropogenic heat from transportation and network density  $N$ : the lower the network density, the higher the anthropogenic heat from traffic. Conversely, anthropogenic heat from buildings is better correlated to building intensity FSI. However, this relationship is not as significant as the previous

one ( $R^2=0.658$ ). In fact, high variability is determined by the different percentages of non-domestic buildings in the four urban textures. Urban textures as Gracia, where the residential use is predominant, generate much less anthropogenic heat from buildings compared to other textures with a higher share of non-domestic buildings.

It is interesting to note that the actual energy consumption of domestic buildings in Barcelona is estimated to cover just 42% of the heating demand and 12% of the cooling demand (Agència Local d'Energia de Barcelona, 2013). This means that many buildings are currently underheated in winter and overheated in summer. While heating needs are predicted to decrease due to climate change, cooling needs are instead predicted to increase significantly. This means that mechanical cooling systems are expected to become more and more used also in residential buildings in the next decades in Barcelona. Such an increase in mechanical cooling will entail an increase in anthropogenic heat generation and a consequent exacerbation of the urban heat island effect. On the other hand, higher urban temperature will further increase building cooling demand, and such a vicious cycle can have a very severe impact on the city's energy supply network and greenhouse emissions. For this reason, it is important to reduce anthropogenic heat from buildings by avoiding active cooling systems in favour of passive cooling strategies to prevent dramatic impacts on the environment in future.

## Conclusion

The study investigated the magnitude of the anthropogenic heat flux in four urban textures of Barcelona, considering building energy use and transportation. The results indicate that anthropogenic heat from buildings is more relevant than anthropogenic heat from transportation at the local scale. Furthermore, anthropogenic heat is much higher in those urban areas with a higher presence of non-domestic buildings, because they have a much higher energy demand than domestic ones.

The correlations identified between the anthropogenic heat fluxes and some morphological parameters such as network density (N), building intensity (FSI) and percentage of non-domestic buildings allow extending these results also to other urban textures. Such relationships can be used in urban climatology studies, to derive input parameters for urban microclimate simulations as well as in urban metabolism studies to estimate the environmental impact of energy use by transportation and buildings. The results can also be used to develop maps of anthropogenic heat intensity across the city for use in planning to address mitigation and adaptation strategies to reduce the environmental footprint of cities.

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## Illustrations and tables

Urban texture	A - Base land area (unit: Ha)	F - Gross floor area (unit: Ha)	B - Footprint (unit: Ha)	I - Network length (unit: m)
La Dreta de l'Eixample	90.8	346.2	52.6	12 897
Sants-Hostafrancs	96.1	260.1	50.5	19 773
Vila de Gracia	108.2	339.7	73.6	27 287
Barrio Gotico	61.1	266.8	42.3	18 247

Urban texture	FSI - Building Intensity (unit: m <sup>2</sup> /m <sup>2</sup> )	GSI - Coverage (unit: m <sup>2</sup> /m <sup>2</sup> )	N - Network Density (unit: m/m <sup>2</sup> )
La Dreta de l'Eixample	3.81	0.58	0.014
Sants-Hostafrancs	2.71	0.53	0.021
Vila de Gracia	3.14	0.68	0.025
Barrio Gotico	4.36	0.69	0.03

**Table 1.** Urban morphology variables and density indexes for the four urban textures

Typical traffic flows (n. vehicles/day)					
	Car	Scooter	Van	Bus	Total
<b>La Dreta de l'Eixample</b>					
C. Roger de Lluria	10063	6732	1943	416	19154
C. Mallorca	10618	6593	2429	486	20126
<b>Gracia</b>					
C. Gran de Gracia	8606	9508	2637	625	21376
C. del Montseny	3609	4303	1319	0	9231
C. de Marti	1596	1179	1110	0	3885
<b>Sants-Hostafrancs</b>					
C. de Sants	11098	7703	2776	763	22340
C. de Premia	643	763	416	0	1822
Av. de Josep Tarradellas	5549	3851,5	1388	381,5	11170
<b>Barrio Gotico</b>					
Via Laietana	8675	3539,5	1943	208	14365,5
C. de Jaume I	3331	1457	1735	0	6523
C. Ample	1041	1041	694	0	2776
Average fuel consumption (l/100 Km)	9	6	13	86.8	

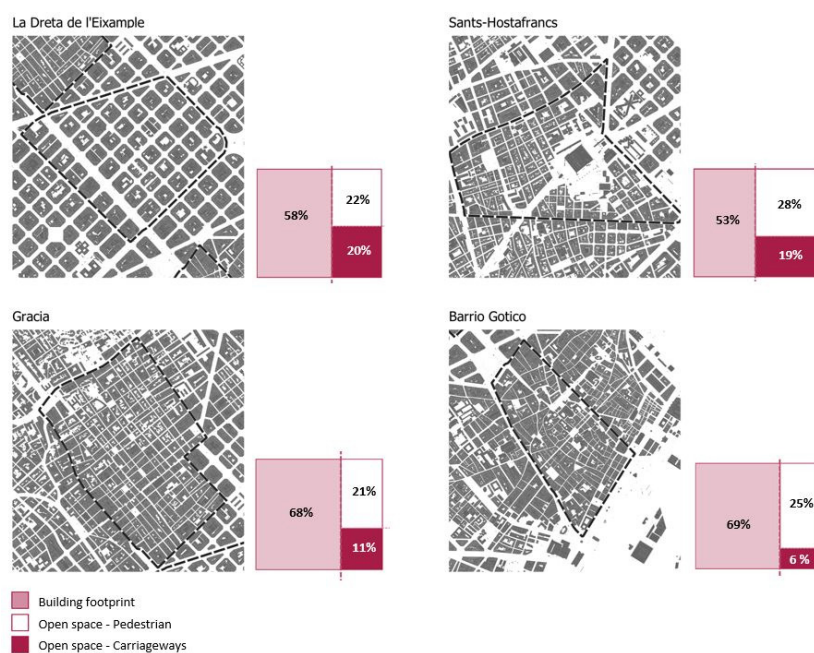
  

Urban texture	Open space (% of Urban area)	Carriageways (% of Urban area)	Anthropogenic heat flux from transportation (W/m <sup>2</sup> )
La Dreta de l'Eixample	42.0	20.0	12.9
Sans-Hostafrancs	47.0	19.0	10.3
Gracia	32.0	11.0	6.9
Barrio Gotico	31.0	6.0	4.8

Urban texture	Domestic Buildings area (m <sup>2</sup> )	Non-domestic Building area (m <sup>2</sup> )	Anthropogenic heat flux from buildings (W/m <sup>2</sup> )		
			Domestic Buildings	Non-Domestic Buildings	Total
La Dreta de l'Eixample	1641960	1199884	15.78	38.05	53.83
Sans-Hostafrancs	1489200	771336	13.53	23.12	36.65
Gracia	2214370	469089	17.87	12.49	30.36
Barrio Gotico	1141230	744467	16.30	35.08	51.37

**Table 2.** Traffic flows in representative roads of each district and anthropogenic heat fluxes from transportation and buildings in the four urban textures



**Figure 1.** Urban textures analysed and percentage of urban area occupied by buildings, carriageways and for pedestrians



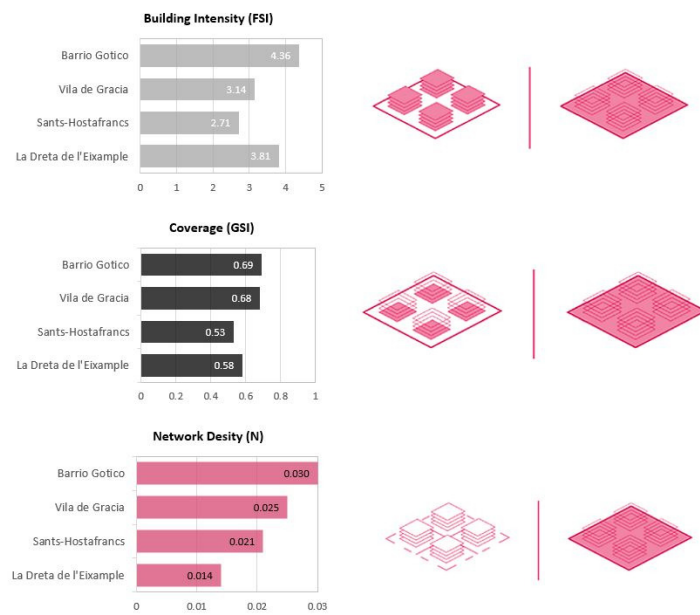


Figure 2. Comparison of density indexes for the four urban textures

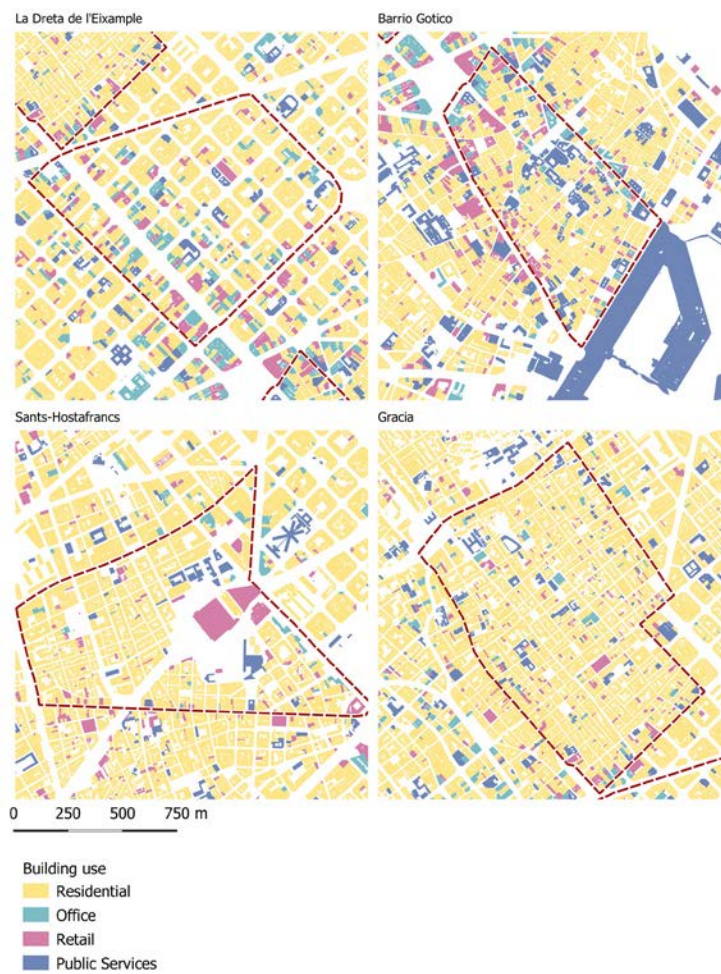


Figure 3. Distribution of domestic and non-domestic building area in the four urban textures



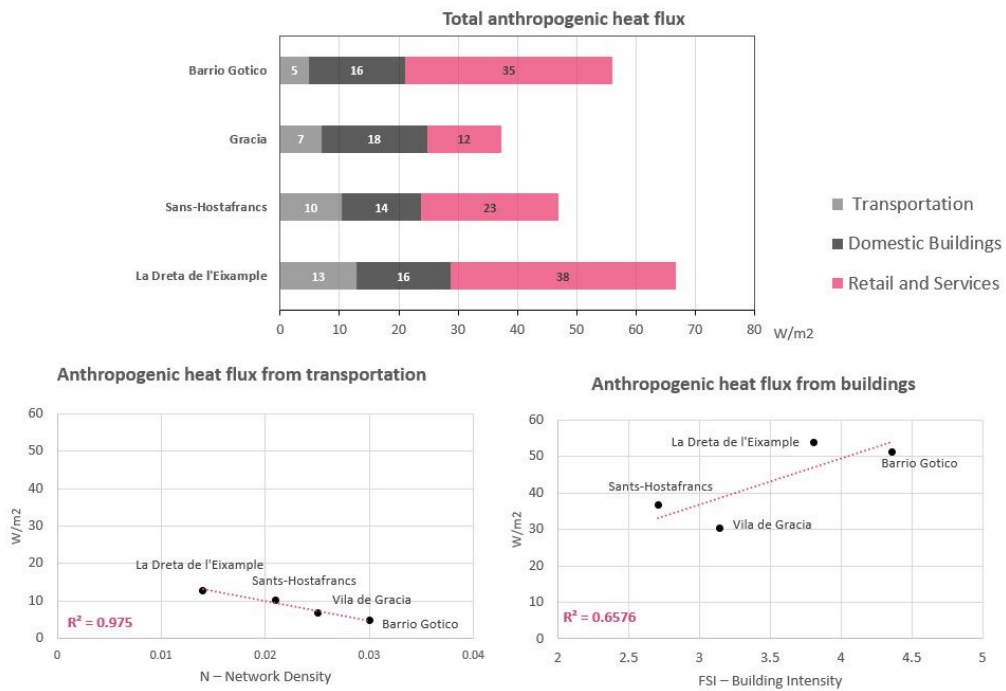


Figure 4. Comparison of the anthropogenic heat fluxes and relationships with urban density parameters



## Saverio Muratori. Architecture and reality

Francesca Delia De Rosa

DiAP - Dipartimento di Architettura e Progetto - Sapienza Università di Roma.

E-mail: francescadeliaderosa@gmail.com

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**Abstract.** Muratori says: «while the relationship between the animal and the environment is an absolute relationship, because there is no reflection of consciousness, it is a relationship that is established and that the animal cannot correct because it does not have the possibility of self-determination, in man instead there is consciousness, for which man can adapt the environment to himself...».

Saverio Muratori was an architect between the '30s and '70s and through its studies the concept of environment itself reaches a new complexity. Complexity that unfolds on two coplanar levels: on the one hand architecture and on the other reality. Muratori lived an era of uncertainty, in which modern architecture showed signs of subsidence. Echoing the words of Alessandro Giannini: «The irrationality of reality is nothing but structural inadequacy of modern science, an implicit failure in the modern way of formulating science and a threatening ghost that looms over humanity and that will eventually overwhelm it. Therefore architecture is the salvation of man.»

What will be the thought that will allow us to overcome a new crisis? In architecture there is not a single truth, but multiple and Muratori has expressed, thinking and doing, his vision of architecture, linked to the world of urban morphology. Active architect and thinking man between contradictions and confirmations offered, for those who want to accept it, a design method capable of establishing a coherent and rational relationship with the existing urban scene, far from imaginative and self-referential visions.

On the night of October 16, 1834, Turner portrayed live the tragic accident that destroyed the House of Lords and the House of Commons in London on the night between 16 and 17 October 1834, painted the famous picture *The burning of the Parliament building*. The flames envelop the building in a grip from which it is impossible to free, the golden light is the protagonist of this picture which bears witness not simply to a historical fact, the loss for London of one of its oldest and most important landmarks, but a moment of severe crisis for the city which, although it has become a metropolis of the world thanks to the industrial revolution, must pay for the loss of its identity.

Mixed feelings pervade the picture: warmth, energy, drama and negativity. Vittoria Crespi Morbio, expert in figurative arts, describing Turner's work says: "The present dissolves into the past, the visual experience into memory, the particular becomes universal by disappearing into a timeless symbol."<sup>1</sup> The spectators in the foreground helplessly watch the fire, the destructive force of nature. A grand and terrifying sight. A critical moment that inevitably implies a change. A painting in which the particular becomes universal, in which each element is essential to convey the author's implicit message addressed to the community. Turner shows us the finiteness of the human being in front of the grandeur of nature, small and dispersed but at the same time an active part capable of shaping reality in his own image. The world around us is this reality and man is action.

Just as Turner's painting is a critique of the society of his time, in which the general order of life was lost, so Muratori criticizes his contemporary society, discovering it unprepared. But the crisis implies a necessary and inevitable change, a change that Muratori seeks in the hope that there is a redemption for the architecture of his time and obviously for ours. But it is not architecture that is in crisis, but civilization. Turner's art conveys messages, but architecture is a living message, man makes it alive. Giannini affirms that architecture is man's salvation, because it is the only one of the arts that acts in the practical world, straddling two worlds whose limits are as fleeting as they are clear: the expressive world and the mechanical world of technology, just as defined by Muratori. Muratori, militant architect, develops a method of study and design for the city based on urban morphology, a method that considers every aspect of human knowledge, tradition, economy, history, psychology. All aspects aimed at the one who imposes the basic module of architecture and beyond: man.

In *Storia e critica dell'architettura contemporanea*, a book defined by Masons as a creed and a study book, his vision of architecture is clear: the new must fit into the context without highlighting self-referential characteristics, so it is the creator of the works to enjoy it exclusively, but on the contrary it must add a new piece in respect of the past, linked to the present and reaching out towards the future.

From the second half of the decade his intellectual and practical commitment as a militant architect was completely devoted to the study of the city and its dynamics. A city that is not understood as a set of parts, but an organism. This is formed in successive stages which are nothing more than the awareness of the ability of a material to rediscover itself as material, and consequently of its ability to arrange itself according to a precise and rigorous order up to defining the various scales of the organism itself: systems, structures and elements.

The concept of organism becomes fundamental, being for Muratori the coordination of acts in a single action, a reflection of our inner order, therefore an original and creative reality.

"And in that immediate transfusion of our sensitivity into raw matter, we make matter participate not only in our human organic world but, through this, also in our personal individuality, which

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<sup>1</sup>AA.VV., (1997) *Arte Storia Universale*, (Elemond Editori Associati, Milano)

manifests itself no longer as occasional and momentary, but as further concrete differentiation of a world already concrete and universal in itself"<sup>2</sup>.

Occasional and momentary in opposition to concrete and universal.

It is precisely in the *Storia e critica dell'architettura contemporanea* that Muratori expresses his aesthetic conception, his vision of art. A thought that will reach its maturity towards the 50s during the ordinariate in Venice.

In these writings Muratori identifies a real parameter of judgment for architecture: the degree of organicity, denouncing the latent lack of this factor in contemporary architecture.

This grad of organicity, the concept of organism must be understood through its Vitruvian conception as a balanced synthesis between technique and expression. The reflections on Muratorian aesthetics find a starting point in the *distinzionista* theory of Croce, a theory at the basis of contemporary philosophical currents, so fundamental to have allowed architecture to free itself from all the contradictions of the theories in force, making it free and leading it back to intuition and spontaneity.

But Muratori recognizes limits in Croce's theory: Croce never said how to operate, what is the process that leads us to the resolution of the artistic and therefore architectural project: "It is an intuition, the artist wakes up with a certain intuition and has conceived the work of art".

But architecture cannot be pure art, pure intuition. For Muratori, art is not the starting point but the conclusive moment of knowledge, it is synthesis, it is the last phase of a process. It is not the result of an auroral phenomenon of the spirit, fruit of an arbitrary and self-referential attitude of the architect, of the individual thinker. It is the result of a collective process, it is a fact of life, made by men for men.

The aesthetic category is already in reality, man has the only task of inventing it, in its Latin meaning of discovering it, rediscovering it, and never imposing it.

So Muratori wonders about the style.

It is the expression of perfect organicity and harmony of the parts in the whole, and it is above all the absolute reality that contrasts with style understood as a manner, a peculiar and egocentric form of a specific personality or school or nation or time and, even worse, academy. Once again, architecture is the only one of the arts that acts on a practical field and consequently must respond to two worlds: the world of expression, of the community, and the practical world of mechanics, functional and static.

Being an organism, architecture will necessarily have to achieve a balance between these two worlds of expression and mechanics. And this objective is entrusted to the sensitivity of the architect, who will have to understand when the expression will have to give way to mechanics, to the contingent aspects of reality.

The real, the reality that is always the starting point and the point of arrival of Saverio Muratori's design and theoretical thinking. The point of arrival, the synthesis between theory and practice, will be harmonious and balanced, if we want to be controlled by bodily experience.

Muratori therefore goes beyond Croce's vision, the world of the spirit without rules or laws, sudden and spontaneous, and contrasts it with the vision of architecture as a synthesis between technique/mechanics and corporal expression/value. Intuition is always present but is followed by criticism.

Style differs over time because the community changes and transforms over time.

Concepts and thoughts that Muratori has verified by designing and building, obviously all never

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<sup>2</sup>Muratori S., (1980) *Storia e critica dell'architettura contemporanea*. *Disegno storico degli sviluppi architettonici attuali* (1944), (Centro Studi di Storia Urbanistica, Roma)



without contradictions, since it is the architect, his education, his cultural background that he chooses. But it is not the victim of an unpredictable creativity: every action originates as an intent aimed at a goal.

Civilization, the recipient of the architect's work, must be able to recognize itself in what he observes. The work must belong to the civilization, to the place for which it is intended, to that place and nowhere else. His projects are a verification of his thoughts, they are experiments resulting from a contemplative, spiritual process but, as Muratori defines, always guided by bodily experience. "The common bodily experience".

In 1952 Muratori had a new opportunity to put into practice what his mind outlined on paper. The Enpas office building in Bologna. The building was designed between 1952 and 1957, built between 1959 and 1961 and inaugurated on April 4, 1963, on an area torn apart by the bombings of the Second World War, near Piazza dei Martiri, along the axis of via dei Mille, perpendicular to the main historic artery of the city, via Galliera. The possibility of dealing with a historical context marked by war events is seen by Muratori, taking up the words of Giorgio Pigafetta, as a "very tenacious but very rich design experiment". Here the two worlds mentioned above come into play: the world of expression and the world of technique. Muratori studies the historical context of the city of Bologna, and his thinking is guided by the human intuition of the bodily sense that allows us to understand "foreign" matter and to make it our own by transforming it. Muratori does not conceive a work dictated by personal needs, but on the contrary offers the city its own image, reinterpreted. In fact, through bodily experience, which is common to all men, he identifies a norm that will be the basis of the project: his expressive language.

The Enpas building is Muratori's proposal to the problem of civic and environmental architecture and to the urban problem which must be in «close connection to the whole life of Bologna, understood above all as a moral and cultural physiognomy». Therefore the expression that arises in the individual consciousness becomes a participant manifestation of a collective reality. The filtered expression of the individual becomes universal expression. The project is divided into two volumes: the main one on via dei Mille with seven floors, intended for offices and homes, and the second on the back of a single floor used as a hall for the public. The suggestions mentioned define the expressiveness of the building, characterized by a cement structure that reinterprets the wooden structure of the oldest arcades in Bologna, those of the XIII. Each element of the structural skeleton, struts, tie rods and the double cantilever on the road, is seen as a clear contemporary update of the Bolognese Gothic style. It is not a building with a picturesque character, Muratori shuns decorativeism and proposes an architecture that is coherent with the place, responding to the problem of environmentalism, but linked to the time in which it was built. In the upper levels the structure is not hidden, protruding with respect to the infill walls which highlight the distinction between the load-bearing part and the carried part.

The main building, built through the linear typology, interprets the suggestions, the characteristics of the noble architecture of the medieval city of Bologna, responding to the law of seriality, matrix of the city of Bologna, identified by Muratori. The building, however composed from individual different distinguishable elements, it is projected into our mind as a harmonious organism, coordination of acts in a single action.

But Muratori had to respond to practical needs, the world of expression is not complete without that of technique. Depending on one's personal sensitivity, the world of expression stops to give way to the world of mechanics, the world of practice, of what is contingent. Thus, Muratori proposes a building in line that perfectly responds to the functions that the building should have housed: the arches on the ground floor allow access to the public, employees and

residents, who through the stairwells with attached lifts, service blocks which are repeated up to the top floor, can reach the desired floors. The archive is in the basement, the mezzanine is intended for the analysis laboratories, from the first to the third floor there are the clinics, from the fourth to the fifth the offices and finally the sixth floor is intended for the residences.

The plans can be summarized in three standard floors: ground floor, office floor and residence floor. At the basement level, the arcades represent a filter between the outside and the inside, from which it is possible to access the entrance hall which has a monumental staircase and two mirrored service areas with stairs and lifts. The plan of the offices is a triple structural body with a central corridor that allows you to reach the different rooms arranged in series along the position determined by via dei Mille. The floor intended for the residences is still a triple structural body with a triple distribution, with different sizes of the apartments according to needs.

The office building is the result of a process. In the first moment the intuition, the architect's sensitivity gives shape to the raw material, the technique makes it feasible. Man makes it a living material in which to recognize himself. In this way architecture becomes transmissible and as Saverio Muratori states: "All this is not valid for a single moment, a single historical period but also as a development over time, in the sense of a process of forms towards style and the differentiation of style over time".

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**Figure 1.** Ortophoto of Bologna.



**Figure 2.** Nuova Sede degli uffici ENPAS, Bologna, 1952-1957. (Photo by F. D. De Rosa)



**Figure 3.** Nuova Sede degli uffici ENPAS, Bologna, 1952-1957. (Photo by F. D. De Rosa)

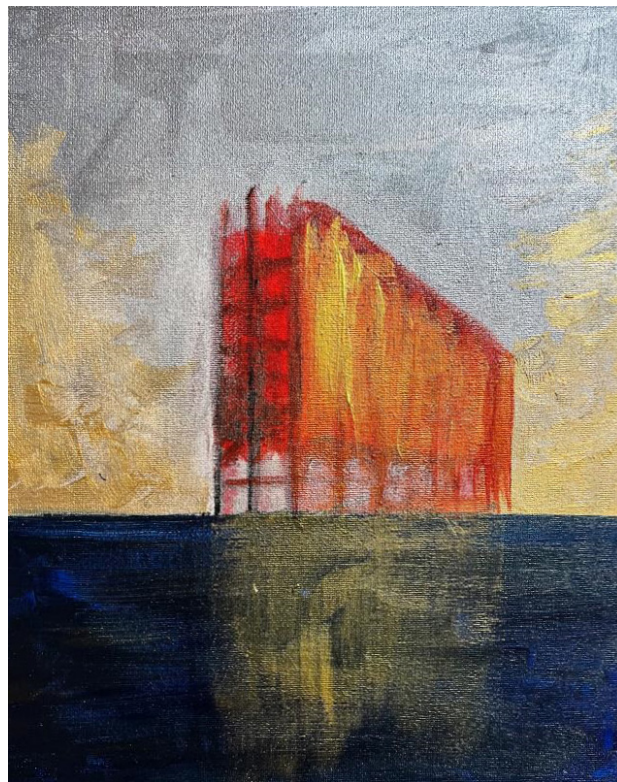




**Figure 4.** Palazzo Grassi, Via Marsala, 12 - 40126, Bologna. Medieval architecture. (Photo by F. D. De Rosa)



**Figure 5.** Palazzo Re Enzo, Bologna. (Photo by F. D. De Rosa)



**Figure 6.** Visione riflessa (Painting by F. D. De Rosa)





## Salerno in the making. Sustainable urban regeneration proposals for the disused railway of ex “scalo merci”

Felice De Silva

Department of Civil Engineering. University of Salerno. Via Giovanni Paolo II, 132. 84084, Fisciano (SA).

E-mail: fdesilva@unisa.it

**Keywords:** *Spaces of life, sustainable urban regeneration, urban growth, reuse of disused urban areas, reduction in soil consumption.*

**Conference theme:** *Design a Sustainable Urban Form*

**Abstract.** *The paper addresses the issue of the sustainable future of cities framed within the processes of redevelopment of the built heritage and urban regeneration. In light of the new needs linked to the international scenario of ecological transition, the topic is developed by investigating the role that urban development and regeneration policies play in defining scenarios that are able to give a vision for a smarter, more sustainable and inclusive development of the European city of the future. Within this framework, one of the actions to be urgently undertaken in our cities is the reuse of soils – with the reconversion or reuse of abandoned or unused areas, etc. – as a key strategy to contribute to the reduction of land consumption and to oppose settlement dispersion. As a contribution of the teaching and research activities of the course of Architecture and Architectural Composition III of the Degree Course in Building Engineering-Architecture of the University of Salerno, a design research is presented for the disused railway area of ex “scalo merci” of Salerno. The project proposals presented work on the relationship between urban morphology and the hypothesis of sustainable urban regeneration by proposing three different scenarios for a unitary but internally articulated part of the city, which refer to as many ideas of the city, in which different ways of putting in tension the relationship between nature and architecture are experimented.*

## Introduction

Cities and metropolitan areas are the places where more than two thirds of the European population live; they are the main engines of the economy and the catalysts of creativity and innovation. At the same time, cities are also primarily responsible for energy consumption, carbon emissions and the use of non-renewable resources. Urban areas are both the cause and solution of economic, environmental and social problems and will become increasingly decisive places for the sustainability of the entire planet. Therefore, urban development and regeneration policies play a leading role in defining scenarios that are able to give a vision of the sustainable future of the European city of the future.

The strategic importance of integrated urban regeneration to achieve smarter, more sustainable and inclusive urban development (Bonomi, Masiero, 2014), was recognized in the Toledo Declaration of 2010, the outcome of the informal meeting of the European Ministers responsible for urban development of the Member States of the European Union. Today, the actions related to the European Green Deal offer important tools not only to renew the existing building stock in terms of energy efficiency but also to regenerate urban habitats through the integration of natural and built environments in order to meet needs fairly and socially inclusive, reducing resource consumption, emissions and biodiversity loss while addressing the effects of climate change. By 2030 the world will change with inevitable implications for the territory, cities, architecture, products and services that will be designed, developed and used in the future. An answer for this time horizon is already suggested by the 17 Sustainable Development Goals 2030 presented by the United Nations which pave the way towards a model for achieving a better and more sustainable future for all.

In this reference framework, one of the actions to be urgently undertaken in our cities is the reuse of soils – with the reconversion or reuse of abandoned, abandoned or unused areas – as a key strategy to contribute to the reduction of land consumption and combat settlement dispersion.

With these premises, the bases of the activities of the Architecture and Architectural Composition III Course of the Degree Course in Building Engineering-Architecture of the University of Salerno<sup>1</sup> originate from some lines of research developed over the past years by the DICIV – also in the context of cooperation agreements, memoranda of understanding and agreements with other public institutions operating in the area of which our University is the center of gravity – within of which some themes have been addressed, characterizing the contemporary urban and architectural project, for the purpose of building new parts of the city catalysing an innovative strategy of transformation of the city.

The teaching and research activities have focused in recent years on a design research for the redesign of the disused railway area of ex Scalo merci, which wants to offer a contribution – which focuses in particular on the issues of the relationship between urban morphology and problems of revitalization and redevelopment of the built environment – to the topic of sustainable urban regeneration for the city of Salerno (Fig. 1).

## Salerno, a city in the making

The innovative overall setting of the planning process defined by the Municipal Urban Plan (P.U.C.) of Salerno – conceived starting from the first half of the nineties of the last century by a

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<sup>1</sup>The author has collaborated, as a research fellow and an expert on the subject, in the teaching and design research activities of the Architecture and Architectural Composition III course held by prof. Roberto Vanacore in the academic year 2019-2020, agreeing on the intentions, the structuring of the theoretical and methodological premises as well as the responsibility for the results.

design group led by the catalan architect Oriol Bohigas, representing the MBM studio Arquitectes S.A. of Barcelona (Josep Martorell, Oriol Bohigas, David Mackay with Oriol Capdevila and Francesc Gual) with Albert Puigdomenech – which became effective in 2007, is based on a hypothesis of reconstruction and redevelopment of the existing city rather than urban expansion: «The basic problem of European cities is therefore not that of growth, but of improving the quality of the existing. Rebuilding against expansion. Instead of building outside the city, build in the already built city» (Bohigas, 2005: 12).

The assumption is that the fragmented structure of cities and metropolitan areas is outlined as an often disordered juxtaposition of homogeneous parts – neighborhoods, urban sectors, singular elements – which makes their unitary understanding difficult; these contradictory and sometimes conflicting fragments establish the topic of the necessary urban reorganization to be implemented through their mending aimed at transforming the sum of parts into a coherent, understandable and meaningful whole.

The city imagined by Oriol Bohigas is a “limited” and “dense” entity, that is a city with well-defined limits that prevent its degeneration in the disurbanized periphery, within which to reconstruct a dense spatiality from a physical point of view, functional and social, in which public open spaces play a central role in controlling the urban form by reconnecting and giving meaning to the heterogeneous parts of which the city is made up. «The city is its public space. Therefore, the shape of the city must be designed starting from this space, rather than from the isolated architectural elements to which, nonetheless, a part of the definition of public space corresponds. The shape of the city determines the spatial articulations in which people find the scenario and the instruments of coexistence. Therefore, the shape of the city and its constituent elements is not only an aesthetic and functional theme, but also the basis of an effective living together» (Bohigas, 2005: 49).

Again Oriol Bohigas, about the urban open space, writes: «We need to start rebuilding from the urban void, from what can become a collective space, above all for three reasons: because it is the first topic accessible to the management of the Administration, because restoring public space is the fastest and most effective way to give a new environmental character to a whole neighborhood and mainly because it is the means to recover a social and urban conscience. From a reconstructed and rehabilitated public space, osmotic effects are produced towards private space. Starting from this point of view, the new models influence not only the improvement of the physical surroundings, but also the demographic balance and, as a consequence, the definitive establishment of a population that was degrading» (Bohigas, 2005: 12).

With these programmatic premises, the P.U.C. identifies a particular relationship between the urban plan and the urban project, the latter understood as an element through which to guarantee the formal coherence of the new planned constructions. The Plan is based on the forecast of project hypotheses for well-defined urban areas, the “Aree di Attuazione Puntuale Urbanistica” (A.A.P.U.), in which to conceive strategic regeneration projects for the future formal structure of the new city of Salerno. The urban-architectural projects imagined for these areas - already in the “Programmatic document” of 1994 seven A.A.P.U. to which four others were added later: South Historical Center; Northern Historic Centre; Santa Teresa and Villa Comunale; Trieste waterfront; Concordia square; Eastern waterfront; Lungo Irno; Hilly fractions; Neighborhoods Italy - Europe - Mariconda; Colombo waterfront – would have started the possible urban transformations immediately, even before the definitive designing of the local strategic plan, and defined the shape and character of the parts of the city involved, configuring themselves as a shared “urban framework” that would have supported and

accelerated the transformation of the city in its entirety.

Oriol Bohigas writes in this regard: « it seems clear that today the instrument of urban control is rather a set of projects than a generalized plan, built on illusions and temporal indeterminacies, composed only of quantifications and regulations. It can be said that there is a need for a "strategic" urban planning that is carried out starting from those concrete points chosen so well that by themselves they can initiate transformations with more general consequences. All modern cities have been examples of this method: they were formed from interventions that induced transformation events, communicating to their surroundings, in a fairly autonomous way, a desire for improvement, awakening, urban quality. [...]. Starting from the projects also means seeing the city from the particular to the general and therefore interpreting the partial plans as a sum of projects and as a legitimation of their coherence in a sector of the city. [...]. Simplifying, the serious limitation of the current legislative approach can be said to consist, proceeding from the general to the particular, in responding more to a "metaphysical" vision of the city than to the behavior and real needs of citizens which are substantially always disregarded. [...]. And again, strategic and "metastatic" urban planning – in a positive sense – is not made up only of well-situated punctual projects, but of well-finished buildings. It is through the completed work – and not through the completed project – that the osmotic metastatic effects and transformation of the urban tissue are produced» (Bohigas, 2005: 14).

Within these areas, the "Comparto edificatorio" (building sector) is one of the tools with which municipal urban planning is implemented. It is made up of one or more territorial areas, built or unbuilt, and is bounded in the tables of the P.U.C. Each Sector consists of one or more Transformation Areas (AT), one or more Standard Areas (AS), one or more Traffic Areas (AV), Public Residential Building Areas (AT\_ERP) and from areas for Productive Settlements (AT\_PIP), which are regulated by a unitary regulation and management, to be implemented with a P.U.A. (Masterplan for a specific area of the city). Within the A.A.P.U. the P.U.C. it also identifies the so-called "Project Areas", defined as Public Redevelopment Area (APR), i.e. publicly owned areas where construction rights have been allocated and for which the plan provides guidelines relating to functional destinations.

### **The outcomes of the didactic workshop**

Every architectural project must find its roots in the place in which it is located; in the best cases the project adopts and interprets – through the personal way of seeing things of the designer – the specific conditions of the site. The ability of a designer to read, describe and interpret a place, together with the development of a clear question from a functional point of view, represent the fundamental premise for a good project. Antonio Monestiroli writes, with great clarity: «The architectural project is rooted in a place. It assumes and gives meaning to a place. It assumes the conditions of the place in which it is located, whether they are the rules of urban construction or the characteristics of the natural landscape. It transforms them when it binds those rules to itself, or characters into a new unit. Even places, like the values of a theme, are a priori, they were formed in history, they sum up a culture prior to our project. Even places are objects of our knowledge, they must be analysed, interpreted, a configuration must be given that corresponds to our culture of living. The places, urban or natural, are the places of the dwelling, in whose form we recognize ourselves» (Monestiroli, 2002: 30-31).

The choice of the site in which to develop the design experimentation therefore required a lot of attention; the nature, purpose and meaning of the project guided the identification of the project area which was also born from a reflection that tends to enhance the role of architecture as a tool for a new urban quality. In many cities there are degraded areas, destined for

abandonment and obsolescence; marginal, fragmented and hybrid areas, which extend not only in the suburbs of our cities, but are often close to or even inside urban centers. The challenge was thus to identify a degraded, residual area in the city of Salerno, to ensure that the project was also the first step in a wider process of urban redevelopment. The work developed on the existing city, recognizing what today is abandoned, unused or used improperly, but which shows a city that has transformed over time and of which it has helped to determine the current spatial and morphological arrangements, new regenerative potential at the urban scale. Starting from these singular unfinished areas and «admitting the city as a spatial system made up of several parts with their own characteristics» (Rossi, 1966:74), the goal is to broaden the field of intervention to the urban dimension to trigger more complex processes, capable of affecting the multiple scales of the contemporary city. The commitment of the students was therefore also to design a unitary set of buildings and open spaces capable of developing the potential of a residual and marginal area awaiting a morphological and functional definition, focusing on new forms and new identity. In Salerno, the system of railway, port, commercial and productive services and functions, which over the years has involved many parts of the city, has left many urban parts unfinished, abandoned and underused spaces waiting for designing actions capable of giving them new meanings in contemporary key. The city has thought about these issues for a long time, which can provide opportunities to implement profound transformations, starting from the reactivation and reinterpretation of these areas.

Among the portions of urban territory that are affected by abandonment processes, an emblematic case is the area of disused railway of ex "scalo merci" (disused railway yard) the heart of the strategic urban project of the Lungo Irno (A.A.P.U. 7), a large axis of urban structuring and accessibility to the city that develops in a north-south direction, from the hills to the sea and parallel to the course of the river - it starts in the north with a large circular square that acts as the gateway to the city and ends in the south with another square open onto the sea - and imagined by Bohigas to innovate the use and morphological reading of the entire city and today almost completely realized.

The urban part chosen as the project area for the design research activity is located in the heart of the city near the coastline, between the Palace of Justice built to a design by David Chipperfield, the rails and the right bank of the river Irno, occupies a large part of the railway station being abandoned of the historic Central Station identified by the urban planning instrument in force as a mainly productive building sector CPS\_2. The area is configured as a large void of regular shape, almost triangular, and extends over an area of about thirteen hectares, of which almost six are destined by the P.U.C. as an urban park while on the remaining seven hectares it is foreseen the possibility of creating a floor area destined for Production-Services (QSP) of just over 58,000 m<sup>2</sup> and a floor area destined for Residence (QSR) of almost 13,000 m<sup>2</sup>. Considering the centrality of the "Comparto CPS\_2" of the disused railway yard with respect to the Lungo Irno area and its position in a strategic area, strongly interconnected with the surrounding fabric and characterized by high accessibility, the idea at the basis of the design experiments developed by the students is to imagine a process of urban development that promotes a condition of continuity with the urban context of reference by assuming the large void of the area as a foundation piece of a wider system of public spaces on the scale urban and metropolitan. The hypothesis proposed, in accordance with the provisions of the municipal plan, is the creation of a network of open public spaces which, following the course of the Irno (from the area of the Palace of Justice and beyond, to the sea) can reconnect heterogeneous parts of city, along the north-south axis, in new syntactic articulations from which to give rise to new urban configurations.



The regeneration of the disused railway yard clearly represents an important opportunity for the modification of the city. The students have developed three different proposals which offer the opportunity to promote new strategic urban functions in the heart of the city and to mend the edges of the urban fabric on the margins of the great void of the railway yard through new squares, tree-lined avenues and a large public urban park. canceling the "fence" that now exists between the area and the parts of the city that surround it. The pre-existing structures present in the area (the locomotive depot, the old station, the church of S. Demetrio, etc.) are preserved and organically inserted into the new design of the area, contributing to adding typological and dimensional variety to the urban part.

The proposals, which incorporated, analyzed and interpreted the development trends of the city identified by the P.U.C. and the conditions of the closest reference context, despite their diversity, are inspired by a common strategy of functional integration which intends to allow the neighborhood to acquire those characteristics of richness, complexity and diversification capable of triggering a process of increased attendance, the intensity and quality of relational opportunities (Jacobs, 1961; Lefebvre, 2014). The design proposals work on the relationship between urban morphology and the hypothesis of sustainable urban regeneration by proposing three different scenarios for a unitary but internally articulated part of the city, which refer to as many ideas of the city, in which different ways of bringing tension the relationship between nature and architecture (Monestiroli, 1979, 2002).

The first design proposal (Fig. 2; Fig. 6) suggests a reworking of the historic Salerno courtyard block in a logic of innovation of the urban tradition. The idea of block, «constitutive unit of the urban tissue and its basic element of subdivision» (Panerai, Castex, Depaule, 1980:121) is here reworked and declined through the decomposition of the building block. The repetition of the block, the reference to the street and the square, the density of the buildings are used as tools for the construction of a compact urban pattern. In this way, a unitary succession of three large quadrangular blocks with an open courtyard connected to each other, each composed of singular buildings of different shapes, sizes and heights, placed in axis with the new railway station building, located north of the tracks and perpendicular to the course of the Irno, it identifies a new urban axis in the area and draws its southern edge by communicating from a distance with the Palace of Justice which instead identifies the northern edge of the disused railway yard. In the space put in tension by the built masses of the Palace of Justice to the north and the new axis there is space for a large urban park that connects the western part of the city with the sea.

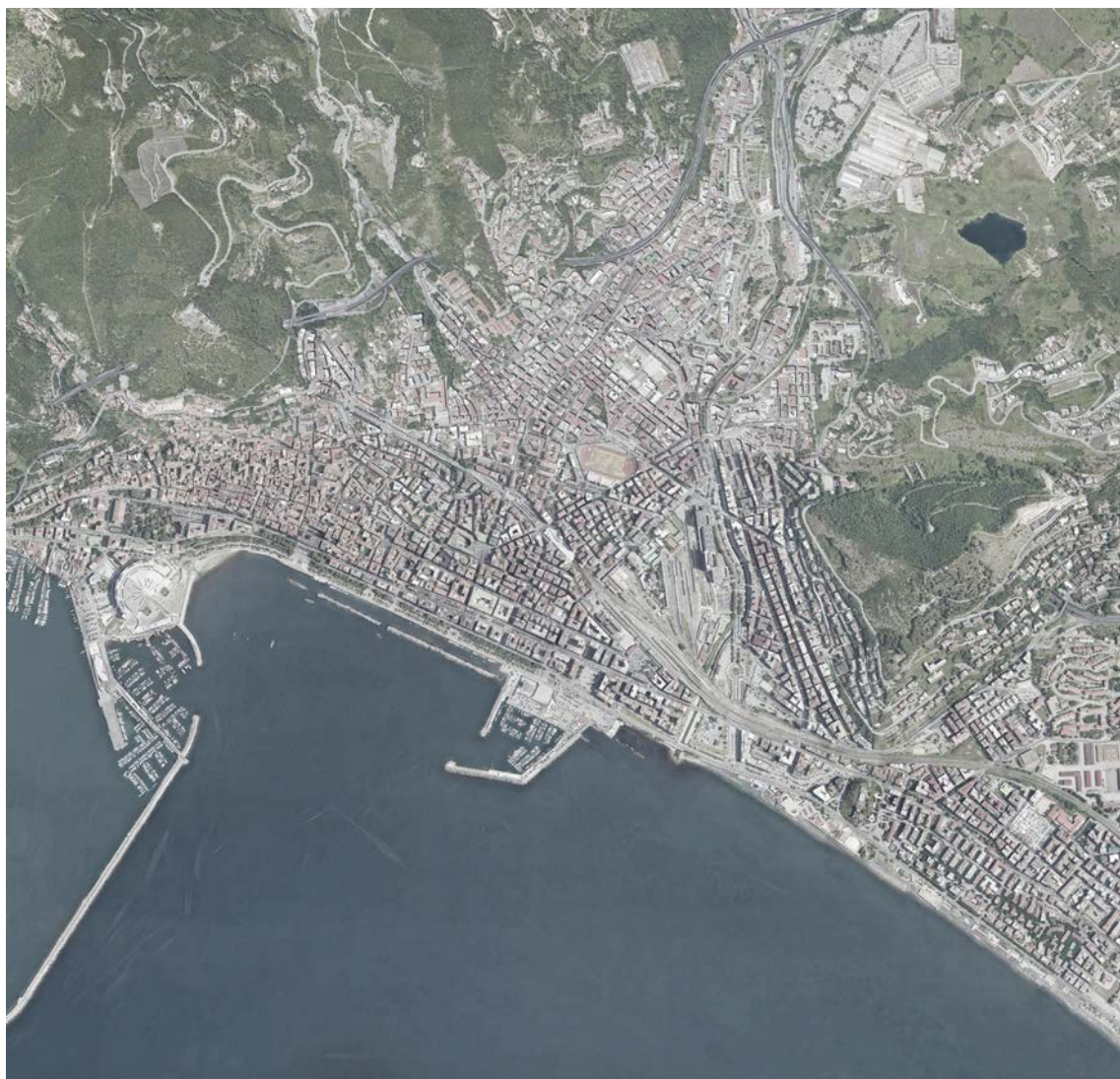
The second design proposal (Fig. 3) is based on the mix and combination of different elements and spaces which abandons the idea of the perimeter construction along the road edge and introduces a new system of urban spaces which goes beyond the traditional idea of urban block. On the north-western edge of the area, a composition of new buildings in an "L" shape from which a series of towers rise, whose distance relationship identifies the size of the settlement, are arranged to form open and permeable courtyards and they alternate with a various system of open spaces, paved and green, which are inserted between the buildings and compose a graduality of areas of use that changes from the semi-public to the public.

Finally, the third design proposal (Fig. 4; Fig. 5) suggests the construction of a new urban landscape that abandons the idea of the block as an elementary part of the city and of the street as a place overlooking the house and tries to introduce a new relationship between buildings and nature by working on an idea of the city in which a renewed importance is assigned to the design of open spaces: «gradually the city turns into a park» (Le Corbusier, 1977: 84). In this case, therefore, the proposal assumes the large void of the area as an

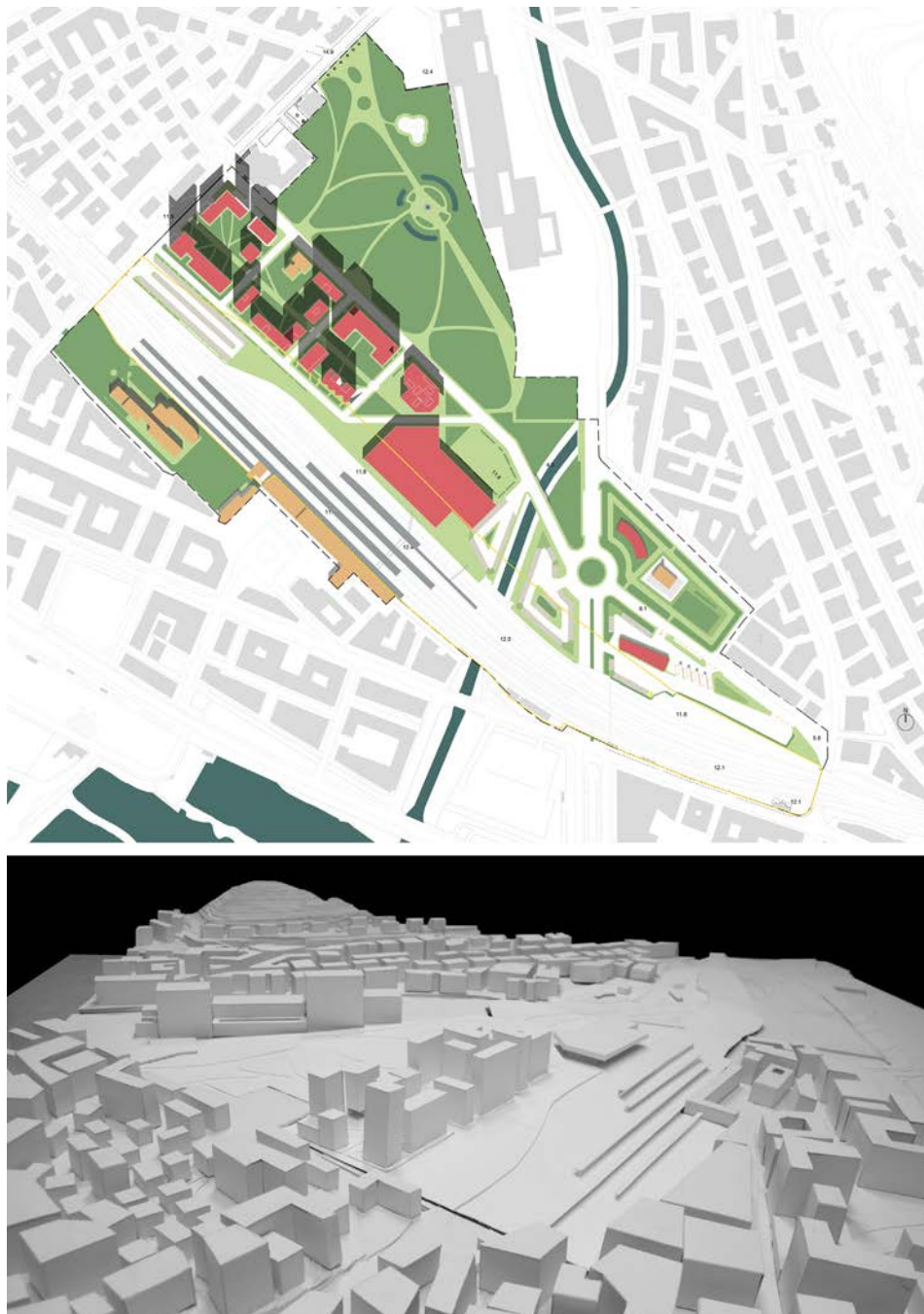
opportunity to work with an acropolis logic in which a few large buildings with their own complete and recognizable identity – sort of vertical blocks containing a plurality of functions and spaces – relate to each other at a distance and define the field of relationships between solids and voids by implementing a substantial inversion of the traditional relationship between built space and open space, between figure and background, based on the prevalence of solids over voids (Rowe, Koetter, 1978) which is at the basis of the Project of the Modern Movement. The project can be read as an attempt to compose modern relationships, typical of the big city, capable of constituting a new centrality for Salerno.

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**Figure 1.** Aerial view of Salerno.



**Figure 2.** First design proposal for the disused railway area of ex scalo merci of Salerno. A reworking of traditional Salerno blocks.





**Figure 3.** Second design proposal for the disused railway area of ex scalo merci of Salerno. A new system of urban spaces that goes beyond the traditional idea of the block.





**Figure 4.** Third design proposal for the disused railway area of ex scalo merci of Salerno. A new urban landscape that abandons the idea of the block as an elementary part of the city and the street as a place overlooking the house and tries to introduce a new relationship between buildings and nature



**Figure 5.** One of the buildings of the third design proposal for the disused railway area of ex scalo merci of Salerno



**Figure 6.** One of the buildings of the first design proposal for the disused railway area of ex scalo merci of Salerno.

## A sustainable and social-oriented urban buildings' reshape

Annarita Ferrante<sup>1</sup>, Cecilia Mazzoli<sup>2</sup>, Rachele Corticelli<sup>3</sup>

<sup>1,2,3</sup>DA – Department of Architecture, Alma Mater Studiorum – University of Bologna, Bologna

E-mail: <sup>1</sup>annarita.ferrante@unibo.it, <sup>2</sup>cecilia.mazzoli@unibo.it, <sup>3</sup>rachele.corticelli2@unibo.it

Keywords: *urban densification; urban morphology and typology; adaptable facades; user-oriented design; sustainable renovation*

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** Existing dense urban areas are facing the problem of reducing urban sprawl and soil sealing; therefore, effective urban regeneration actions are needed. In this framework, the increasing demand for a sustainable renovation design could be addressed using a typologically oriented renovation involving urban buildings. In particular, energy renovation, which is often related to upgrading the existing facades, could bring into light the intrinsic typological structure of the building, i.e., implementing the reshaping of buildings so that they can be adaptable to their existing structural conception and their typological matrix. Using flexible and adaptable facade elements is also important to meet the needs of a constantly changing society. A user-driven and user-oriented design can be the key elements for a design procedure which can reflect and interpret end users' needs. To reply to some of these architectural and social issues, the paper investigates the possible deployment of advanced volumetric additions that can be smartly adapted to the urban context to meet energy efficiency and safety requirements while satisfying the comfort and needs of urban dwellers. These variable components can be applied in re-designing urban blocks to improve the socio-technical conditions in the dense city centers and in the peripheries. An abacus of solutions that refers to various possibilities and combinations was applied in different case studies of the European contexts, developing a wide set of configurations which might provide a useful procedure to reshape urban buildings with improvements in terms of aesthetic appearance, energy performance, safety, and quality of life.

## Introduction

The current urban reality is still an increasingly artificial land context, where the tendency to spatial dispersion and functional dissociation, followed by urban planning from the second half of the XX Century, is in contradiction with the crucial principle of long-lasting balance inherent in sustainable spatial development. Land and soil are essential and limited resources, especially in Europe (EU), where the land taken for urbanization and infrastructure has grown at more than twice the rate of the population increase, a trend that is unsustainable in the longer term. Soil sealing, meant as ground covered by an impermeable material (such as asphalt), can be extremely dangerous for the environment. It contributes to an increase in the risk of flooding, water scarcity, global warming, agriculture and biodiversity threats, and soil degradation.

According to a European Commission brief, “the demand for developed land continues to rise, driven by new lifestyles that require more space per capita, as well as by competition between municipalities to attract new developments because of the assumed economic revenues.” It seems clear that facing the spread of impermeable surfaces due to urbanization and land-use change is one of the leading environmental challenges of today.

According to the United Nation’s Habitat Programme, it is predicted that by 2030, 6 out of every 10 people in the world will reside in urban areas. The global population is also expected to reach over 11.2 billion people by 2100, compared to an estimated 7.6 billion today. The population is also increasingly ageing, which means that people will stay in their houses for longer, lowering the number of houses available in the market every year. The structure of households is also changing: the number of two-person or single households is increasing, especially in developed countries. Another main issue regards the proliferation of slums and informal settlements, which are the most vivid evidence of an inadequate urban and housing policy. A new housing strategy is needed, a strategy that must also face other current issues, such as the affordability of the houses, the accessibility to markets and services, and the resources and materials needed. All these issues create the need for many countries and governments to meet the demand for constructing new homes by opening a debate on this topic and elaborating on national and international strategies. This strategy needs the participation of many levels, such as mobility, land-use strategies, infrastructure strategies, and economic development, to create inclusive urban planning. Global population growth and the consequent urban expansion will soon be serious issues that governments must prioritize (Figure 1).

Residential buildings represent 76% of the total building stock, and 50% of them were built before 1970, thence before the first energy efficiency regulations were introduced. Only 19% of residential buildings were built after the introduction of the Energy Performance of Buildings Directive (EPBD) 2002/91/EU and the following EPBD 2010/31/EU. (Mazzoli et al, 2022)

As a result, the existing building stock across EU presents very low standard energy performance (Eurostat, 2021). Thus, its renovation embeds the highest potential in energy savings and their capability of change and transformation regarding architectural and economic issues.

Aimed at boosting the energy performance of buildings, the EPBD 2010/31/EU, together with the Energy Efficiency Directive (EED) 2012/27/EU, promote policies to support the building sector in achieving a highly energy efficient and decarbonized building stock by 2050. Both directives were amended in 2018 and 2019 as part of the “Clean Energy for all Europeans package” (European Commission, 2019). Directive 2018/844/EU, amending EPBD 2010/31/EU and Directive 2012/27/EU, introduced new elements and sent a strong political signal on the EU’s commitment to modernize the buildings sector considering technological improvements and to increase building renovations. In October 2020, the Commission presented its “Renovation



Wave strategy" (European Commission, 2020) as part of the European Green Deal (European Commission, 2019), containing an action plan to boost building renovation. Its objective is to at least double the annual energy renovation rate of buildings by 2030 and to foster deep renovation. The Renovation Wave plays a central role in the Recovery and Resilience Package proposed on May 2020 (European Commission, 2020) following the unprecedented crisis due to the pandemic: the EU must significantly increase the rate of deep renovation, reduce greenhouse gas emissions from buildings by 60% compared to 2015 and, by 2030, increase the rate of deep renovation from the current 0.2% to 3% per year.

### **Crucial issues related to urban sprawl and renovation of the built environment**

Less than 2% of Europe's current building stock comprises replacement and new construction. In 2050, it is predicted that more than 90% of the existing buildings will still be standing and populated. Similarly, the construction industry's present rate of rehabilitation is still 1,4%, and public money funds have entirely financed the sharp rise in this proportion since very recently. To actuate an effective transition toward a low-carbon building stock, energy renovation is still necessary.

Therefore, it is evident that reshaping the existing built environment has the potential to make a significant, positive contribution to climate neutrality. However, given the actual energy consumption of the stock of existing buildings, renovating them to zero energy or even positive energy level poses a significant technological and financial barrier. The expected pay-back period for such initiatives ranges from 25 to 40 years and beyond, which makes any investment either unattractive or not viable.

At the same time, there is a growing environmental demand for limiting soil sealing and urban sprawl in the context of a decarbonized urban environment. This demand is seen as a potential way to protect the finite natural resources and the health of ecosystems, particularly those near urban borders. In order to contrast the phenomenon of urban sprawl in the EU's cities, alternative options for constructing new buildings have been investigated (European Commission, Directorate-General for Environment, 2014).

Notably, the idea of densification and related intensification of existing infrastructures are having a significant impact on the planning processes, affecting the guiding principles of building form and urban design, and potentially having an impact on the current urban landscapes in the EU, limiting soil sealing, and preventing urban sprawl. Numerous references in the literature on urban planning (Churchman, 1999), as well as in scientific research (H2020 EU Projects), have argued that renovation always represents the less impactful alternative to an analogous scenario of destruction and reconstruction.

### **Urban densification strategy through volumetric additions**

Several Regions and Municipalities are already beginning to align their agenda with these goals and are battling the difficult work of resolving the "as-built" urban planning scenario by adopting densification policies. This strategy was investigated and put into practice as a result of the lessons learned from the "ABRACADABRA" project (<https://cordis.europa.eu/project/id/696126>), which demonstrated the effectiveness of a densification strategy based on the implementation of new building additions in over 90 cases throughout the EU, offered alternatives to the construction of new buildings, and contrasted the phenomenon of urban sprawl. Urban densification can be considered a successful strategy for deeply renovating existing buildings with no soil consumption through a punctual addition of new volumes. The latter also extends the living spaces, increases the building envelope performance, and



improves buildings' architectural and aesthetic quality.

As the analyses carried out as part of "ABRACADABRA" have shown, the development of architectural and urban solutions towards nearly Zero Energy Buildings (nZEBs) – such the one of the volumetric additions – is currently prevented by the presence of several legislative-political, economic-financial, and social barriers. As far as legislative barriers are concerned, the lack of adequate policies for implementing deep renovation strategies causes a strong instability in the investment market and an excessive risk rate for public authorities, social and market actors, and other investors. Furthermore, another significant barrier of both economic and social nature is the limited accessibility of existing financing instruments dedicated to the energy efficiency of existing assets and the low level of trust and participation of the private sector in deep renovation financing processes (supported almost exclusively by public funding). Finally, there is a lack of decision-making tools and techniques to implement deep renovations based on volume additions, such as incentive-sharing schemes between building owners and tenants or cost-benefit sharing between owners and tenants. (Ferrante et al, 2020)

The desire to remove these obstacles inspired the creation of the "ABRACADABRA" initiative, which emphasized social, technological, legislative, and economic-financial factors. The suggested approach is based on implementing volumetric additions (Add-ons) and Renewable Energy Sources (RES): the latter result in the "AdoRES" that allow the existing buildings to meet the nZEBs requirements. These new volumes to be added to the buildings can be placed next to the existing structures or as new buildings that stand apart.

AdoRES' technical viability at the building scale has been determined by categorizing many potential scenarios, starting with the deep renovation option, which is assumed to be "the entry-level" for any further renovation action through Add-ons. The different AdoRES scenarios, including the deep renovation state, are classified into five basic solutions: ground addition, top addition, aside addition, facade addition and assistant building (Figure 2).

The "ABRACADABRA" project is "based on the prior assumption that substantial increase in the real estate value of the existing buildings can play a key role in the deep renovation. (...) By grounding the process on this strategy, the following objectives are identified: (i) reducing the payback period of the renovation interventions; (ii) enhancing the trust of main investors; (iii) improving architectural and performance qualities of existing built stocks; (iv) boosting the market sector for the implementation of AdoRES towards the nZEBs target". (UNIBO, 2019)

Thus, thanks to the synergy created between old and new structures, this strategy allows for economic, financial, environmental, and social benefits in terms of the payback period (PBT) and net present value (NPV) of investments.

In a further development of the "ABRACADABRA" project, Add-ons can be used to achieve a higher level of performance not only in terms of energy efficiency, but also in terms of mechanical seismic safety requirements. Following this approach, the "Pro-GET-onE" project (<https://cordis.europa.eu/project/id/723747/it>) introduces the integrated "GET" system consisting of an external steel exoskeleton combined with prefabricated facade modules. These modules can be customized by all users involved in the building process to best meet the requirements of the specific building to be renovated. In particular, the building can be designed with balconies to increase the unheated surface area, as solar spaces to increase energy performance or as extra rooms to increase the usable heated surface area (Fotopoulou et al, 2019).

At a broader urban scale, the actions developed by these two projects aim to provide concrete models of intervention and innovative technological solutions to upgrade the European building stock by contributing to its decarbonization by 2050 and to the transition towards

climate neutrality that many cities must achieve by 2030. At the building scale, renewable energy generation in the building sector needs to be accelerated by synergically integrating existing passive and active technologies within the consolidated built environment. This process must urgently take place, in the coming years, through the design of a fast, off-site and circular type of construction, based on the implementation of prefabricated solutions that are reversible over time, easily reassembled and reusable or recyclable.

However, such a decarbonization of the existing building stock, attentive to the principles of minimizing environmental impact during the entire lifecycle of buildings, might also consider other aspects that have become unavoidable. In particular, the New European Bauhaus (NEB) initiative, the creative and interdisciplinary initiative connecting the European Green Deal to our living spaces and experiences, promotes a rethinking of urban spaces as “beautiful, sustainable, together” (European Union, 2020).

In line with the initiative and the principles of NEB, the projects “ABRACADABRA” and “Pro-GET-onE” have relied on business models to magnetize owners and investors’ interests, and on attractive, circular, and people-centered energy-efficiency and seismic-safety solutions through civic engagement and participatory processes.

### **Experimentation and abacus of solutions**

It is well known that in the historical urban centers, urban building types and type aggregations present close interrelations among built landscapes, natural local features, and land characters and that the streets and open areas have always guided the historical phases of urban formation. As an opposite to the cases of conserved historical urban textures, most urban configurations in current peri-urban expansions show diffuse, irregular sprawl with a progressive detachment from the morphological and environmental contexts. Therefore, recent urban formation and peripheries appear to have produced neighborhoods whose buildings essentially neglect the importance of plot patterns. In fact, most of the buildings in European suburbs have been designed according to modernist principles and conceived to be universal: solutions have been applied, with few considerations on cultural and social characteristics all over Europe, generating, in different sites, very similar problems.

The risk involved in the architectural and energy regeneration of such areas and buildings of the peripheries is to (re-)produce over-imposed solutions on already over-imposed masterplans that have led to the loss of the architectural identity of buildings and standardization of design solutions. Therefore, succeeding in the endeavor of a sustainable, user-oriented renovation and re-design in these contexts requires more than getting the engineering right (Webler et al, 2010), and more focus should be placed on the social aspects at the community level.

In fact, developing a more sustainable environment depends upon consumers’ willingness to engage in greener and more collective behaviors). (Re-)design processes of existing urban buildings are called to respond coherently to social and end-users’ requirements, to current energy and safety regulations/requirements and more permanent components (structural and functional invariants) as well. In this process, a certain degree of adaptability and flexibility, as well as the adoption of processes engaging the inhabitants, could offer a real solution both to the anonymity and standardization of these housing complexes.

The design approach proposed here aims at combining the complementary nature of the standard and planned design with the different urban dwellers’ requirements. In such a way, the resulting architectural and urban design will tend to overcome the current standard distinction between informal settlements and planned developments. The goal is to attempt re-interpreting an evolutionist approach to improve socio-technical environments in the

specific contexts of urban planning, offering appropriate solutions and tools to activate “social creativity” and to make the voice of many heard.

In order to meet these objectives, detailed ethnographic analyses of the urban contexts and studies can be used as a key tool to understand and somehow “anticipate” urban dwellers’ expectations. In fact, the redesign of the current facades in different building types could be observed to understand the actual modifications and appropriations of the building spaces: this observational method should be developed as a first step of the ethnographic analysis to consider urban dwellers’ expectations and use them as a key input in the reshaping of the same buildings (Figure 3).

The use of ethnographic research to inform the architectural and technical aspects of design with proper consideration of the end user expectations might efficiently support the development of energy-efficient solutions in socio-oriented real urban reshaping. In the use of appropriate social engagement methods and user-driven design technologies, it is necessary to involve users, build competencies, and implement a real demand for regenerative solutions. The social engagement methods might include:

- i) the functional analysis of socio-technical systems;
- ii) the human and organizational factors’ best practices;
- iii) the user requirements elicitation through ethnographic research.

Therefore, the use of ethnographic research and the real representation of the buildings through photos is a key passage to inform the technical aspects of design with proper consideration of the end user needs and expectations.

In this context, a user-oriented design can be defined as a top-down approach in which the architect tries to identify the users’ needs and satisfy them. Instead, a user-driven design is a bottom-up approach where the end-user actively participates in the co-design process to meet their own needs. Hence, the proposed design approach illustrated here promotes not a closed, over-imposed design solution but an open, adaptable design strategy.

In this context, the architectural solutions, made within abacuses, can be considered as a combination of users’ needs and urban reshaping, with the aim of merging the use of renewable energy and technologies that ensure a specific architectural and functional result, user satisfaction, and aesthetic quality (Figure 4). Different architectural solutions have been realized for several buildings: in each one of these solutions, the various additional volumetric units were hypothesized and divided into three functional types: sunspace, extra-room, and balcony. The abacus is connected and adapted to the structural frame proposed according to the building’s existing structural configuration. This aspect could implement and accelerate the market penetration of deep renovation within the private sector, which is the most challenging sector to overcome the existing barriers in energy retrofit market uptake. In fact, very often, energy-retrofitting actions are implemented in over-imposed actions by the main ownership, with no direct benefit for the final users. Instead, these architectural solutions focus on local private owners of built environments in which owners may directly benefit from economic and spatial gains.

In search of further integration and multi-objective optimization, which consider energy and non-energy related factors in the building renovation, the reshaping of the built environment can also be considered in relation to the necessity of increasing its resilience and its seismic capacity. Efficiency, attractiveness, and marketable renovation can be achieved through a holistic and integrated set of strategies and technologies in which all the different requirements (energy, structural, functional) are considered.

This was the essential idea of “Pro-GET-onE”, which combines pre-assembled components in

the same holistic and integrated system, aimed at reaching the highest performance level in terms of:

- i) energy requirements – by adding (or substituting the existing with) new plug&play high-energy performing envelopes and heating, ventilation, and air conditioning systems;
- ii) safety – by using an external structure (exoskeleton) to increase the overall structural capacity of the building, and support the new facade's envelopes;
- iii) social sustainability and desirability – by increasing the real estate value of retrofit options by providing tailored and customized solutions for inhabitants, increasing safeness and minimize disturbance of inhabitants.

In addition to virtual pilots (located in the Netherlands, Romania and Italy), a real demonstrator has been implemented in the project. The pilot case in Athens is a typical student house from the 80's owned by the National and Kapodistrian University of Athens, located in the University Campus of Zografou area, in the eastern part of Athens with a common structure when compared with similar building blocks all over Europe.

The project has therefore conceived an exoskeleton which has been demonstrated to be capable of reducing horizontal displacements in the case of seismic events. This external structure is integrated with an abacus of different options (balconies, sunspaces, extra-rooms) for the extension of the existing units, following the option of "facade addition" according to the "ABRACADABRA"'s taxonomy and classification Add-ons (Figure 5).

One of the outcomes from the "Pro-GET-onE" project activities is devoted to the development of tailored abacuses in the sense of architectural and structural components for customized, pre-assembled facade modules and to be integrated with diverse types of possible structural frames. This procedure has been implemented in a user-oriented design process, considering the outcomes from the social surveys developed in the early phase of the project. Variable possibilities of new abacuses, tailored to different case studies and different users' needs, have been defined with different variable options according to construction constraints and final user expectations. (UNIBO, 2018)

The studied solutions aim at creating the conditions for attractive, self-financing schemes to support deep renovation actions in the existing urban contexts, with a highly replicable strategy for the Mediterranean and seismic countries.

## Conclusions

In conclusion, with the aim of encouraging the development of interventions on existing buildings and existing consolidated urban contexts to reduce soil consumption, we should consider solutions related to the upgrading of the existing facades that bring into light the intrinsic typological structure of the building, implementing the reshaping of buildings so that they can be adaptable to their typological and constructive features. In this context, the use of flexible and adaptable facade elements is also important to facilitate the co-design process by acting as interpreters of users' needs and expectations.

Sustainable renovation should be considered more than a technical, energy-oriented or specific issue: both decarbonization through the energy efficiency of buildings and the creation of buildings with reshaped and more attractive facades could effectively contribute to the rehabilitation of the urban landscape and make it more comfortable, efficient, safe, and beautiful.

## Acknowledgements

"ABRACADABRA - Assistant Buildings' addition to Retrofit, Adopt, Cure And Develop the Actual Buildings up to zeRo energy, Activating a market for deep renovation" - has received funding from the European

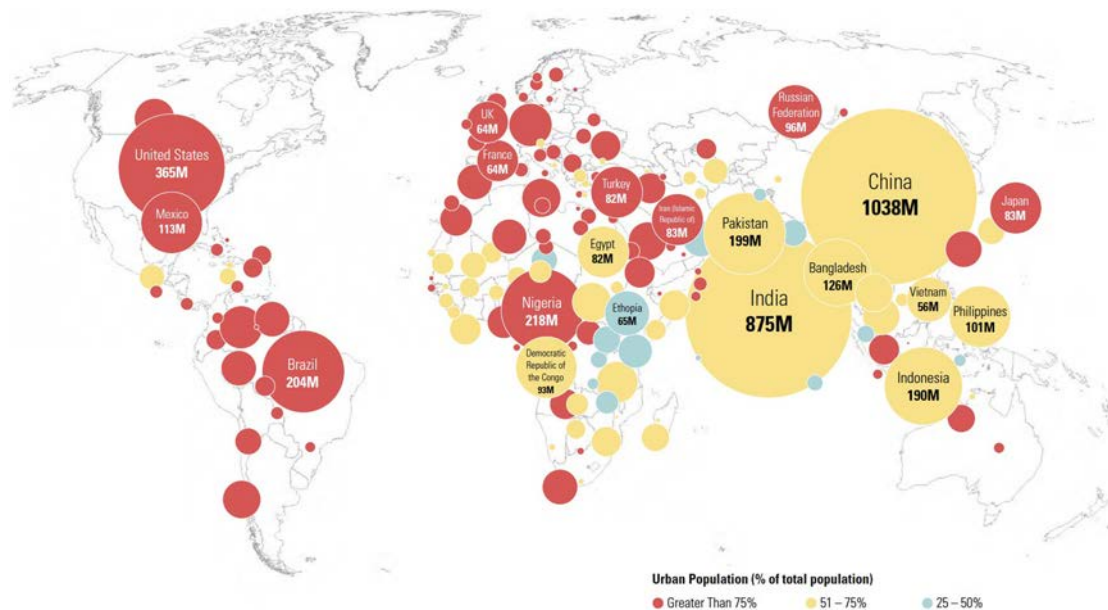
Union's Horizon 2020 Research and Innovation Programme under the Grant Agreement (GA) No 696126. "Pro-GET-onE - PROactive synergy of inteGrated Efficient Technologies ON buildings Envelopes" - has received funding from the European Union's Horizon 2020 Research and Innovation Programme under the Grant Agreement (GA) No 723747.

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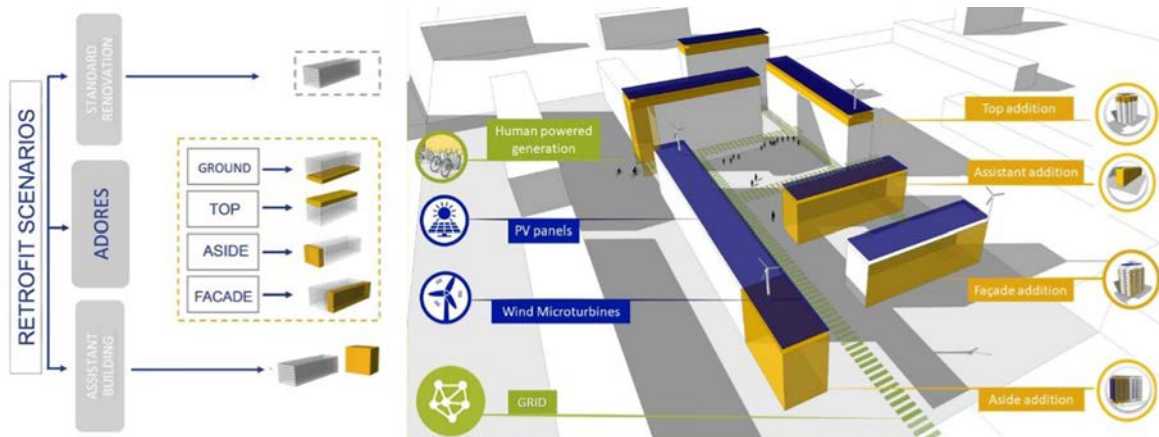
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## Illustrations and tables



**Figure 1.** Graphic representing countries and territories with 2050 urban populations exceeding 100,000. Circles are scaled in proportion to urban population size. (© 2015, ARUP, "Future of Rail 2050", <https://www.slideshare.net/AndrewCarr14/arupfutureofrail2050>)



**Figure 2.** Left: taxonomy and classification of Add-ons as proposed by the "ABRACADABRA" project. Right: possible implementation of the "ABRACADABRA" strategy at the urban scale: the new energy-positive homes produce and exchange energy with the existing buildings leading to energy-neutral built environment. (© 2018, "ABRACADABRA" team)



**Figure 3.** Above: geometrical reconstruction of a building in Athens. Below: the ethno-photo-graphic-reconstruction that considers users' preferences and consequent appropriations through shading devices, HVAC systems, enclosure of balconies through verandas and sunspaces, enclosure through space appropriations of balconies.





**Figure 5.** Top: a view for the construction of the new facade and the reshape of the students' house in Zografou, Athens (© 2021, "Pro-GET-one" team, BIM Models by M. Iannantuono and V. Giannakoupoulos). Bottom: abacus of the different Add-ons solutions, customizable in function of the specific design requirements (left) (© 2018, Cinti, A.); views from the inside of the added volumes (right) (© 2021, M. Iannantuono).



## Cities and earth's shape

Luigi Franciosini

Dipartimento di Architettura dell'Università degli Studi Roma3

E-mail: luigi.franciosini@uniroma3.it

Keywords: *Territory, Morphology, City*

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *There was a time when the city, by its presence in the landscape, contributed to defining the geographical characters of space: it could make them perceptible, it could explain them, it could elevate them to a place of convergence and representation of geological, material, formal, social, cultural, ritual, economic, and religious values, and, above all, the city offered itself to others as an aesthetic experience. The earth received the legacy of history and human happenings, gathering in the folds of the earth's crust, in its forms and in the spaces of architecture, the perpetual renewal of its birth in which "the events of the past, prolonging themselves in time beyond their original impermanence become space in which each observer lived his own present"<sup>1</sup>. A solid image elevated to a resonant object of meaning and memory.*

*Therefore, it would seem entirely illusory to be able to make an aesthetic, functional judgment around the 'image of the city without calling to our attention the meaning of beauty as a place of material and spiritual convergence of all past times narrated in the forms of architecture: a concrete image of the bond that the city realized with the earth, the spatial substance of the pact with the matter of the soil.*

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<sup>1</sup>Braudel F. (1953) "Civiltà e imperi del mediterraneo", Giulio Einaudi Editore, Torino, p. 318 e segg.



*"...Walking on this earth, our heart rejoices in the primary joy...The joy of that alternation of breaking and recomposition of equilibrium that is walking. The step gives us happiness of our body resting on the ground. Beside this rock, we climb the tree's trunk and pass under the leafy branches. We climb, descend, following the ground's contours up the elevations, the hills, the mountains, or down in the valleys.*

*Then we enjoy the flat expanse of the plain and measure the texture of the land by the fatigue of our bodies.*

*This lonely path is immeasurably superior to any avenue in a metropolis: for in each of its bends, in each of its curves, in each imperceptible change of perspective that presents itself, it teaches us the divine consistency of the particular, bound by the harmony of the whole.*

*Let us carefully study the spirit that emanates from places. Here it is the natural forces (the earth's geometry, the quality of light and air), that established this place as the cradle of civilization "<sup>2</sup>.*

D. Pikionis, *A sentimental topography* (1935)

The theme of this brief reflection concerns the relationship between the architecture of the city and the shape of the earth. An intense relationship that has governed the imagery of the urban phenomenon and helped define a field of study, the science of the city, with its theoretical principles and operational developments.

Rare are the figures of architects, artists, urban planners, and geographers "...of men capable of taking things seriously, and of seeing them all together united in the values that spring from mutual relations..."<sup>3</sup> who have given attention to the relationship between land and the form of the city starting from the thought that explores the real dimension as concrete as it is vague, that explores the territory and its geo-physical structure. An attention that is expressed on the methodological level " between esthetics and science" would explain Giuseppe Ungaretti : that of Saverio Muratori and Gianfranco Caniggia, of Ludovico Quaroni, of Vittorio Gregotti, of Agostino Renna and Salvatore Bisogni, and finally of Francesco Venezia and Francesco Cellini, among all.

Of the latter, with whom I have shared tensions and passions, I have understood the sobriety and measure of his research , in the groove of tradition and rationality ; relics of a surviving knowledge, guarded for those who are able to do with wisdom.

My attention goes, then, to Aldo Rossi and his imaginative thought, which had the merit of seeking through his art, solid and volatile, integrated in the city and the theater of the world , a language open to collective participation, to the memory, of which the territory is the primary reason, the conformative place of the measure of time.

Their theoretical commitment is punctually found in their design practice, always aimed at identifying original figurative languages, far from both the International Style and Postmodernism. Then follows an incomplete list that unfolds over a wide time span , starting from the last half of the past century: among the personalities my thoughts go to Dimitri Pikionis, to his entire work as an architect-poet, to his gaze that plumbs the depths of the human soul starting from the experience of the soil, starting from the earth, from the stone, the only narrating witness of the passage of time. A thought then leads me to Rosario Assunto and his account of the city and

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<sup>2</sup>Pikionis, D. (1935), "A sentimental topography", in Dimitris Pikionis, Architect 1887-1968, Architectural Association, (1989).

<sup>3</sup>Quaroni L, Quaroni I. (1981) "L'architettura della città" in Quaroni L. "La città Fisica", Laterza, Roma-Bari, p. 11

the "regressively Prustian" landscape, and to Fernand Braudel's immeasurable unraveling action aimed at understanding the human environment, between soil and life.

Finally, my attentions are directed to conformative practices nourished by Gestalt, by images and visions of the contemporary city: on the contributions of Gyorgy Kepes (*The Language of Vision*, 1944); on Kevin Lynch (*Images of Cities*, 1966); on Vincent Scully (*The earth, the temple, and the gods, Greek Sacred Architecture* 1964); on Christian Norberg-Schulz (*Genus Locus* 1979), but above all, my attention, goes to Lucio Costa's urban projects for the monumental axis of Brasilia (1957-61), for the University City of Mexico City by Mario Pani and Enrique del Moral (1952); for the platform of the Sydney Opera House, by Jhon Utzon (1957-73); and finally for Le Corbusier's Capitol of Chandigarh (1950-1958).

Basically, my purpose (taken for granted by those who work in the field of architectural culture), is to bring to attention, the inseparable role that the form of the earth, the shape of the ground (orography, geology, hydrography, morphology), the resistant structure that sustains our acting under gravity, takes on as a determining element of the ideational and conformative process of architecture and the city. The form of the soil and architecture, indissolubly linked in unity, teach us to recognize and see the world, or so it has happened for millennia of anthropogenic transformations, which have, by the ways of putting and the ways of raising, between excavation and construction, between adaptation and transformation, shaped the city immersed in the breath of the atmosphere.

The form of the earth thus represents the material component that introduces the construction of the city, and particularly of the ancient city, whose soul, placed between nature and artifice, constitutes the ordering principle of erecting, of doing in a constructive sense. The action of tracing on the ground layings for founding requires a technical skill, an interpretive sensibility, a representational strategy: orienting, adjusting, correcting, making visible, shaping, by subtraction and addition, the earth giving form and space to matter.

To put things in more extreme form, writes B. Secchi "...the urban project (the form of the city and its functions) is largely a project of land, both when of construction through a "centuriation," and when it is a founding act of the city, of a part of it, or modification of the existing. It acquires meaning within a more general social project and acquires value through an architectural project."<sup>4</sup> From this, a continuity with tradition and with the characters of the ancient city seems thus to be defined.

Is it a feeling of nostalgia for the ancient city, for its clarity and measure, for its representing itself as an open form in the landscape, distinguishable and aesthetically appreciable, that moves these reflections?

If not of nostalgia, this mental image is pervaded by the conviction of rediscovering in the time of nothingness, an alliance between earth, matter and form, between eyes and hands, between thinking and acting. In this sense, E. Jünger's reflection seems clarifying: "...Around catastrophes pessimistic currents are evidenced.... Pessimism is expressed by what one sees emerging. Then one looks the other way, turns one's eyes to more beautiful images, even if they belong to the past..."<sup>5</sup>

There are more trends that have characterized the urban practices of modernity: on the one hand, the attempt to plan the city with an abstract and utopian approach, starting from the cancellation of differences, the homogenization of places, climate, traditions; on the other hand, the loss of the geometric characteristics of the soil, which is identified with the physical

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<sup>4</sup>Secchi B. (1983) "Luoghi cospicui Assicurare problemi emergenti" in Casabella n. 487-488, pag.4

<sup>5</sup>Jünger E., Hedegger M. (1989) "Oltre la linea", Adephi, Milano

features from the same properties in all directions; a geometric plane, a tabula rasa that gives the background to the urban diagram: "...The flat land is the ideal terrain, offering the possibility of normal solutions " suggests LC. It is the most important condition that can facilitate the development of the city of the future, the prototype of modern machinist efficiency. It, the separated and mechanized city, aspires to possess a homogeneous and universal character: therein lies its ethics in accordance with the demands of social equality.

On the other hand, taking giant leaps, forgetting much, very much, a less naive but perhaps equally abstract thought is asserted that reduces space, the pursuit of urban quality to a schema, to the 'invisible narrative of a social project based on the elaboration of urban policies, of programs, of immaterial strategies, not found in the forms of things, almost entirely dependent on other fields of knowledge, with the consequent and natural abandonment of the urban project. If we look at the drawings of these planners, the images that search for new visions, we can realize the progressive reduction of 'importance that they take on the descriptive, connotative plan of the project the soil, understood as a non-generative element of the "logical dependencies and grammatical concordances " <sup>6</sup>. The design of the city becomes more and more a map, an ideogram, a scheme, in which the traces of the very geography of the land (orography) can hardly be recognized.

Then a thought emerges in which freedom, fluidity, openness, vitality, variability, impermanence, incompleteness, invention, assume the role of antidotes to the crisis of the contemporary urban condition. "...These seem to be the terms on which architects, sociologists, anthropologists, urban planners, philosophers, are reflecting directly investing the form of urban space..." <sup>7</sup>. The most audacious of them, exhibit the bold tendency to stand for an approach that exalts the "...spontaneity and extraordinary mutability that often informally connotes conformative processes especially through designing disorder " <sup>8</sup>. An operational mode that consists of a " non-linear narrative of the city, which admits conflicts , dissonances: a process in constant struggle between balance and disequilibrium" <sup>9</sup>.

All this moves from having considered "...the imperfect and dangerous outcomes of the contemporary city planned by the ambition of urban sciences, the reliance on normative instrumentation, and the failure of architecture, from having thought the absolute control of reason over the fate of the urban image" <sup>10</sup>.

Finally, that way of understanding the architecture of the city that is functional to the contemporary crisis of values, incentivizing the self-referentiality of languages unrelated to any principle of ethical sharing and social design, should be highlighted.

In this sense, the notion of landscape receives from contemporary culture an immaterial, aerial, superstructural, ambiguous character that eludes the substance of the notion of territory: a concrete, measurable entity that lends itself to employment in the field of sensitive and practical experience of doing.

### **A brief story**

There was a time when the city, by its presence in the landscape, contributed to defining the geographical characters of space: it could make them perceptible, it could explain them, it

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<sup>6</sup>Secchi B. (1983) " Luoghi cospicui Assicurare problemi emergenti" in Casabella n. 487-488

<sup>7</sup>Sendra P., Sennet, R. (2022) Progettare il disordine, Treccani, Roma

<sup>8</sup>Ibidem

<sup>9</sup>Ibidem

<sup>10</sup>Ibidem

could elevate them to a place of convergence and representation of geological, material, formal, social, cultural, ritual, economic, and religious values, and, above all, the city offered itself to others as an aesthetic experience. The earth received the legacy of history and human happenings, gathering in the folds of the earth's crust, in its forms and in the spaces of architecture, the perpetual renewal of its birth in which "the events of the past, prolonging themselves in time beyond their original impermanence become space in which each observer lived his own present"<sup>11</sup>. A solid image elevated to a resonant object of meaning and memory. Therefore, it would seem entirely illusory to be able to make an aesthetic, functional judgment around the 'image of the city without calling to our attention the meaning of beauty as a place of material and spiritual convergence of all past times narrated in the forms of architecture: a concrete image of the bond that the city realized with the earth, the spatial substance of the pact with the matter of the soil.

Ludovico Quaroni's description of the ancient city moves from these same considerations. His 1939 writing, entitled "The Architecture of the City," opens thus, "To those who for the first time cross the Falisco plateau towards the Paglia valley, there appears, submerged in the sky and in the sun, the image of Orvieto, compact, on the rock that came out of the earth, like a budding of the rock itself. The houses, of golden tufa, from the golden tufa arise so that one hardly knows the base. The roofs (...) crowd, undulating motionless throng, around the cause and purpose of the city: the Duomo. An architectural work exists only as a function of its environment (...). The air, the light, the pre-existences, the shape of the ground, and its surface elements, everything in short that is proper to the environment and that the environment imposes on the construction, the architect (...) has kept it in mind in the formation and realization of his work."<sup>12</sup>.

The ancient builders must have had a feeling for these qualities: as they founded their cities, built their temples, their cathedrals, it seems that guiding their choice of places was the determination that they should possess the power to provoke a feeling, the power to elevate the soil to a sign, the topography to a city, the architecture to a rite, to explain through the composition of the organism the interdependence of geography, city and soil.

There is always a need for special attention that accords the experience of place a correspondence with the city and architecture: not every place for itself is appropriate. Every place points directions and gathers different polarities, measuring distances, feeding on movement: the shape of the land directs the shape and order of the city, which opens to spaces: right places for right architecture.

We are enlightened in this regard by the thought Iosif Aleksandrovič Brodsky: "There are places where history is inevitable, places where geography provokes history"<sup>13</sup>.

### **A sick city**

Imagining and designing the city, the good city, today has become increasingly difficult as planning has produced an aggregate, a shapeless composite, in which functions have been separated, segregated, zoned, nullifying differences in favor of the continuum, nullifying hierarchies, nullifying the experience of time, nullifying different speeds, erasing the opposition between countryside and city, between territory in extension and civitas.

The city arises as a challenge to the natural order, reshaping territories in order to satisfy practical

<sup>11</sup>Braudel F. (1953) "Civiltà e imperi del mediterraneo", Giulio Einaudi Editore, Torino, p. 318 e segg.

<sup>12</sup>Quaroni L. (1981), ..... in "La città fisica", La Terza, Bari

<sup>13</sup>Brodskij I.A. (1987) "Fuga da Bisanzio", Adelphi, Milano

and symbolic needs and requirements "...or as is happening in contemporary times by suffocating it, trying at all costs to impose order on the surrounding world. In this one senses the intention to de-nature humanity" .

This thoughtless, forgetful approach is countered by the consideration that every urban civilization, every form of city, has established a covenant with the natural environment from the form of the land. Our time has misplaced this the balance that has remained buried, invisible, under the heap of excesses. It is essential to bring it back to light by following some elementary common sense principles:

- Read, distinguish to differentiate. Identify and hierarchize;
- Recognize, describe, nominate;
- Connect;
- Contrapose the city to the territory in extension, admitting the existence of a physical boundary, an articulated and vital edge that specifies the place of encounter between different physical and environmental dimensions;
- Reinforcing the coexistence of different landscapes of the city, qualifying the experience and ways of perceiving them at different speeds; the transition from one place to another, requires pausing and taking time;
- Regenerate, focus and not disperse.

## Conclusions

The point of origin of my thought is to consider the field of ideation and creativity (proper to every artistic activity and therefore also to the architect), embedded in a field of shared values verified by the times of history. I am convinced that the recognition of the qualities of inhabiting physical space, is regulated, in its constituent forms, by the principle of analogy and similarity, correspondence and consequentality to precedents, rather than contrast and dissonance. Contrast is everywhere; similarity, in its sensible manifestations, is hidden in the complex folds of time and space, in customs, memory, traditions, and arises from the tendency to give more stable, intelligible unitary solutions rooted in the depths of being.

At this stage when "... there is no time but the now, this culmination of the will be and the was, of that instant when the drop falls into the hourglass..."<sup>14</sup>. I believe that what is required of the contemporary world, forgetful and desacralized, is first and foremost a path of recognition of the multiplicities and depths on which existence is nourished: "to bring to the surface the secret veins of things." It is on this commitment that our responsibility as artisans, our responsibility as researchers, rests.

Ernst Jünger, in a free reflection, expounds "the idea that the moon can be the object of both astronomical and mythical approach and that its surface possesses both a real and measurable character and a physiognomic one," and that "both qualities can be brought together in synoptic form, if the mind has the faculty to do so... In this case the leap is successful, the leap backward to the origin; and from the perspective coincidence of opposites springs a new dimension that not only unites them in a spatial sense but elevates them qualitatively"<sup>15</sup>. Before taking the leap backward, the leap to the origin, one must get rid of the superfluous.

The place, once occupied by the feeling of interdependence between things and events, is

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<sup>14</sup>Borges J. Louis, "( 1985) Il passato" in L'oro delle Tigri , Adelphi, Milano

<sup>15</sup>Jünger, E. (1959) "Al muro del tempo", Adelphi, Milano (2000)



not entirely lost: there is still the power of attraction, the inexhaustible richness of recognizing, reknitting, connecting what has been separated.

### **The school of Gignano-Torretta-Sant'Elia of l'Aquila<sup>16</sup>: a project for the ground ( 2019)**

The project area looks like a natural reservoir on a slight slope, located between the hillside that rises to the south and the softer slopes that, with a wide opening, lead north towards the deep views that frame the mountain range of Gran Sasso. Among these different orographic characters (steep and petrous on one side and easy and vegetated by shrubs and some trees on the other), there is a long and narrow corridor, which stretches from east to west, destined for the construction of the new school complex.

All around the natural landscape is little vegetated, dispersed among the grasslands divided by dry walls, the last remnants of the division of the agropastoral territory, now abandoned. Scattered along the tops of the plains dominating the valley appear residential agglomerations consisting of low houses, mostly single-family. A landscape in strong transformation where, to draw attention, is the solemn presence of the mountain landscape, that of the plateau narrow in the basin of the massifs of Gran Sasso and Mount Velino. An evocative environment, produced by man in balance with a complex nature, now shaken by the fragile balance, by an urban suburb that grew quickly, in a disordered, noisily heterogeneous way, the outcome of a process driven by necessity, by the emergency ( the reference is to the exceptional earthquake that struck Abruzzo in 2009). In this territorial context, the school complex, Gignano-Torretta-Sant'Elia de l'Aquila, a place of social inclusiveness, is inserted.

When the signs of the city become rarefied, when the shape of the urbs dissolves as a physical place (a condition recognizable by the character of the architecture, by the fragile and incomplete relationships that return the urban experience) there is the risk of losing the feeling that determines the reasons for social coexistence, the very nature of the civitas.

When the architecture of the city becomes insignificant and clear, no longer offering any model, no reflection of the aspiration of the society that inhabits it, then the search for a system of order, a structure, a balance and a meaningful form, must be sought elsewhere, and make grip on other, elevating to model what remains survivor to witness resonant values and identity. Thus the remains of the material culture preserved in the vision of the landscape of the agropastoral civilization ( of the terraces, of the fences, of the secular walls, of the mimetic rural architectures) rise to reference of our ideational path, all concrete and rational elements, rarefied in the solemn and severe dimension of the mountain territory. These references make-up the point of figurative and symbolic convergence between the needs posed by the modern settlement (the school complex), the attention to the place (the territory divided between city and country, between valley and mountain) and the social and ethical ideal of the school, a place for the whole community. A set of attentions incorporated in the choice of typological, morphological and technical construction, in compliance with the pedagogical and educational specificity of the architecture of the school marked by a modern teaching, the most up-to-date principles of environmental sustainability, saving energy, safety, and at the same time opportunity for technological and architectural experimentation.

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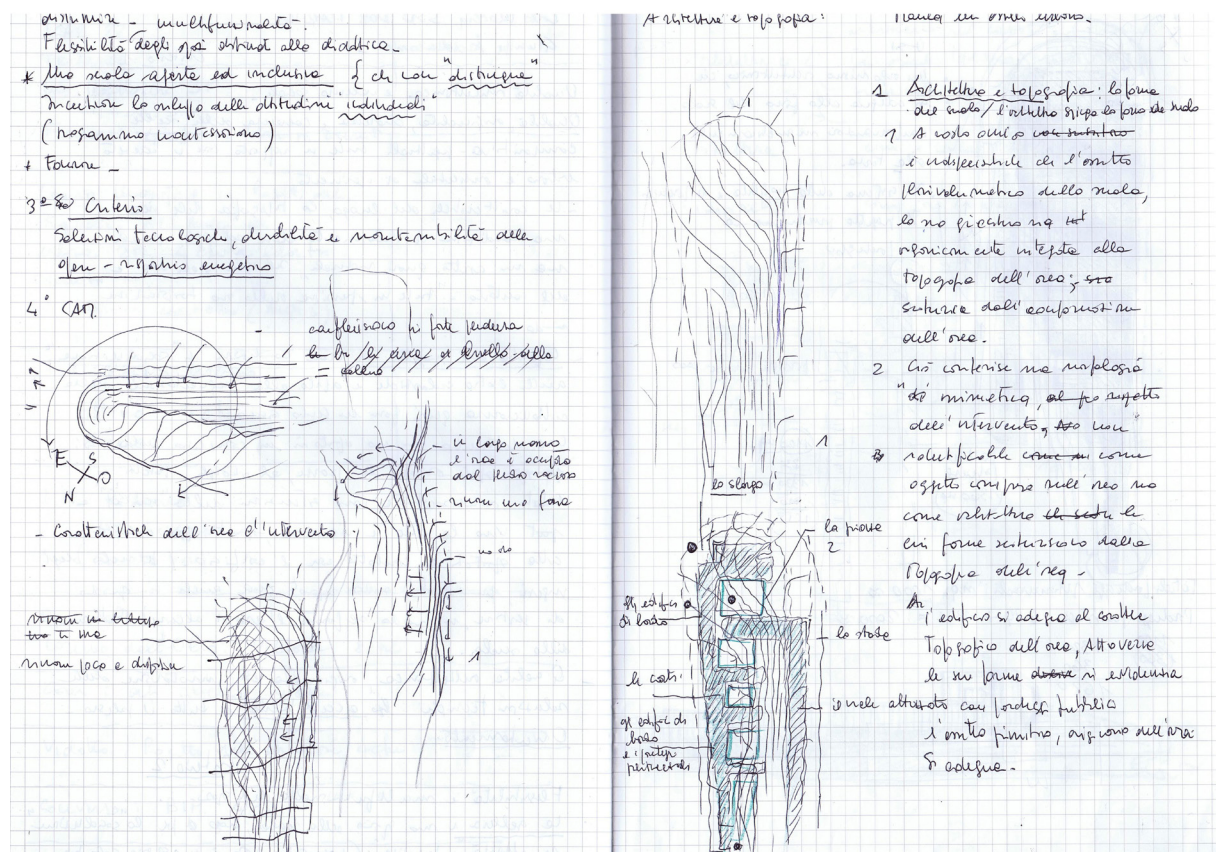
<sup>16</sup> International design competition 'in-nova schola' for the Gignano-Torretta-Sant'elia school centre in l'Aquila, Design team: Prof. Arch. Luigi Franciosini (team leader), Arch. Cristina Casadei, Arch. Antonio de Paolis (young architect), Arch. Laura Calcagnini (environmental sustainability), Ing. Alessandro Vittorio Bergami (structures), Ing. Raffaele Vincenzo Graziano (systems); consultants: Arch. Prof. Adolfo Lucio Baratta (technology), Arch. Fabrizio Finucci (valuation); Geologo Roberto Salucci; collaborators: Arch. Sofia Franciosini, Arch. Marta Faienza, Arch. Lucilla Castañeda Aller. FIRST CLASSIFIED PROJECT.

## Layout and plan design

The architecture of the school springs from the shape of the land.

The location of the building (on the one hand contained between the north-south hillsides and on the other stretched out along the valley in the east-west direction), helps to describe, to make expressive the origin and form of the place: a natural corridor on a slight slope straddling east and west, corresponding to the remnants of an ancient aquifer, an impluvium contained in the ruggedness of the hillsides, characterized by the masses of limestone climbing on the escarpments and by a clayey lens deposited along the valley belt, which is more malleable and adaptable to the building's bedding needs. This is the context in which the school complex is set, which through soil re-modeling operations is precisely adapted to site conditions: to topography, slope classes, heliothermal orientation, views to accessibility conditions. From these initial considerations, it is clear the importance that the shape of the soil (morphology, topography, geology, solar orientation), had in conditioning the reasons for the architectural form, its spatial and functional organization and its aesthetic and symbolic value.

## Illustrations and tables



**Figure 1.** International design competition 'in-nova schola' for the Gignano-Torretta-Sant'elia school centre in l'Aquila, Design team: Prof. Arch. Luigi Franciosi (team leader), Arch. Cristina Casadei, Arch. Antonio de Paolis (young architect), Arch. Laura Calcagnini (environmental sustainability), Ing. Alessandro Vittorio Bergami (structures), Ing. Raffaele Vincenzo Graziano (systems); consultants: Arch. Prof. Adolfo Lucio Baratta (technology), Arch. Fabrizio Finucci (valuation); Geologo Roberto Salucci; collaborators: Arch. Sofia Franciosi, Arch. Marta Faienza, Arch. Lucilla Castañeda Aller. First classified project. Securing under construction.

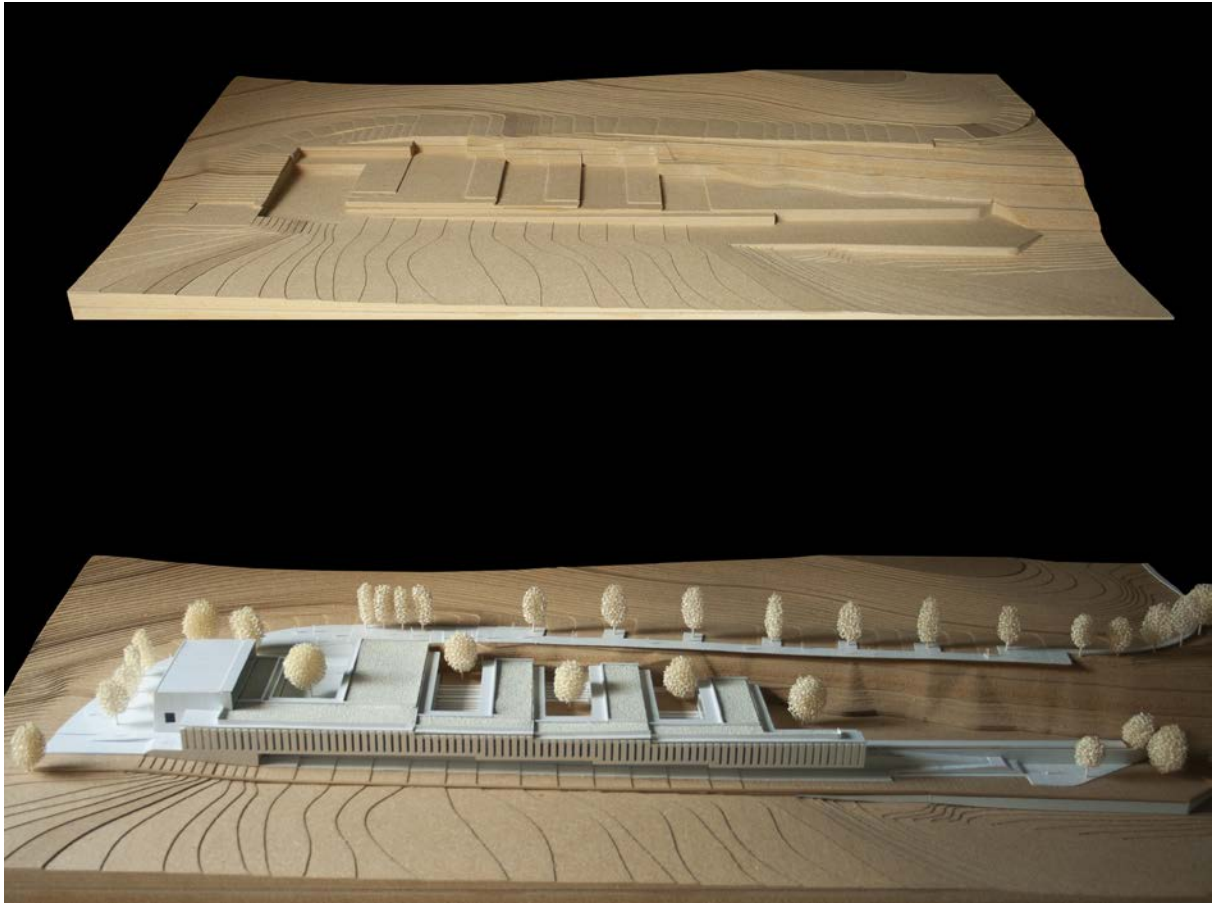


Figure 2. Bird view (Gignano-Torretta-Sant'elia school centre in L'Aquila).



Figure 3. Bird view (Gignano-Torretta-Sant'elia school centre in L'Aquila).





**Figure 4.** Project model (Gignano-Torretta-Sant'elia school centre in L'Aquila).



**Figure 5.** View of the complex from the access road (Gignano-Torretta-Sant'elia school centre in L'Aquila).



**Figure 6.** View of the complex from the service road (Gignano-Torretta-Sant'Elia school centre in L'Aquila).





## Searching for the sustainable “form” of the city

Andrea Iacomoni

Sapienza University of Roma, PDTA (Department of Planning Design Technology of Architecture),  
Via Flaminia 70/72, 00196, Roma, Italy

E-mail: andrea.iacomoni@uniroma1.it

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**Abstract.** *The theme of urban morphology has always been inherent in a balanced relationship between natural space and man-made space, with a particular interaction between the built and the void, where the margin between the two elements has never been a “border”, influencing the shape. With the excessive development the settlements have expanded in a fragmentary way, highlighting the rupture of the historical relationship, defining the indeterminate limit of the spaces of the city, but above all deforming their thickness, meanings and identity. However, the form is obviously not an exclusive connotation of the city, but a quality that can be found in nature, when the two types of space are combined, where the boundary between urban and natural is confused with penetrations of the “green “in the urban” crevices”, so much so that they can be considered a summary expression that has become a “new space “of the ancient urban dimension. An act that restores design strength to marginal open spaces, to re-evaluate public space as a space for sharing, inclusiveness, identity, but also healthiness and well-being, with a series of actions that link nature and architecture in a new compositional order between fabrics and environment, which conquer their shape by discovering an environmental and anthropic “depth”. In this vision, the design of the limits between the city and the rural landscape assumes central importance, restoring crucial relationships to reverse the trend of the deterioration of urban systems, responding to the new needs and different themes of the contemporary city. The paper aims to deepen, explaining with examples, the interventions that concern the open territory and the urban fabric, as a matrix form that connotes a dialectic of values, redefining the role of the built context as an “environmental connective” between urban spaces and redefinition morphology of the margins, for the functioning of the ecological network, of mobility, of the urban fabric, for environmental and social regeneration.*

## Introduction

The climatic, environmental and anthropic changes that characterize the current period, constitute a fundamental theme in the urban planning and architectural debate, since they condition on the one hand the protection of territories, landscapes and fragile urban contexts, on the other the uses, performance and efficiency of architectural artefacts and everyday objects (Iacomoni, 2019) also involves the shape of the city more generally. In this particular combination, the relationships between city and territory, made up of relationships between urban and natural, highlight a “form of the city” determined by “anthropological mutations” in the relationship between settlements and the environment (Cusmano, 2002).

The theme of urban morphology has always been inherent in a balanced relationship between natural space and man-made space, with a particular interaction between the built and me, where the margin between the two elements has never been a “boundary”, influencing the form. For this reason we must bear in mind that historically, the city has always had a close relationship with nature: the medieval historic centers with the gardens inside the walls, the parks and gardens in the expansions of the nineteenth-century city, the greenery in the urban planning of the modern movement. With the now well-known development, the settlements extended in a fragmentary way, highlighting the rupture of the historical relationship by defining the indeterminate limit of the spaces of the city, but above all by deforming their thicknesses, meanings and identities (Giraldi, Iacomoni, 2022).

However, form is not an exclusive connotation of the city, but a quality that can be found in nature, when the aforementioned types of space are combined, where the limit between the urban and the natural is confused and the penetrations of the greenery in the urban crevices resize the space by defining new forms, with new dimensions that are summaries of “new spaces”.

In particular, the contribution aims to focus attention on the potential of green spaces as a regulation of urban design, in its limits and in its dimensions, but also as a sustainability of the transformation interventions. Particular attention is paid to urban quality, which can be pursued through complex strategies, which include the structural and process scales of intervention as well as the economic, environmental and social spheres of action.

In this sense, green spaces in the city are considered increasingly important, especially from an environmental point of view, because they are essential for combating pollution, but also from a social point of view, because they are a meeting place.

Exemplary is the new meaning of centrality, social and cultural, assumed in many cities by open space (Pulselli, Tiezzi, 2008), and in particular by urban parks, green crowns and environmental networks, recognizing nature as a component fundamental of the new city design, aimed at guaranteeing new qualities for the inhabitants (Iacomoni, Rossi, 2020).

An attitude that restores design strength to open spaces, in particular those on the outer edge of the built environment, with a series of actions that link nature and architecture in a new compositional order between fabrics and the environment, which conquer their shape by discovering a “thickness” anthropic environment, as a space for sharing, identity, health, well-being, where the relationship between the limits of the city and the landscape is at the center of the action, with projects that restore crucial relationships to “reconfine” the needs of contemporary citizens.

In this strategy of regeneration of living environments, the environmental relationships that link urban communities to their living environments and, above all, the identification and quantification of the economic, social and cultural benefits that they derive from them, in terms of ecosystems, have become central to planning (Poli, 2008), where the landscape

“external” to the city directs towards new research into forms of sustainability for the contemporary city.

From this point of view, it is interesting to report an analysis carried out on some examples of “sustainable cities” where urban greenery contributes to a general urban regeneration. These examples, detailed in the second part of the contribution, play a decisive role in tackling the environmental challenges that many cities have to solve due to climate change, resource use, air pollution, soil consumption, water supply and waste recycling.

### Measurement and analysis

It seems clear that the main function within the complex man/nature system is performed by the infrastructures and the most important in terms of functional value are the green ones. Some recent examples, prodromes of wider regenerations, can be found in the actions of many administrations in favor of greenery, such as the Barcelona Strategic Plan, with the regeneration of two hundred hectares of urban land destined for parkland; or Munich, with a structured plan on urban greenery and sustainable mobility, therefore a “green system” not only with an aesthetic, ecological and social function, but also a glue between various places in the city.

Even in Italy some cities are moving with strategic plans organized around the theme of greenery; like Turin, a city that has increased urban quality through public green areas; as well as Florence, which intends to create a system of green areas through an increase in the supply of urban parks and gardens; and also Pisa, with projects to re-naturalize the urban environment, is pursuing the doubling of green areas in the city. Examples that demonstrate its functional value in a network of green spaces that provides ecosystemic services, the basis of human well-being and quality of life. In this logic, in order to trace paths of sustainable growth, paying attention to soil consumption, it is necessary to consider the landscape as an integral part of the shape of the city, linked to the territorial transformations which, integrated into a vast area system, can also feed a new development.

The analyzed examples of the Green Capitals demonstrate how green infrastructures and urban regeneration are the main tools for directing European cities towards increasingly sustainable environmentally and socially sustainable development models.

A common fact among the various European cities analyzed is the presence of a conspicuous green, natural or designed heritage, highlighted for the purpose of sustainable development of the urban fabric. Infact, green infrastructures can be an effective planning tool capable of contrasting and mitigating climate change and its short and medium-term consequences. «Green infrastructures are identified as ecoducts, ecological corridors, hedges, rows, green bridges and all those linear entities that allow the reconnection of natural or semi-natural areas (point-area entities), which have been artificially fragmented by artifacts, buildings, roads or railway lines» (Andreucci, 2017).

Green areas also contribute to the cultural and historical landscape, giving identity to the places and landscapes of urban and peri-urban areas where people live and work. They can make a significant contribution to achieving EU policy objectives in the areas of regional and rural development, climate change, disaster risk management, agriculture, forestry and the environment. In this sense, various cities have elaborated a strategic plan going in the opposite direction with respect to the cement-making privatization: the results have not been lacking, above all in Europe, where the cities engaged in strategic planning have tried their hand positively in Green Urbanism, directing «[...] the increase of urban green areas, the arrest of soil consumption, sustainable mobility, [...] likely to provide more extensive benefits than those

directly attributable to climate adaptation. However, it is ascertained by the scientific community that the costs of adaptation are far lower than those of inaction» (Castellari et alii, 2014).

The primary objective of an urban strategy based on regeneration through green infrastructures is to bring nature back to the city in a suitable period of time, to make cities resilient and give citizens a higher quality of life, with a new of greenery, which can have a wider formal and environmental value for the entire city, creating an urban green system as a glue between the different areas of the city, with an aesthetic, ecological and social function.

Analysis in details how, in the examples cited, the recomposition interventions that concern the open territory and the urban fabric result in a new matrix form that connotes a dialectic of values, redefining the role of the built context as an "environmental connective" between the spaces urban areas and morphological redefinition of the margins, for the functioning of the ecological network, of mobility, of the urban fabric, for environmental and social regeneration (Di Iacovo, Rovai, Meini, 2010).

As already mentioned, examples that indicate good sustainability practices are those proposed by European cities that have received the Green Capital Award, among which it is worth mentioning Lisbon, with the enhancement of its huge natural area just outside the historic center - Parque Forestal De Monsanto, approximately 1,000 hectares – sectorised into equipped areas and internal ecosystems; and Ljubljana covered for three quarters by green areas, where the recovery of the old barbed wire barrier erected during World War II becomes a green path of memory that connects the new large parks around the city created by recovering abandoned environments (a former landfill, a cemetery area etc.).

Turning our gaze once again to Italy, the intention of the Administration of Pisa to double the number of green spaces through projects for the renaturalization of the urban environment, in which the public residential districts, with their green network, are part of a wider system of public urban green; imposes a combination of the various infrastructures, green, blue and gray, which highlights an integrated landscape vision aimed at qualitatively increasing the pedestrian and cycle connections, combining them with the widespread green network of the city in its entirety. With the aim of re-building the public city (public spaces, green areas, equipment, mobility, social housing) the Municipality of Pisa has undertaken a redevelopment strategy for public residential districts, in particular here we mention three operations that we have developed with projects and educational activities for the INACasa districts of Gagno, I Passi and San Giusto, through the redesign of public spaces, with a decisive role of the interstitial greenery (but also of the larger parks) constitute a "network" within the wider context of "Pisa as a resilient city and its green infrastructures".

The first case is the Gagno district, north of Pisa, on the edge of the urban limit, representing an interesting node for reconnecting urban greenery to the rural environment, also through the re-functionalization of spaces and infrastructures, such as the local railway line which becomes a tram, mending the old caesura through the new green public spaces of the already existing social and sports services and homes. The second project, for the I Passi district, has the strategy of coordinating the residential part with the environment, society and the economy, identifying, in addition to the restructuring of the interstitial green spaces, areas for vegetable gardens and for agricultural trade; a sports playground is built along the new cycle path, also incorporating an educational agricultural park.

The third case, the San Giusto district, the most urban of the three, along the railway near the historic centre, is an operation of mending the spaces, considering the district as a historic centre, combining vehicular mobility with pedestrian mobility, and inserting numerous spaces



equipped for the neighborhood, from spaces for children, to shared vegetable gardens, to semi-natural spaces that connect with the existing ones.

These projects are conceived as part of a wider project of renaturalization of the capital, in which rural, urban, public and private areas coexist, with the intention of participating in the broader strategy of "Pisa, a green and resilient city", mending the fragmentation of green areas in the only large park in the city.

## Conclusion

Territorial planning and resource management are fundamental factors for promoting opportunities for growth and enhancement of natural and cultural heritage and, in these territorial dynamics, the issue of landscape governance is fundamental, understood as a unitary system that includes productions, ecosystem services, sustainability, economic development, conservation of values and identity, pursuing a new urban design suitable for improving the quality of life for citizens.

Thus, this reflection wants to leave open hypotheses of reflection on the potential of "green" as urban planning regulation of the city, placing the attention on the quality of the cities and on the complex strategies to be pursued, both in terms of intervention scales (structural and process) and areas of action (economic, environmental, social), to be implemented continuously over time and in compliance with the specificities of the contexts. Well, with a view to sustainable configuration of the city, which guides the change of use compatible with contemporary life, it is necessary to understand the evolutionary dynamism of the relationships between the physical and human environment, observing and understanding which actions and tools are the most suitable for the purpose, to grasp and direct the direction of progress, to interpret the "living" meanings because they bear the values of one's own identity, to pass them on to future generations (Mecca, 2006). It is therefore necessary to ask these questions without forgetting that, to make cities greener, both good governance and the active participation of residents and businesses are needed, a bottom-up approach that creates new solutions and encourages understanding of political decisions. A complex and overall green strategy, both in the drafting of plans and in the individual project, through a selection action (Corboz, 1998) that brings us closer to the goal of a green city: building a network of green, natural, anthropic spaces, agricultural or urban, which within a small radius, and combined with mobility, lead to an increase in the quality of the city and of users.

The contemporary city can "reform" itself through a coherent use strategy of the perimeter green spaces, which respond to new themes and different needs, combining with the urban fabrics. The landscapes formed in this way can represent the dynamic balance towards which the slow co-evolution of the relationship between nature and culture has tended in which, the most interesting aspect of this evolution can be summarized in the ecosystemic role that the natural landscape has assumed, in terms of sustainability, maintenance of biological diversity (Iaconi, 2021), but also in the recognition of traditional forms of use of places and quality of life.

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## Before and beyond adaptation. A strategic local approach for morphological transformability

Diego Moya Ortiz<sup>1</sup>, Diego Sepúlveda Carmona<sup>2</sup>

<sup>1</sup>Escuela de Arquitectura de la Universidad de Santiago. Santiago de Chile. Av. Lib. Bernardo O'Higgins 3677, Estación Central.

<sup>2</sup>Delft University of Technology, Urbanism department, Julianalaan 136, Delft, The Netherlands

E-mail: <sup>1</sup>d.moya.ortiz@gmail.com, <sup>2</sup>D.A.SepulvedaCarmona@tudelft.nl

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**Abstract.** *Urban form transformation refers to complex processes involving different drivers and systemic goals. It is argued that these processes depend highly on the self-organization levels of the different actors involved, to the detriment of comprehensive planning action. Currently, urban planning and design are influenced by climate change variability, and socioeconomic and cultural changes fostering research on aspects such as resilience and adaptation under the acknowledgment of socio-environmental vulnerabilities of the local actors and their related systems. Moreover, to a large extent, morphological and functional transformations depend on actors' specific actions and sensitivities. Thus, although it may be obvious, urban form transformability is sensitive to active governance coalitions, which involve political power and different rationalities and paradigms re-defining the values of the urban space. To address this complexity, we expose a thesis work based on three socio-vulnerable districts of the Santiago metropolitan area in Chile. The paper illustrates a spatial strategy that considers the different components, physical scales, and agency levels through the novel figure of an adaptive roadmap. Through this figure, an adaptive-pathways method illustrates how different rationalities of actors' coalitions, defined for each physical scale as concrete operational units, enable diverse urban design actions. Overall, we conclude there is an inevitable relation between the potential morphological transformation and the validated actors' participation, on which, if recognized, the interrelation of the diverse scales can function as an integrator urban design approach. In addition, the method proposed, allows this possibility through a decision-making approach informed by a deliberative design.*

## Introduction

Urban form transformation takes place through multiple and complex processes at different scales, motivated by different drivers and various systemic goals. There is a strong consensus on how these self-organizing processes occur, specifically on the complex adaptive system condition that influences how urban areas evolve (Portugali, 1999; Batty, 2007; Allen, 2012). Beneath that organic self-organization process, most urban transformation occurs through multiple actions driven by specific and heterogeneous actors with their own rationales and perspectives (Watson, 2003; Hartman and Jehling, 2018); these actors include communities, local governments, real estate developers, and market corporations, among others.

Examining that complex interplay has led recently to a deep understanding of how urban morphology influences urban planning and design, and how the interrelationships correlate with the level of resilience of urban form (Felicetti et al. 2018). However, how urban planning and design operate in practice is a field limited in scope. In Global South countries, such practice is determined largely by public land management capacities, the existence of proper urban instruments in their various forms, and the capacity to attract investment. In addition, these aspects depend on the governance and planning frameworks which, in the case of Chile, have been strongly influenced by neoliberal, centralized principles (Moya-Ortiz, 2019). Hence, when addressing the complexity and self-organizing conditions of urban areas, urban planners and designers are confronted with the limitations of institutional structures (de Roo, 2017). There is hence a need for methodologies that can enhance local decision-making to cope with climate-change adaptation and emerging metropolisation processes, in order to counteract the detriments of fast-growing urban agglomerations.

Urban planners and designers must hence understand the agency of urban transformation in terms of the diverse actor coalitions, levels of functionality, and modes of producing space (Lefebvre, 2013). We recognize this aspect as fundamental to how the urban form, influenced by these processes, determines the possibilities of inclusion and development for local, disempowered groups (Moya-Ortiz, 2019). Indeed, it is difficult to uncover this complex of agencies and relations, and especially how its manifestation in concrete urban morphological conditions—something that we call “morphological transformability”—shapes various groups’ development. Such an understanding, however, could inform a more just approach to urban planning and design, by providing a methodology for enhancing and operationalizing communities’ values. Such a locally managed methodology of urban design could mediate between the many structural mechanisms, and effectively coordinate the diversity of visions and demands. It could thus align efforts and set priorities to enhance local development within the biophysical and social dynamics of the locale.

The value of this methodology resides in its capacity to facilitate complex adaptation processes. It endeavors to go beyond climate change variability by considering the social change within, to counteract the main economic drivers behind the metropolitan agglomerations’ forms and functionality. This can be done by enhancing local decision-making that could, in time, align the currently reactive pathways of localised areas towards the metropolitan potentialities, hence counteracting those drivers that tend to bring about socio-spatial fragmentation (Sepúlveda, 2022). Indeed, this can be achieved by recognizing the social, physical, and economic particularities of the locale through a more open, participatory process to improve its spatial qualities and to amplify the functional possibilities of the most decayed areas in the main urban agglomerations.

We affirm, here, that the paradigms of climate change and human development are aligned, with local adaptation as their main driving agent, since they also coincide with local capacity

and dependencies for transformability through social engagement. Then, the emphasis on a more responsive local decision-making system within its paradigmatic values of form-morphology is critical to achieving the compulsory alignments—functional and morphological—to embrace a new and more robust pathway of adaptation and development.

The core of the problem and our approach lies, first, in the particularities of the emerging metropolitan system which defines agglomeration. We are specifically concerned about resources on infrastructure and tendencies to reinforce or disregard more mature and well-functional metropolitan centralities. The second main root of the problem is the tendency to reinforce existing functional disaggregation and spatial fragmentation. To achieve greater transformation, it is necessary to consider the potential to scale interventions through inter-municipal strategies, so as to counteract fragmentation tendencies and to foster local adaptation towards metropolitan cohesion.

To address this complexity, we present a case study of three socio-vulnerable districts of the Santiago metropolitan area: Pedro Aguirre Cerda, Lo Espejo, and Cerrillos. The research proposes an urban design methodology—an adaptive roadmap—considering the various components, physical scales, and a tool design that recognizes and potentially facilitates the alignments of the diverse agency levels. This roadmap could enable the various actors and sectors to visualize and compare all possible mechanisms to make and take decisions, and to recognize the diverse and uncertain dynamics. This figure is based on the adaptive pathways method, which considers how the different rationales of the various actors' coalitions, defined per physical scale as concrete operational units, enable diverse urban design actions. We finally conclude that there is an inevitable relation between the potential morphological transformability and the validated actors' participation. If recognized, the interrelation of the diverse scales (diverse actors' views and own physical components) can be operated as an integrator in an urban regenerative design approach.

### Proposed methodology

We draw on three main methodological approaches to build our adaptive roadmap model. We begin by identifying a specific inter-municipal area among these three districts (comunas) to apply the adaptive roadmap and evaluate the various outcomes of a collaborative, inter-municipal spatial strategy. The main objective of this exercise is to identify the levels of spatial and morphological transformability in different scenarios, according to the agencies of the stakeholders and actors involved.

This first step is an adaptation of Marcus' method of spatial capital (Marcus, 2010), which seeks to understand the possibilities and potentials of transformation of urban fabric according to three main aspects of urbanity intensity. We apply Marcus' method to identify design actions, by evaluating the morphological conditions of accessibility to density (network analysis), functional diversity, and built intensity (density analysis). We consider the results in conjunction with demographic information to characterize and relate socially and economically specificities in the analyzed areas. In sum, different urban strategic morphological potentials can be identified, for example, local streets, public infrastructure, community places, borders, and plot openings.

The second step is to construct the adaptive roadmap, for which we apply two methods: the Dynamic adaptive pathways method (DAPM) (Haasnoot et al., 2019) and the stakeholder onion diagram method (SODM). DAPM is a planning approach that describes a sequence of policy actions or investments in institutions and infrastructure over time to achieve a set of pre-specified objectives under uncertain conditions. Incorporating it furnishes the adaptive



pathways map with insights into policy options, the sequencing of actions over time, potential lock-ins, and path dependencies. Most of its application relates to the policymakers' desire for easier updating of plans in response to new climate change scenarios. DAPM is highly suitable for analyzing and exploring, and it can be applied by sequencing different possible actions related to an infrastructure action plan, according to different scenarios. The SODM is based on the work of Czischke (2018). The onion diagram visualizes the positions and relationships of stakeholders and actors around a project or development process. In contrast to the previous stakeholder analysis (which visualizes the relationships according to critical fields of urban development models), the stakeholder onion diagram uses three layers surrounding a center, which corresponds to the "field" or "process" and is divided into the three domains to which stakeholders belong: market, state, and civil society. Grouping by domain sheds light on the actors' motivations. The distance of each layer from the center reflects the level of operational involvement, power, or action in the process. Actors are positioned by three main characteristics: domain of resources, veto capacity, and legitimacy level. In addition, the relationships among actors are classified into three groups: strong relationships of exchange collaboration, ad hoc relationships of exchange or collaboration, and indirect relationships.

Combining DAPM and SODM allows the adaptive roadmap to illustrate the different levels of morphological transformability according to different urban design strategies. As this process is structured according to the DAPM, it shows the sequencing of different possibilities according to different change scenarios. The complementary SODM and the stakeholder analysis shows us the different constellations of power, veto, and legitimacy needed to engage every spatial transformation.

Overall, this methodology aims to inform a model of strategic spatial planning and urban design by defining and validating its components and phasing, the diverse values they respond to, and how the complexity can be synthesized into a consensual and co-evaluated spatial transformation. Therefore, the method seeks to establish how this proposal could achieve a consensus on the physical and governance scales to align the diversity within the system.

### **Operability, measurement, and analysis**

The approach is tested through a case study on three comunas of the Metropolitan area of Santiago (MAS): Pedro Aguirre Cerda, Lo Espejo, and Cerrillos. The MAS can be considered an emergent metropolitan system characterized by path-dependent trajectories in terms of economic and functional concentration, which define spatially fragmented morphologies (De Mattos, 1999) through asymmetric juxtaposition and concentration of metropolitan infrastructures, functions, and urban artifacts that operate over different scales with multiple rationalities and systemic goals. In this regard, the centralized and sectoral institutional design, in terms of planning and governance under a neoliberal policy framework, determines a particular agency on the territory, which reinforces socio-economic asymmetries at the territorial level (Moya-Ortiz, 2019). It can be argued that the main effects of neoliberal values at the spatial structure level are related to concentrations, and manifests in deprivation of urban functions and infrastructures which are translated, at the level of the comunas, into different forms of spatial inequalities that depend especially on market-driven actions and interests. The practical upshot is that several population groups experience asymmetric access to services, public facilities, environmental qualities, affordable housing, and social and economic opportunities for development.

The districts of Pedro Aguirre Cerda, Lo Espejo, and Cerrillos offer good examples of urban areas with uneven socio-spatial conditions at the metropolitan level. These districts, in the

pericentral area of the MAS, were created institutionally for social housing during the 60s to serve other important functions needed by the metropolitan economy at the time, such as industries and factories. Today, the three districts present a high concentration of low-income populations whose vulnerability is reflected in measures such as education and employment level. Since their municipalities (local governments) lack major financial and technical resources, their operations, planning, and urban design are confined to local strategic projects without much connection to broader scales. Unfortunately, those conditions have persisted over a long time due to path-dependent poverty conditions and the inability to implement better planning and economic distribution, perpetuating a vicious cycle of precariousness. From a spatial perspective, a great component of the issue lies in the current morphological characteristics of these areas, specifically its observed spatial fragmentation. This condition has worsened with the deployment of other infrastructure developments, such as urban highways and railway lines which have undermined the urban fabric of these areas. Thus, while at these three districts share the same Metropolitan advantages in administrative and functional terms, the Metropolitan structure creates barriers and physical boundaries which damage the local neighborhoods by impeding connectivities. This fragmentation and the associated lack of functional and social integration generate diverse enclaves. This morphological condition is key because it constrains economic movement and opportunities among the three districts. To test the approach in these three districts, a spatial strategy at the inter-municipal level was developed using a collaborative (Innes and Boher, 2018) and co-production approach (Albrechts, 2013). The operational goals were set to define specific morphological transformation actions, operating simultaneously, and respecting the different actors' engagements under inter-municipal agreements. Pedro Aguirre Cerda (PAC), Cerrillos, and Lo Espejo have different morphological structures but present similar social needs for development and to relieve constraints on endogenous community capacities. Thus, the first phase of determining the spatial strategy was to characterize the social urban demands from surveys and interviews with actors, stakeholders, and communities. The second phase was to identify initiatives at the local level that represented endogenous potential in terms of activities developed by local communities. The third phase was to identify the levels, resources, and characteristics of the various actors' agency. The actors considered had a range of specific interests and sensitivity to the impact of urban transformation at the inter-municipal level. They can be summarized as follows:

- The State, through its regional departments, holds the main managerial control over providing subsidized social housing and street and highway network infrastructure.
  - The Real Estate Market is the major developer of the housing market and land ownership.
  - The franchised Infrastructure companies operate and manage large-infrastructure urban highway networks.
  - The Neighbors and civil communities pertain to specific municipal areas and neighborhoods.
- The last phase was to identify and characterize the spatial administrative structures of these urban areas at the inter-municipal scale, to determine their specific potentials. We identified that Lo Espejo and PAC present a more structured, grid form, with a high level of coverage and residential density at low height levels. They feature a standardized neighborhood unit design around clear public centralities but exhibiting different levels of decay. These centralities, which contain the available public spaces, are potentials for local development in terms of public facilities but are limited in space. Both areas are fragmented by transport infrastructures and metropolitan functional areas such as cemeteries and industrial camps, which act as physical and impermeable barriers.

In the case of Cerrillos, there is a clear predominance of industrial plots which act as physical barriers disconnecting their neighborhoods. This disconnection also affects the urban program which does not link labor activity with the characteristics of the local population.

The morphological particularity of this inter-municipal area exhibits a paradox of sharing the same locational value within the metropolitan system but being spatially fragmented, mainly by the introduction of metropolitan highways and railways. This, in turn, generates enclaves between spatial barriers which constrain people's movements and local economic activity.

Once a strategy is defined, the adaptive roadmap is built up. We set three scenarios to test the different levels of resources and agency from the main actors involved. The scenarios were designed considering the level of stakeholder agreements among the main actors: real estate developers, regional representatives of the ministry of housing and urbanism, and local and central government.

It was important to understand how and to what extent the municipalities and their communities could reach their inter-municipal objectives considering different levels of participation, engagement, resources, and collaboration with the rest of the stakeholders, which were, in turn, translated into different levels of morphological transformability.

The three scenarios are defined by the orientation of their agreements:

- a) by local agreements, in which most of the effort in the strategy is developed by the three municipalities and their communities and local actors without major state support,
- b) by market-oriented agreements, in which most of the efforts and goals of the state are subsidiary and are directed towards market profit (this scenario represent the current situation), and
- c) by public-oriented agreements, in which municipal, community and state action are aligned and guide the market action of developers and corporations to achieve inter-municipal objectives.

### **Evaluation of the methods proposed, their applicability, and their projected outcomes**

Using an adaptive roadmap allows us to identify the outcomes of different scenarios according to the engagement levels of different actors and their urban transformability capacity. Thus, each scenario illustrates different limitations and (potential) achievements.

In the first scenario (local agreements), it is mainly evident that the morphological transformations associated with local agreements (municipalities) present minimal or insufficient economic and political support from the State or public or private investment, and do not manage to generate greater degrees of spatial integration at the metropolitan level. In this case, the municipalities are not capable of overcoming the physical barriers or of generating the spatial and regulatory conditions to attract metropolitan functions that contribute strategically to their development. Therefore, the actions of occupation and development of local infrastructure continue to be insubstantial, and do not generate municipal economic sustainability in the long term.

The second scenario (market-oriented) illustrates the market's strong interest in generating residential development in areas of metropolitan interest and is capable of rapidly transforming these areas. However, the functional contribution to inter- and intra-communal needs is not strategically considered. The asymmetry in the interaction and institutional-political capacity between local actors versus the State and the market prevents municipalities from obtaining competitive advantages from this type of development. Finally, the lack of integration of those actors involved (franchises) in the management and transformation of the barrier-generating metropolitan infrastructure does not contribute to overcoming fragmentation or spatial

segregation, instead maintaining the conditions of spatio-economic isolation of the comunas within the metropolitan context.

The third scenario (State–local) is, without a doubt, the most effective inter-municipal objectives. The articulation of local actors in collaboration with the State, which can intervene and manage land on a larger scale, allows the attraction of strategic metropolitan functions. The definition of functional typologies of specific development (housing, services, facilities, employment centers, and local training) can be better framed. In turn, the State can manage more substantive transformations at the infrastructure level, as is the case of overcoming physical barriers caused by highways or other major mobility infrastructure. However, this scenario demands three structural elements to manage fiscal decentralization and political-technical capacities: (1) solid empowerment of local actors, for example, through the direct transfer of financial resources to municipalities, and the consequent increase in their technical and planning capacity; (2) an associated public management between the State and the municipalities, capable of mediating over the interests of the real estate market, for example, proposing incentives according to local interests, and (3) an institutional rearrangement to facilitate governance and the territorial autonomy of local governments.

Finally, the exploration of adaptive routes in case of disagreements or turning points during the process indicates that, in all cases, the change towards scenarios (a) and (b) throughout the process implies tracing part of the required intra- and inter-municipal spatial transformations by the comunas, as part of the negotiations with the rest of the actors.

Moreover, it can be observed that the main transformability occurs when all actors have a major voice in terms of decision-making under the coordination of the public action of the State. The impact of having a major level of participation of communities and municipalities results in different scale operations over the morphological configuration of the inter-municipal area.

### Concluding remarks

To elaborate on our conclusion, we have to start from the common aspects observed at the main agglomerations in the Global South where metropolitan functional systems are emerging. We can understand this process as the main territorial adaptation to the global economic system (logistics, networks, command, and control functions, etc.) which tends to enhance and develop the most mature and path-dependent centralities. These centralities concentrate on the actions of the stronger global and metropolitan actors inspired by economic parameters. On the contrary, the local conditions in areas that do not respond to the main interest of the drivers of this market-driven model need a more local sensitivity and perspective. Achieving this need requires alignment of the dominant, stronger actors and large-scale development perspectives with the local ones in an evolutionary process which demands high levels of negotiation. Overall, such change occurs at the morphological level, which enables difficult complex economic and social interaction processes and thus determines the local communities' development. By informing where the positive local conditions are and their possible transformative (adaptive) pathways of change, we can uncover the synergistic interactions, evaluate their positive trade-offs, and define a clear decision-making platform to take a more integrated set of territorial decisions. In addition, this method allows us to identify and acknowledge the set of capacities, support, and stakeholder engagement necessary to drive the transformations.

The thesis of self-organization in the Global South context is insufficient for public officials when

demands on housing, services, and other facilities increase, and when the necessities are urgent. On the other hand, urban instruments as master plans are challenging to deploy within an institutional context where poor local governments do not have enough planning attribution and resources to acquire land as they do in some Global North cases. These constraints are problematic for planners and urban designers because the needed urban intervention is in highly fragmented urban structures with weak coordination and straitjacketed by an institutional framework characterized by silo culture, vertical bureaucracies, and asymmetrical relations among a high diversity of actors and stakeholders. This technocratically rationalised way of planning is inherently limited in scope (Innes and Boher, 2018).

Issues of adaptation, resilience, and self-organization in urban form planning demand more flexible, organic, and strategic spatial planning frameworks driven by more specific and local sensitive actions; this challenges the governance structure, the availability of instruments, and how different and diverse actors are involved.

Overall, the proposed methodology considers the main metropolisation drivers and their structural effects as robust centralities on urban consolidated areas. In addition, it can be nurtured by concrete tools, which represent a way to revise the local and trans-local potentialities from the perspective of the very local area to enrich a more integral capacity for decision-making. In this regard, the powerful visualization of the adaptive roadmap can inform the negotiation process and explain how the diverse actors' constellation of involvement defines different results at morphological levels whose impact decisively affects the more disempowered actors.

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## Illustrations and tables

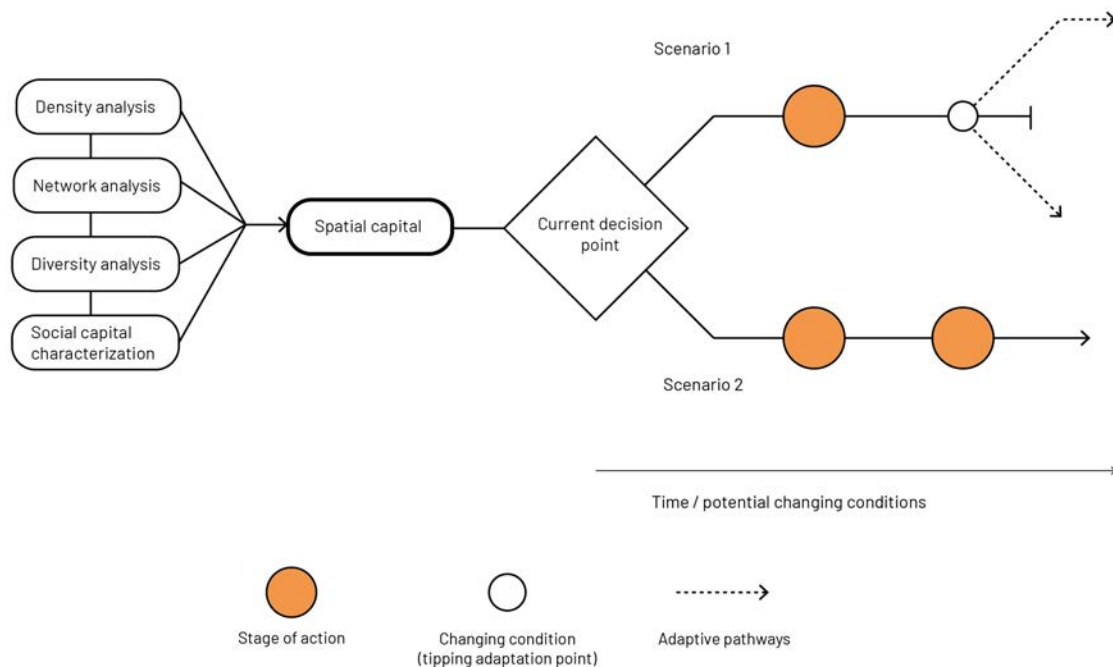
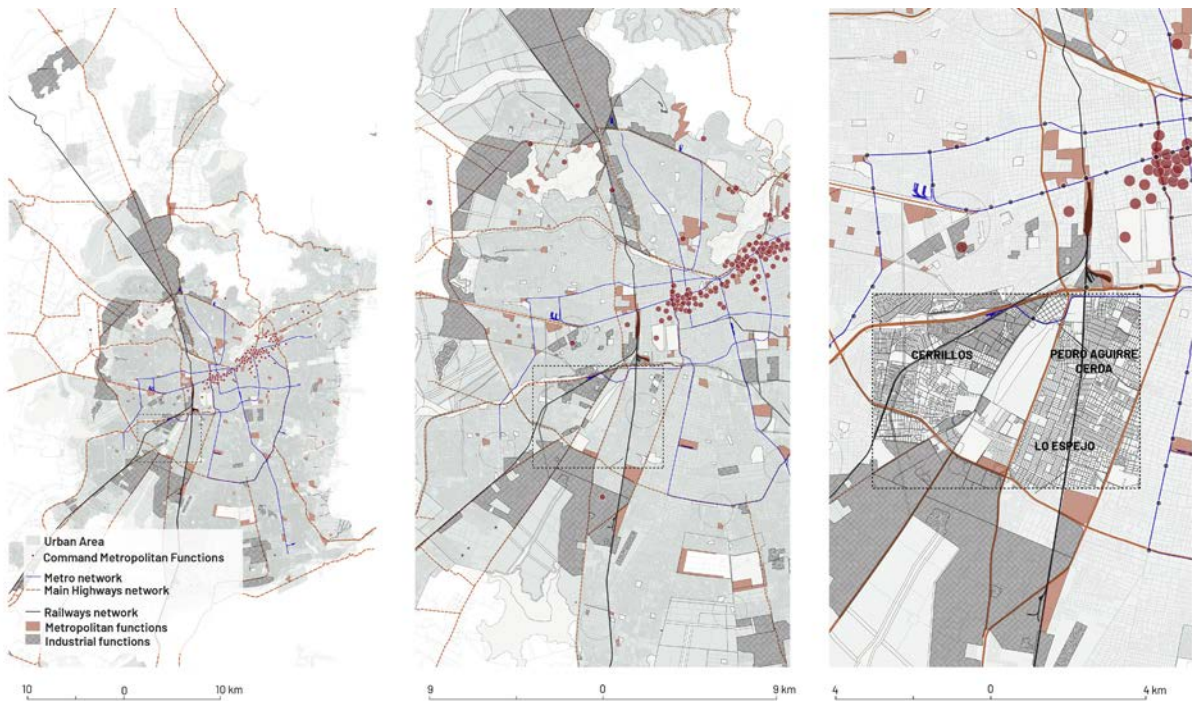
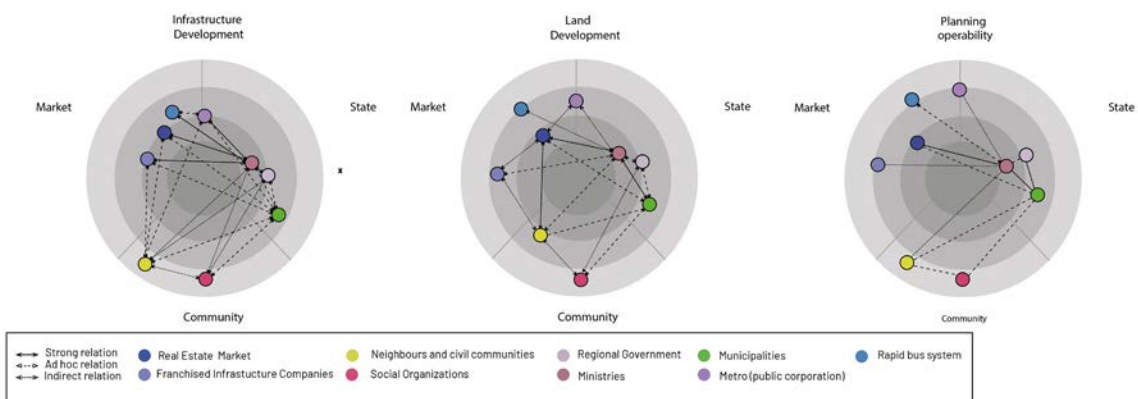


Figure 1. Adaptive roadmap conceptual method framework. Own elaboration.

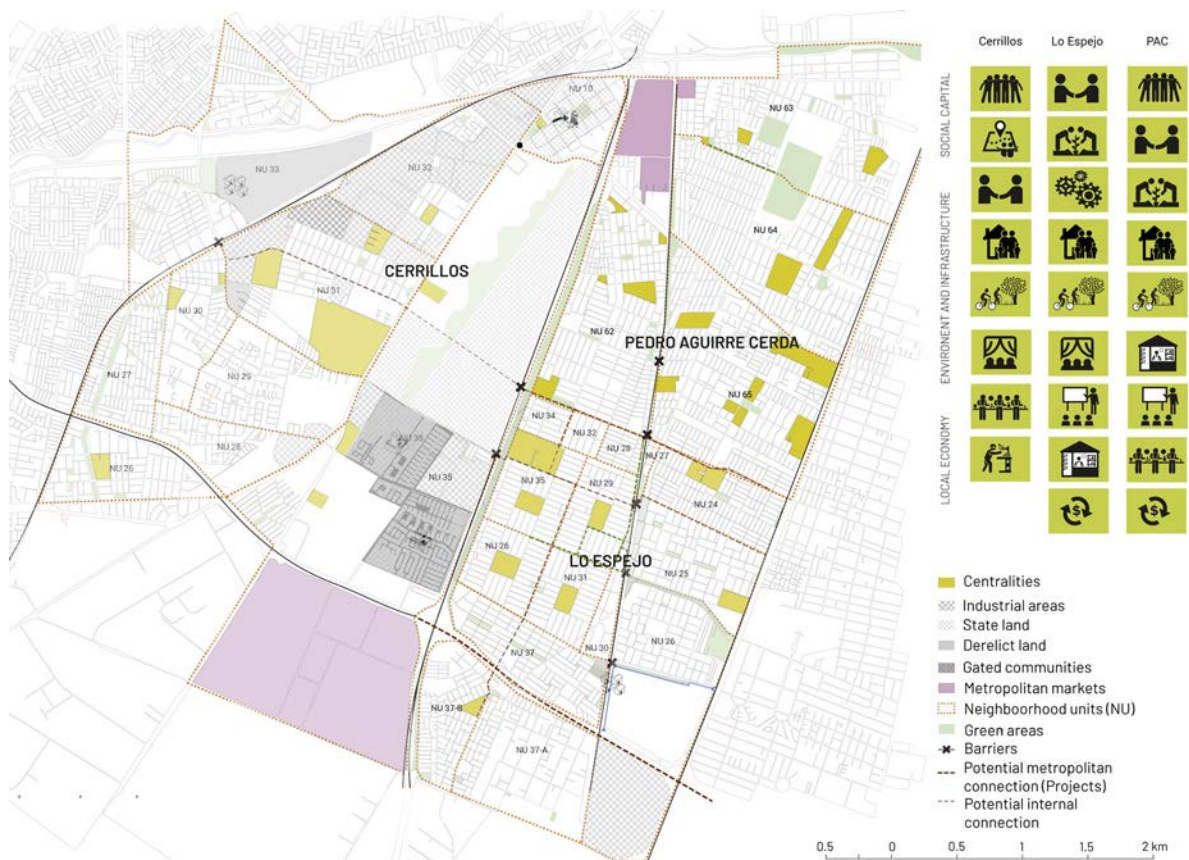


**Figure 2.** The location of the three districts at different scales. The maps show the different effects of metropolitan networks and functional agglomeration. Own elaboration.

#### Stakeholder relation under current model of Governance and Planning



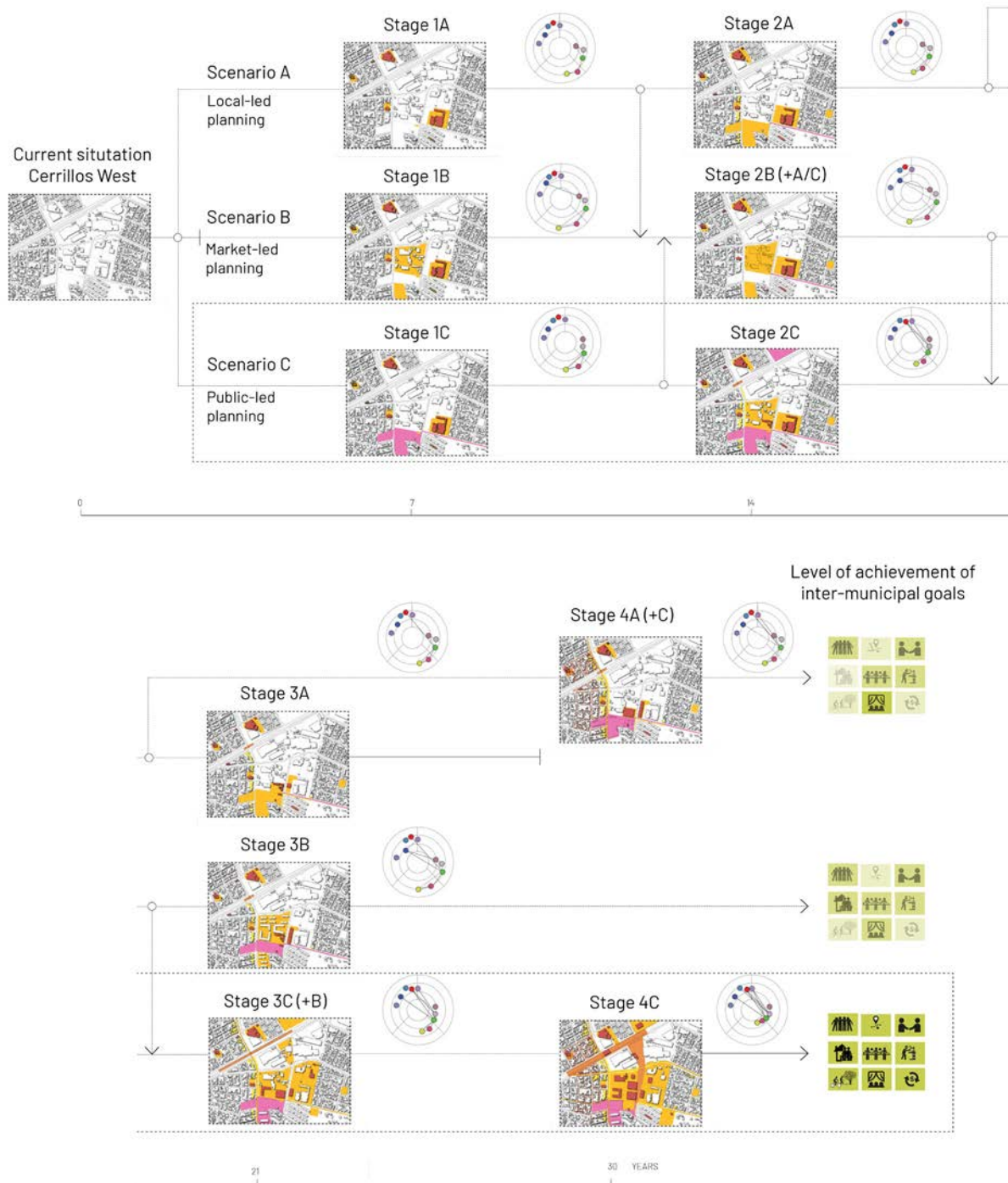
**Figure 3.** Stakeholder and actor dynamic based on research. Onion diagrams. Own elaboration.



**Figure 4.** The urban structure of three municipal areas, their issues, and social objectives. Own elaboration.



## ADAPTIVE ROADMAP



**Figure 5.** The adaptive roadmap for one of the inter-municipal areas. It shows the different results and adaptive pathways of each scenario. Own elaboration.

## Designing a sustainable urban landscape. Between urban and rural morphologies

Giulia Annalinda Neglia

ArCoD. Politecnico di Bari. Via Orabona, 4. 70125 Bari.

E-mail: giuliaannalinda.neglia@poliba.it

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**Abstract.** *Territorial and landscape morphology is the basis of urban design. Public open spaces play an important role in the dynamics of urban and metropolitan development, especially when the city meets interstices or peripheral rural areas, and correlates to sustainable processes of change in social, economic and environmental evolution. This is particularly relevant in the case of small and medium-sized cities, which are set in direct connection with natural territorial structure, and with fragments of agrarian fabrics (Donadieu 1998). In these cases, territorial analysis and landscape design can help in adopting and implementing integrated strategic plans for enhancing the relationship between the different systems of the urban environment (Caniggia 1976).*

*This paper aims at dealing with the role of landscape architecture in defining a consistent urban revitalization, in connection with the urban morphology and the territorial structure (Neglia 2018). Spanning from analysis to design, it aims at presenting some landscape design-based proposals for the urban regeneration of the southern coastal area of Bari, a medium-sized city in southern Italy, through the reconstruction of linkages between urban, natural (McHarg 1969) and rural areas (UN-Habitat 2019). The argumentation of design proposals will clarify the increasingly needed relationship between landscape architecture and urban morphology, as well as between territorial analysis, interpretation of the local forms, and sustainable use and re-use of environmental resources.*



## Introduction

Contemporary cities are shaped by a mixture between built-up fabrics and pieces of natural and agricultural fabrics that punctuate them, as well as by a new-found relationship with the countryside that innervates the sparse urban landscape of the suburbs (Donadieu 1998) especially where, for hydro-geological reasons, it is difficult to settle, or along the informal and rich in resources coastline of the contemporary metropolitan cities. This defines apparently disordered urban and metropolitan landscapes, which are instead rich in values and elements to be valorized, reconnected and reconsidered within a sustainable and ecological vision of the city.

Within this framework, the role of landscape design becomes increasingly important for shaping these complex and multilayered urban landscapes and for designing public spaces at the intersection between urban and rural, as well as for making connections between environmental and urban form, natural and built environment into the creation of places with clear and sound identity.

In these marginal and interstices areas landscape architecture and urban design become closely interconnected, so the quality of one also depends on the value of the other: while urban design focuses on designing and shaping the built up areas of the urban and territorial spaces, landscape architecture considers issues of environmental and ecologic value and the inter-scalar interconnection of natural and anthropic resources, dealing with analysis and design, for the management and transformation of landscapes and open spaces.

Landscape design demands therefore a sound understanding of urban and territorial morphology (Muratori 1966), as well as of a wide range of subjects, from physical geography to ecology and water management (McHargh 1969), with the aim of creating sustainable and inclusive cities.

Within this framework, it plays an important role for the definition of the form of the urban environment, especially when the city meets interstices or peripheral rural areas, and correlates to sustainable processes of change in social, economic and environmental evolution.

This is particularly relevant in the case of small and medium-sized cities, which are set in direct connection with natural territorial structures, and with fragments of agrarian fabrics that apparently have an unplanned urban form or layout, which often derives instead from underlying territorial conditions. In these cases, territorial analysis can help landscape design in understanding and unveiling the underlying layout, and in adopting and implementing integrated strategic plans for enhancing the relationship between the different systems of the urban environment (Caniggia 1976).

This is the case of the city of Bari, a southern Italian medium-sized city, set along a coastline where a number of so-called "lame" (i.e. shallow valleys that were once small streams of water) reach the coastline. Usually, these natural structures, which are a significant component of the Apulian territorial organism, are seemingly empty of water. Despite this appearance, water is visible through the presence of abundant natural vegetation, but also through the widespread cultivations of vegetable gardens and orchards. Moreover, when it rains, which is more and more often as a result of climate change, their valley bottom, especially near their outlet to the sea, suddenly becomes wet areas collecting the rainwater from the hills.

Along the coastline of the Apulian region, these complex ecosystems also divide the urban from the agrarian territory, industrial from natural areas, defining sections of the metropolitan and rural landscape where the form of both the urban and open spaces has been lost, and which therefore need to be regenerated.

Along the coastline of the metropolitan area of Bari, the karst nature of the Apulian territory defines a changing and dynamic urban landscape that has profoundly influenced the urban conformation: along and inside the course of the lame, which reach the coastline working as real ecological corridors, the urban countryside innervates the scattered urban tissues of the suburbs where, for hydro-geological reasons, it is difficult to settle. This defines an apparently disordered urban and metropolitan landscape, which is instead rich in potential environmental and spatial components to be enhanced and reconsidered within an ecological vision of the urban public spaces.

### **Methodology: From Analysis to Design**

This paper deals with the role of landscape design in defining consistent urban revitalization, in connection with the urban morphology and the territorial structure of the Mediterranean landscape, with a focus on the city of Bari in southern Italy.

It aims at presenting analysis and landscape design proposals for the urban regeneration of the coastal area between Lama Valenzano and Lama San Giorgio, two karst furrows that mark the western boundary of the metropolitan area, developed within the activities of the Landscape Design Studio of the 4th year at the School of Architecture of the Polytechnic University of Bari during the academic year 2020-2021, where students have been asked to deal with the role of landscape design in recovering peripheral and neglected urban areas and defining urban-rural linkages, by designing true Mediterranean and sustainable parks and open public spaces.

In an ecological and urban context such as that of a city in southern Italy, it is particularly necessary, especially in this phase of profound climate change, to design in response and consistently with the territorial and environmental conditions. The challenges that the contemporary urban design poses to us must be accepted by envisioning projects that increasingly move towards a concept of sustainability that is long-lasting.

To this end, it is necessary to develop projects that are profoundly linked to the characters, materials, and vocations of places, where the analysis phase takes on a significant weight, comparable with that of the design, so as to intercept the local resources and potential, and make them available as driving force behind the project.

Therefore, spanning from analysis to design, this paper aims to present a set of possible approaches to the landscape reconfiguration of an area rich in unexploited resources, based on the reconstruction of linkages between urban, natural and rural areas, aimed at increasing the relationship between landscape architecture and urban morphology, as well as between territorial analysis, interpretation of the local forms, and sustainable use and re-use of environmental resources.

The design proposals, which are grounded on territorial, environmental and morphological analysis, are aimed at demonstrating the possibility of re-proposing high-degree self-sustainable open and green urban systems, functioning thanks to wise techniques of local resources control, and appropriate, in their architectural forms, to the local territorial characteristics.

Based on the topic of the formalization of the agricultural landscape and of the coastline, as a main reconnecting principle, the design proposals presented here are aimed at transforming the interface between the countryside and the sea into multifunctional public spaces, where the agricultural landscape is re-knitted to the coastal urban forms, and where the new vision for the public areas of the peri-urban fabrics is strongly linked to the characteristics of the surrounding territory.

## Measurement and Analysis

The southern coastline of the municipality of Bari is reached by the terminal sections of four lame: proceeding from north-west to south-east, Lama Valenzano (now called Canal Valenzano), Lama San Marco, Lama San Giorgio and Lama Giotta follow one another. Some sections of the lame are low and sinuous, others are steep with rocky stratification. All of them, show the karst nature of the territory.

Within the lame, are interspersed stretches where natural vegetation is still present, which are characterized by the typical essences of the Mediterranean scrub, and stretches cultivated with olive groves, vineyards and vegetable gardens. The spontaneous vegetation, which grows into the natural depression, is characterized by the presence of spontaneous plant species such as carob, laurel, bramble, holm oak, fragno; along the ridges, in the most rocky and arid places, grow plants of honeysuckle, hawthorn and wild asparagus. Not infrequently can be found anemones and specimens of orchids, as well as aromatic herbs used for cooking (such as thyme, mint, sage, rue) and medicinal ones (such as borage and sarsaparicin). They define an environment of undoubted value both for their landscape, geological and naturalistic characteristics.

Between the lame fragments of scattered urban fabrics are interspersed with pieces of urban agriculture, both of them having the agricultural hinterland on their back and facing the coastline.

If we retrace, in a diachronic way, the urban transformations of Bari through its regulatory plans, it clearly appears how, for a long time, the presence of these territorial structures deeply oriented the urban growth, until modern times when their natural layout has been deeply changed by engineering transformation, which in some cases also moved and transformed their course into canals (such as Canale Valenzano). Accordingly, some of these natural territorial structures have been transformed into urban engineering works that are now set in between natural and agricultural areas. Finally, the most recent urban and territorial plans have integrated these complex ecological and environmental structures into the planning processes at a metropolitan and regional scale.

Therefore, if the characteristics of the area of the southern coastal area of Bari are to be analyzed, they cannot be understood unless they are integrated with an understanding of the role of the ecological corridors that reach it and delimit its extension.

To this end, it is necessary to analyze the characteristics of the area between Lama Valenzano and Lama San Giorgio, and in particular between Lama Valenzano and the small peninsula on which there is a now disused historical lido, Lido il Trullo, in order to define strengths and potential of this area, as well as its weaknesses, in relation to both the built-up areas, the agrarian fabrics, the naturalistic areas and the coastline.

Characteristics of the coastline. The analysis of the characteristics of the coastline highlighted the different components and vocations of the coastline: the sandy areas of Pane Pomodoro beach and to some extent also of Torre Quetta, both equipped as public beaches; the rocky coastline near Lido il Trullo, now informally used for recreation and bathing; the springs of the mouth of Lama San Marco, a small lama whose course is now almost indiscernible; the very strong naturalistic vocation of the mouth of Lama Valenzano, due to its vocation to be transformed into a wetland area when it is flooded with the rainwater collected by the canal. These different characteristics point towards a different possible use of the different stretches of the southern coastline.

Services and public buildings. The analysis of the existing services and public buildings in the abovementioned urban section has highlighted the different vocations of the urban and peri-

urban fabrics facing the coastline: the strong urban connotation of the Pane e Pomodoro beach, set to the north of the Lama (now Canal) Valenzano, which is strongly linked to the consolidated urban fabrics of the Madonnella neighborhood; the presence of relevant nodalities, not only at the neighborhood scale but also at the urban scale, in the area between Lama Valenzano and Lama San Marco of the Japigia neighborhood, such as the large commercial buildings, the Military Memorial or the Apulia Region headquarters. The presence of these attractors demarcates the limit of the area beyond which there is an almost total absence of public buildings, therefore defining a strong peri-urban value to the area between Lama San Marco and Lido il Trullo.

**Agriculture in use.** The analysis of agriculture in use, carried out on orthophotos and with field checks, has confirmed the manifest almost total absence of cultivated areas close to the coastline, as far as the railway line, and therefore its vocation as an area for leisure and recreational activities. This appears in contrast to the widespread presence of cultivated areas near Lama Valenzano, but also in extensive allotments between the railway and Via Gentile: these latter are mainly horticultural crops (fennel, tomatoes, courgettes, ...), but also orchards (figs, almond, peach, ...), especially in the south-easternmost area, where are linked to the olive groves of the peri-urban countryside (Figure 1).

**Agriculture neglected.** The analysis highlighted how a significant part of the study area is characterised by the abundance of fields that were once cultivated and are now gradually being transformed into a sort of 'third landscape' (Clement 2004) due to the re-appropriation of these areas by endemic species (gold flower, sea fennel, fig, wild mustard, couch grass,...) that exploit the albeit limited existing resources. Significant in this respect are the coastal areas near the Valenzano Canal and facing the Lido il Trullo, where the orographic conformation of the soil helps to favour the accumulation of water resources, and thus of vegetation (Figure 2). **Naturalistic areas.** The areas with the most naturalistic vocation, as emerged from the analysis, are those close to the coastline where, in some cases, poor accessibility has also prompted the re-appropriation not only by endemic species but also by animals and birds that have settled in the area between the mouth of Lama Valenzano and the Torre Quetta beach, up to Lama San Marco. The areas of abandoned agriculture tend also, in some cases, to have a new naturalistic value and, in fact, these two vocations overlay in several plots.

**Protected areas and natural water resources.** In addition to the urban planning constraint linked to the coastline, and to the well-known hydrogeological constraint of the Lama Valenzano, the analysis highlighted the great potential of the mouth of Lama San Marco, at the border of the Torre Quetta lido beach, as a resource for the sustainable development of a natural area that deserves to be enhanced (Figure 3).

**Visual axes.** Finally, the perceptive datum becomes relevant in the definition of the characteristics of an area whose layout will be profoundly modified by the shift of the main circulation axis on the current railway, which is now a dividing line. This will make it possible to re-establish visual connections between the area's main nodes. Among these, in particular, the Military Memorial, the Apulia Region headquarters, and Lama Valenzano itself could represent poles and linear nodes on which to re-establish visual, as well as physical, connections between the hinterland, the coastline and the sea.

## Understanding and Design

The analysis is essential for understanding the characteristics and vocation of the area, with the aim of providing a new vision for the linkage between urban and rural, agriculture and sea, built and natural environment. Within this framework design aims to provide ideas to promote

a consistent urban sustainability for the area by envisioning continuity between the countryside, the sea and the urban form.

In particular the landscape design can propose a completely new vision for this area by overturning the point of view for its recovery and starting from the reinterpretation of the forms of the countryside, of the natural landscape and of the seaside.

In this renewed organic approach between sea, urban and agrarian territory, design actions are aimed at defining a complex landscape, where green infrastructures and urban agriculture can become the new hubs for the urban life. To this aim design proposals were based on the following actions:

To protect. Among the actions preparatory to the act of cultivation is the need to protect the area from physical and atmospheric components that could undermine and disadvantage agriculture. One of these is the relationship with the sea, which must always be mediated to protect vegetation from the salt component. The landscape design forms that refer to this action, therefore, derive from the need to protect areas with agricultural vocation with green areas (woods, orchards) that protect them from the saline action of the sea and that punctuate, following the morphology of the existing urban fabric, the structure of a linear park that lives on activities linked to the coast (Figure 4).

To attribute. Urban design arises from relationships between parts. In the case of the design of this stretch of coastline, the parts to be called in the relationship are the residential urban fabrics, the systems of big public buildings, the urban countryside, the naturalistic areas and the coastal and leisure system. Another possible design action lies, therefore, in the identification of a landscape sign that acts as an ecological corridor capable of separating areas with an urban vocation from those with an agrarian vocation; this sign is also capable to connect different resources by attributing some areas along the coastline to the countryside, and therefore by protecting them, and, at the same time, by connecting residential and public areas with those for leisure on the coastline.

To cultivate. The practice of urban and peri-urban agriculture can become an important activity in the policies of contemporary metropolitan cities. It must be associated with a form made up of places and spaces that cannot be entrusted to spontaneous and informal actions but must be part of the practice of urban design. To this end, one possible design action is to define projects in which agriculture, and the economy linked to it, become the main guidelines of landscape architecture, made up of forms and materials linked to the production and exchange of products, thus defining new vocations for these urban areas.

To activate the coastline. The coastline is often understood as a boundary between land and sea. Instead, it can also be seen as an attractor of resources flowing from the hinterland to the sea. Last but not least, freshwater, by exploiting the natural course of the soil, can be collected through waterways and give life to productive landscapes within the saline ecosystem of the sea. In this way, many of the agricultural activities that are normally relegated to the hinterland, or recreational activities that are carried out on the coast, can be redirected to the sea (Figure 5).

To cross. The action of crossing is the first act of anthropic transformation of places: the repeated act of crossing a space, even of nature, guides its use and defines the polarity of departure and arrival. To cross is to experience, observe, enjoy, and stop. This action, which includes or is linked to many other actions, can become the supporting sign of a project of use, reuse and reconnection of places with different vocations; it can be the element that defines the forms of the coastline and its hinterland; it can hold the different functions that the project of a large peri-urban park requires; and it can also become a favorite place for the observation of the



complex and rich metropolitan urban landscape.

To formalize. In the Mediterranean agricultural landscape, the practice of cultivation has often been linked to the act of transforming agriculture in architecture. It is no coincidence that in the Apulian dialects the term garden indicates the orchard. Therefore, a possible action at the basis of the redesign of the area may be that of the formalization of the agricultural and coastal landscape with the design of a sequence of patterns (productive gardens or public green spaces) and playful-recreational areas, scattered along the coastline and in the sea, which recall the design of the historic gardens that follow one another along the seafront, and are provided with services and activities needed to keep the park in use.

To frame. One of the principles underlying the project of the Mediterranean garden lies in the definition of perspective axes that frame the main views, and that have as perspective poles elements specifically designed inside the garden or borrowed from the surrounding landscape. Therefore, another possible design action is to face the design of the area transversely, framing the main perspectives from the main attractors of the area with linear projects, parks and production areas, that articulate and give order to the area of the Costa Sud.

To re-naturalize. One of the most important contributions that landscape architecture can make to the urban project is based on an ecological approach, in which the city is understood as a complex ecosystem of which the landscape architect emphasizes the naturalistic component. Therefore, one last, of the many possible, actions, stands on the idea to bring back a higher level of wilderness, by intercepting the ongoing processes of re-naturalization of the area along the mouth of the Canale Valenzano, amplifying it or reverberating it on the whole coastline, favoring the process of reforming the coastal dunes, of which now remain only archaeological traces, which will become the new protection system of the agricultural hinterland (Figure 6).

## Conclusion

The urban regeneration of these areas of the city of Bari, has been aimed at demonstrating the possibility of re-proposing high degree self-sustainable 'urban systems' functioning thanks to wise techniques of local resources control, and appropriate, in their architectural forms, to the local territorial characteristics.

Based on the topic of the formalization of the agricultural and coastal landscape, as a main reconnecting principle, projects have been aimed at transforming these peri-urban areas and boundaries into multifunctional public spaces, where the agricultural landscape is re-knitted to the sea and to peripheral urban forms, and where the new vision for the metropolitan area is strongly linked to the identity of the surrounding territory.

In the medium and small towns of the Mediterranean regions, which have been historically conformed by a strong continuity between city and countryside, this topic has been one of the cornerstones of their urban development (Neglia, 2018).

In places where to mean orchard is still used the term garden, bringing a strong aesthetic and expressive value to similar agrarian and architectural forms, from the very beginning of urban history, agriculture has been transformed into one lasting resource for the quality of the urban life that gives economic and cultural value to places.

In the projects of urban parks designed for the segment Bari Costa Sud, set where the urban sprawl reaches the countryside, and where the countryside reaches the seaside, the same sustainable principles and techniques have been used to achieve urban gardens and public spaces that are deeply connected to the physical structure of the surrounding territory. Here parks and gardens have been envisioned as places of artificialization of the nature into

architecture and areas of linkages between similar and congruent spatial arrangements through the use of clear actions.

The projects for this area are aimed at defining also landscape form that are appropriate to the climatic, constructive and settlements layout of the Mediterranean cities. They have been also designed as multifunctional open spaces with the typical characteristics of the Mediterranean gardens. In other words, as new links of relationship between the urban and territorial, which bring back, in a coherent way, the form of the Apulian countryside into the urban context.

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### Illustrations and tables

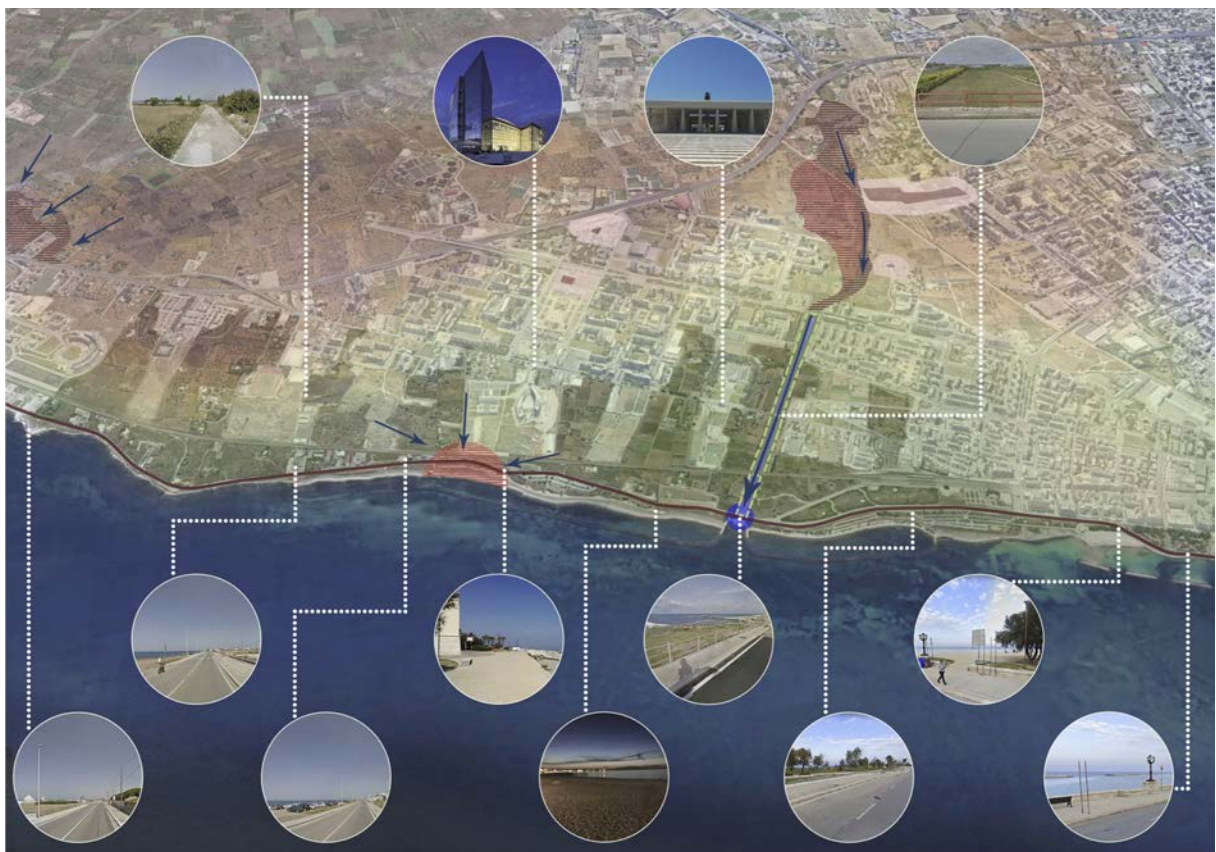


**Figure 1.** Agriculture in use. Source Landscape Design Studio 2020-2021.





**Figure 2.** Agriculture neglected. Source Landscape Design Studio 2020-2021.



**Figure 3.** Protected areas and natural water resources. Source Landscape Design Studio 2020-2021.



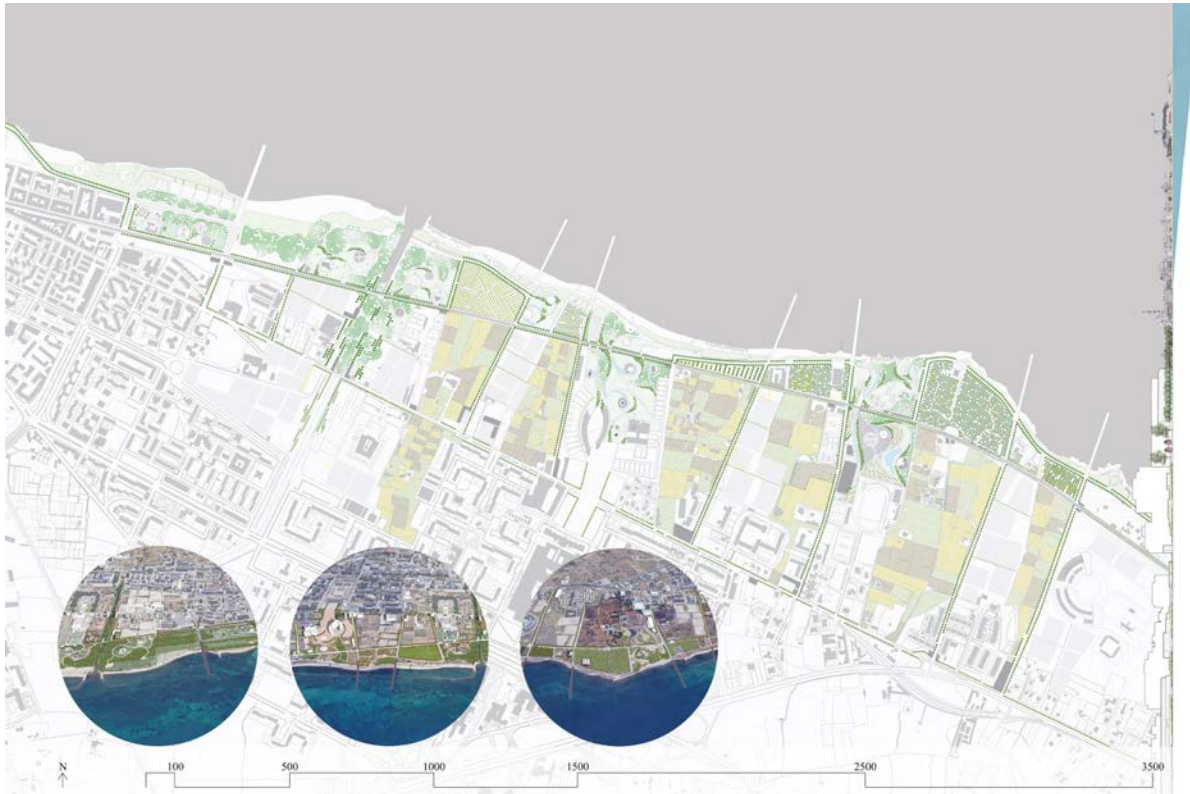


Figure 4. To protect. Source Landscape Design Studio 2020-2021.



Figure 5. To activate the coastline. Source Landscape Design Studio 2020-2021.



**Figure 6.** To re-naturalize. Source Landscape Design Studio 2020-2021.





## Urban Form Balance in Landscape's Folds

Rita Occhiuto

LabVTP (Ville-Territoire-Paysage), Unité Recherche Architecture - URA

Faculté d'Architecture, Université de Liège - ULiège, Bld de la Constitution 41, 4020, Liège, Belgium

E-mail: r.occhiuto@uliege.be

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**Abstract.** *If soil is architecture (TVK 2021) and territory is a palimpsest (A. Corboz 2001) city is an artefact whose sustainability depends on the intense dialogue with its land. Urban form witnesses interrelationships between soil, water and air which condition and orientate mutations over time.*

*This contribution highlights soil, water and building systems that have been the basis of historical morphological readings, able to reconstitute a living character to urban fabrics. Soil-built units allow us to study the city as a porous and hybrid adaptive system.*

*Fabrics, often considered frozen, are however testimonies of human capacity to adapt to natural systems. Structures of cities are parchments from which to learn how to live with soil's original conditions. As narratives, these are now tools for relearning sustainability. Landscapes' obliquity, continuities and openness can be ways to think and transform sites: in re-establishing deep relationships with land, caring for the soil, going through it and living in all its movements, folds and reverses. This understanding of natural environments is a thick condition still readable in urban forms. Re-learning them brings architecture closer to its substrate to make it a unique organism where ground and built can live in dialogue.*

*This pursues reflections on obliquity (C. Parent, M. Corajoud, P. Virilio), and the ability of architecture inscribing itself in the ground, into its folds and becoming continuous space, porous, not delimiting lands. Re-engage spatial relationships on obliquity and porosity of structures can still give cities a sustainable cohesion.*

*This contribution questions readings/designing experiments on adaptive fabrics more attentive to their geomorphological reasons.*

## Introduction

The insistent call for the sustainability of cities is an opportunity to remind that attention to the Earth's resource has always been at the heart of morphological readings, as they record and interpret the processes of mutation of the fabrics and different materials of the territories.

Forgetting that morphology is interested in the project as a operation mode that guides the transformations of places risks reducing an act of knowledge production to the reproduction of fixed forms.

Despite the references to the city-organism and the continuous mutations of the meshes and forms of territorialisation, and despite the expert practices of architects who know how to read and interpret the relationships between architecture, geography and earth sciences, urban morphology risks becoming a mere formal exercise. Indeed, the state of living and mutating territories over time is often reduced to the image of a granite bas-relief, sculpted by human action.

In this way, the knowledge to read the life of cities can become a dead language.

What about the operative character of the historical reading and the soil project?

How can the city and the landscape participate in future balances?

The strengthening of environmental observation methods offers promising perspectives today. These relate to the awareness that knowledge is produced from physical and mental involvement in space, allowing us to approach the landscape materials, both natural and anthropic, and also to re-trace their transformations both in extent and in time.

This type of reading is similar to certain landscape practices, such as the surveying of Anne Wiston Spirn, who, by describing the city as a granite garden, presents urban density as a landscape in movement. The American downtowns she travels through are organisms punctuated by the seasons with which we learn to interact. This practice of space promotes a new way of looking at the mutations of materials and their life cycles. The ability to make sense of the geographies of places and the conditions of life that exist there thus meets the objectives of sustainability to be ensured for all contexts modified by humans.

We think that the knowledge of geomorphological conditions is generators of an informed architectural gaze, supported by an embodied, tactile observation, attentive to the characteristics of the earth and its potential for transformation and recycling.

This posture reinforces the interest in the territory of architecture (V. Gregotti) and its configurations which like palimpsests (A. Corboz 2001) to be reread, allow for a better understanding of the landscape reasons (A. Berque) of the *déjà-là* which, from traces and incisions, communicates what has happened (M. Corajoud).

These readings of the environment are already proof of the existing relationships between different fields of study of the territory.

The interrelations between these concepts invite us to blur the disciplinary limits, in order to consider the environments as a common language, evoking the coexistence of natural and human forces at every surge, fold or subsidence of the soil (CEP 2000).

These actions are presented as agents (G.Vogt) between which it is possible to reopen dialogue, or even to promote coaction. The question that arises today is to understand whether the art of building can be understood as a human action based on the capacity to take care of the soil in order to relearn how to garden the world, without imposing itself on the earth or resisting it. What can architecture do if it takes on the meaning of a responsible writing of the earth and of a new lived soil?

The balance could be sought again in the folds of the ground welcoming insertions and interweavings between hybrid ensembles composed of built and natural artefacts.

## Methodology

The methodology adopted starts from the questioning of the classical modes of analysis of project sites. The ways adopted to enter into the problematic of the environments are of two types: in situ, through direct observation of the features that make up the study areas, and ex-situ, through the reading of texts and maps that document the territories. Both practices stem from the will to know and establish an active relationship with the environments.

Walking and perceptive ground's experiences are fundamental tools of knowledge. In addition to this, reading texts and decoding various representations, as witnesses of different times and characters, bearers of the qualities of the sites. Even if surveying practices call for subjectivity, they are effective tools for revealing the thickness of sites and the nuances of existing atmospheres. These character enhancers make it possible to read apparently neutral surfaces as lived spaces, full of history and other aspects that are impossible to measure.

This type of approach allows for a better understanding of hybrid environments such as peri-urban landscapes or the territories of the generic city.

## Measurement and analysis

We want to stress the importance of restoring the body to cities and territories whose organic nature has been forgotten. The planning practices of the 20th century forged the image of flattened territories, represented by over-coded maps, where the superimposition of signs blurs the real forms of the landscapes.

This invisibility especially affects the reading of cities, often represented as flat surfaces. Environments have left the space to infrastructures which have profoundly transformed the geography. As natural features have faded, an urbanity that is more and more above ground has emerged. Speed has completed the project of distancing the built environment from its anchorage site. The reversal of this process in order to prepare sustainable conditions inevitably requires the regaining of the thickness of the ground.

The contour lines of the site can make the relief visible again. The latter thus acquires the meaning of a recovered body, capable of guiding all successive explorations.

Moreover, the drawing followed by the hand allows the mind to register and even feel the variations of the spatial configurations. Then these characters can be incorporated and experienced through walking in situ. The relationships between our perceptions and places allow us to understand the correlations between the movement of the ground and the types of human layout on the one hand and the reasons for landscape forms, their limits and potentials on the other.

The renewed interest in the soil, its nature and its movements is today an essential step in rebuilding sustainable relationships between humans and environment.

The territory of Liege (BE), our case study, shows that the influence of the soil has faded over time. The project of modernity has subjected the fabrics to a rapid smoothing process. From the asperities of the original natural environments, today's maps hardly show any indications, thus producing a profound change in the users' perceptions.

The site, characterised by water, takes a back seat.

Its marked topography is revealed only at points, through remarkable artefacts, such as the Steps of Bueren. On the other hand, outside the city the ground is punctuated by powerful landmarks, such as the Belles Fleurs and the slag heaps<sup>1</sup>: the visible part of an invisible

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<sup>1</sup>Belle Fleur is the visible element of vertical structures connecting underground mine galleries. Slag heap is an artificial hill constituted by the dross of mine.

underground world, constituting a disappearing post-industrial landscape. On these buried strata also depends the ability to take root, making the writings of the past a potential for the balances of the future.

Taking care of this substratum means reconstructing the links with the territory to the point of feeling part of a composite environment where human action, once exploitative, could be transformed into a project of re-landscaping. This involves reacquiring the ability to interact with the land.

As Michel Corajoud explains, architecture distinguishes the verticality that delimits, while the landscape recognises the continuity and porosity of vast sloping lands.

While architecture's verticality opposes resistance and provokes spatial divisions, the landscape offers expanses of multiple horizons in a continuous sequence, allowing the eye to pass through and welcoming the distance. Unlike architecture, which seeks stability, landscape must take into consideration the "horizontal or oblique contingencies of a ground that remains unstable"<sup>2</sup>. While architecture needs a ground that supports the elevation of the building, the landscape must adapt to the movements and changes of the land during its life cycle.

Thus stability is increased by increasing the grip. A contact that can be achieved by lying down "with arms and legs spread out to increase the surface of contact and not to sink down... To make surface is a notion that founds the landscape thought"<sup>3</sup>.

Unlike architecture, which proceeds by accumulation, according to a process of anthroposage (A. Corboz), landscape offers other guiding principles: the fold, the acted ground, the links between scales and obliquity.

These plastic dimensions could transform the urban project into a new form of dialogue between water, soil and air, allowing the built environment to evolve towards architecture inscribed in the folds of the soil.

Urban form could reacquire the value of a language that follows, interprets or contradicts the conditions of the soil. And landscapes could be re-envisioned as new forms of writing that open up incisions where earth and sky mix and oxygenate. The water, the vegetation and the rocks are in motion again to offer varied configurations, whose folds and breaths the human being will reoccupy to welcome new actions and nourish perceptions and imaginations.

The deep relationship to be re-established between the ground and the human being is also a postulate of the work of Swiss landscape architect Gunther Vögt. His approach involves physical engagement with the spaces. The condition of being inside reinforces the awareness of the role of geomorphic agent that humans must learn to manage. Walking in places sharpens these perceptions and encourages situated reflection.

Together these actions reinforce responsible action as actors and makers of places: "Walking, thinking and making landscape..."<sup>4</sup>.

Understanding landscape materials and their plasticity, which influences the sphere of emotions, was already the objective of the manipulation of land, water and plant masses proposed by Humphry Repton in the 17th century. This same plastic reinterpretation guided the landscape composition of numerous urban parks in the 19th century. In these places of new nature in the city, the landscaping is based on manipulations, folds and continuities of the land.

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<sup>2</sup>Corajoud, M. (2004) 'Hors champs', in *Faces* n°55, (Institut d'Architecture Université de Genève) 14-17

<sup>3</sup>Ibid.

<sup>4</sup>Foxley, A. (2010) 'Distance & Engagement. Walking, Thinking and Making Landscape. Vögt Landscape Architects' Lars Müller Publishers



One of the contemporary designs that makes explicit this capacity to reconstruct a form of dialogue between architecture and ground is the Botanical Garden of Barcelona (architects Carlos Ferrater and Josep Lluís Canosa, landscape designer Bet Figueras, horticulturist Artur Bossy). Although the project's programme includes a reflection on the context, in this case the design team operates on the territory of a former landfill as a plastic material to be reworked. This *modus operandi* has already been used in the 17th century for the Derby Arboretum by J.C. Loudon's and in the most famous urban park of the Buttes Chaumont in Paris, created by Alphand's team in the 19th century.

In the contemporary design of the Botanical Garden of Barcelona (Figure 1), the plastic manipulation of the land reaches an exemplary level of writing. In fact, the land is covered by a triangular grid with a double role: a system for surveying the site and tracing the paths. Triangulation becomes both a way of measuring by appropriating variations in the ground and a new geographical and structural writing of the site.

Indeed, the paths become the veins supporting the land and the landscape spaces. And in the folds, reverses and rebounds of the folded shape of the hill, the buildings, the covers and the belvederes of the Botanical Garden slip in. The same constructive intelligence underpins the compositional principles of the drainage, irrigation and circulation systems, as well as the landscaped areas.

This is a strong example of the potential of the site reading that provides the guidelines for the design. Moreover, the morphological and topographical conditions of the existing site offer the suggestiveness and sensitivity to re-launch a new life cycle. From this project we retain the possibility of thinking architecture through other modes of being founded in the ground.

Instead of being erected, it can be inserted, slid in, until it melts and merges with the context: a way to form a unique whole.

To immerse oneself, to intermingle, to rise up to fall back down and nourish a continuous dialogue with the earth, water and air, as the gardener or the farmer does by aerating the soil: to spread out the surfaces so that the earth and the sky touch each other (M. Corajoud) and intermingle more deeply.

This posture of the soil project brings us closer to another way of considering the earth: not working it to exploit it, but gardening it to take care of each grain, each fold or concretion in order to multiply its effects or deepen the intensity of its relationships.

In this same logic, architecture, more attentive to the possibilities of deployment of the earth as well as to its states of saturation and seasonal equilibrium, could develop modes of insertion more adequate to the conditions of the existing contexts: Designing with Nature (J. McHarg) and not imposing a foreign, deaf and dominant body on it. Is it possible to subject architecture to the site?

We present experiments carried out with students based on sites to which we have given the role of compositional matrices. The common condition between these hypotheses is to inscribe architecture in situ, as a space that infiltrates the lines of the existing soils, waters and environments.

Within the framework of the renovation study of a part of the urban fabric of the city of Herstal, located along the Albert Canal, north of Liège (BE), Aurélie Peeters project is presented as a writing that completes and corrects both the railway infrastructure, the station and the embankment that closes off the drawing of an urban fabric, characterised by a regular grid of long and thin plots.

This working-class district, where industries were formerly intermingled with the housing fabric, was presented as a perforated territory. The industrial abandonment and the dilapidation of

the buildings offered a landscape in suffering from the main street. The infrastructures of the railway and the Albert Canal still impose themselves today as strong cuts which, however, still hold the possibility of requalifying the territory they delimit. The awareness of the potential of the large spaces adjacent to the railway and the opportunity offered by the station renovation project became the starting point for the reading of the district. The striated plot of land of the inhabited plain became the guiding principle of the intervention. The design of this layout underlines its role as the city's first mode of settlement, perpendicular to the main road linking Liege to Maastricht, supporting all the successive phases of transformation of the fabrics. It is clear that the rail and waterways imposed themselves on the site by overhanging it and causing the impoverishment of the marginal land. Today the dilapidated states of these backs of the urban setting become valuable reserves and the slopes can be interpreted as potential for new projects, instead of barriers.

(Figure 2)

This reversal of value has led to the railway embankment being considered as the origin of a reconfiguration project that re-inscribes the railway into the urban fabric. This line, presenting the hidden face of the built system, becomes an urban front. The embankment thus offers new spaces to which to confer the status of public spaces and a park system. The node of the station, redesigned underground and along the land that touches the back of the blocks, allows the urban mesh to be infiltrated. The project concerns: a facility exploiting the obliquity of the slope; a system of urban spaces running along the slopes and weaving in and out of the built-up area; new types of housing.

This project has made it possible to experiment with an inverted principle in which architecture occupies only the residual spaces, making maximum use of the possibilities of infiltration, rooting and adherence to the ground, which it revitalizes like a rhizome. The experimentation thus makes it possible to launch a challenge that places the interest of remembrance of the land at the centre of the project by putting property or urbanisation rules in the background.

Making bodies and surfaces, by exploiting existing continuities, can become a fertile principle for reconfiguring the landscapes of urban fabrics, which have been ransacked by a functional development that cuts up the land until it is exhausted. In this case, re-parcelling is a necessary condition for the components of the landscape to re-emerge, to be visible and recognised as useful principles for a new sustainable start.

Another experiment concerns a slope site in the St. Laurent district of Liege. This site is bounded by one of the ridge roads leading into the city and by the railway and the station, located at the foot of the hill

The restructuring is based on the design of the folds of the land to reconfigure the landscape of the hillside. (Figure 3) This landscape weaving action is followed by the search for opportunities offered by the earthwork system. The architecture infiltrates this structural design. On the one hand, it reinforces the land and on the other hand, it creates spaces for public gardens and the foundations for the implementation of new housing systems: housing in lines of one level and punctuation by small transparent towers.

The design also starts from the hypothesis of exploiting the obliquity: reconstructing a structure in lines and terraces that redraw the landscape of the slope, making the architecture a component that complements without dominating.

The main purpose is to reconstitute the denied landscape. To give it back the dignity of the slope of a landscape in environmental balance, in which the architectural structures enter into a game of interrelations between the built contribution and the qualities of the existing natural materials.

In Visé, a city in the north of Liège, we studied industrial zones, occupying land on the water's edge wedged between the motorway and the Meuse.

Without continuity with the city, this land is one of the few opportunities to respond to flood risks today. Starting from the hypothesis of recovering the lines of force of the original landscape, the projects focused on the possibilities of giving space back to the water on the one hand and rebuilding the links between the city and the Meuse on the other.

These assumptions reverse the policy of channelling water, which separates and leaves large areas of land unused. These areas were flooded or occupied by mooring quays and gateways to the city. These former functions allowed the city to expand by occupying the entire slope and the fabrics followed the slopes to the Meuse.

Since the infrastructure has occupied the river margins, the gates and accesses to the city have disappeared, and the only mooring places are the industrial platforms. The former wilderness islands have been erased and the exchange between the city and the river has disappeared. The Quai des Fermettes is one of the sites at the bottom of the slope that has been the subject of several projects.

Amélie Lessire has developed the hypothesis of re-naturalizing the land by using two strong elements: on the one hand, wood as a solution to reinforce a plant heritage eradicated by the infrastructures, but naturally re-planted on the motorway embankments, and on the other hand, the canalization lines of the Meuse.(Figure 4)

The composition is based on a system of architecture and nature which, on the one hand, confers on the wood the role of a welding space with the city and which, on the other hand, restores to a mesh of fine water blades the possibility of playing the role either of infiltration channels for the overflows of the Meuse, or of water basins for the new swimming pool to be built.

This project stands out for its ability to thwart the functional fixity of the elements of spatial composition. And it presents solutions where water and wood are both architecture and nature.

Another project on the principle of returning the space of fluctuation to the Meuse is proposed by Charlotte Delobbe who redesigns a landscape of fluctuating lines hosting different spaces: free walks, water gardens, green islands and land for a park that connects the Meuse riverfront to the land of the new station district.

In addition, this system of lines joins the new station to encompass it in a landscape of promenades spanning the infrastructure to partially recreate the slope landscape linking the city to the water. (Figure 5)

The two solutions propose as a starting point a strong reconfiguration of the landscapes based on the characteristics of the forgotten environments: the obliquity of an inhabited slope, the continuity of land and water, the river as an access to the city.

All the spatial solutions are based on the study of the landscape conditions of the original sites and on the identification of the determining factors for their conditions of equilibrium. The landscape is at the centre of the project. The configurations of the land orient the project hypotheses. The compositional choices lead to architectural insertions constituting landscape writing in accordance with the natural lines of force. From this revision of the roles of the built environment, the development solutions can certainly lead to more sustainable and adaptive transformations.

This mode of action, if carried out at all scales, can offer very effective links for choices ranging from the scale of the implantation to that of the detail of the building, in interrelation with the movements of the land, the reception of water and the variations in plant cover to be foreseen

not as formal finishes, but as true invariants of the living system that the artefact of architecture and nature can offer.

## Conclusions

The sustainability of cities and landscapes could arise from a greater awareness of the need for architecture to surface, almost to become itself an island, a slope, a plain, a wall or a staircase. Therefore, in contrast to vertical cities with green facades and roofs-gardens, sustainable architecture must merge with the forms of the ground, taking advantage of its movements and materials by adapting the formal language to the need to compose with nature, without simulating or opposing it.

In this way, architecture could surface by proposing as many modes of landscaping as there are observable places in the territories that host human actions.

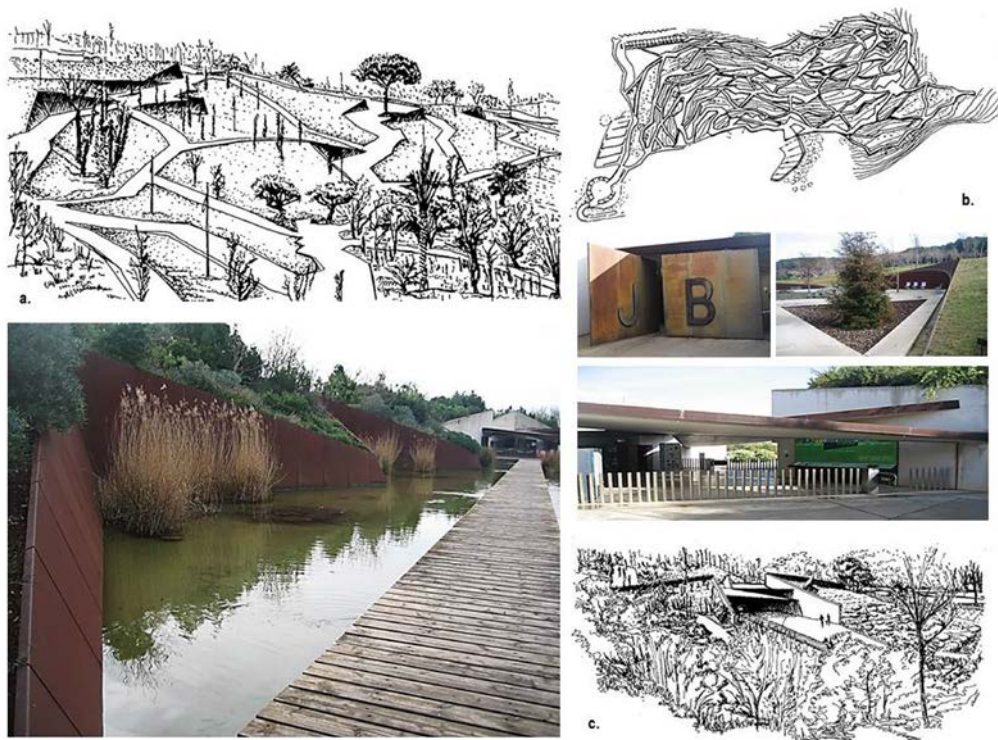
The balance of future cities can be entrusted to architectural compositions with structures that are sensitive to the natural forces in action. The folds, springs, cantilevers, overlaps, anchors and interweavings will no longer be simple formal gestures, but architectural writings emanating from the generating lines of the geomorphologies and materials characterising the sites of implantation. Like geo-architectures, these compositions, put to the test by natural agents, will allow the forms to be declined not in order to be erected vertically and to stand out, but as components of adaptive environments allowing humans to form a body and a co-acting system. (Fig6)

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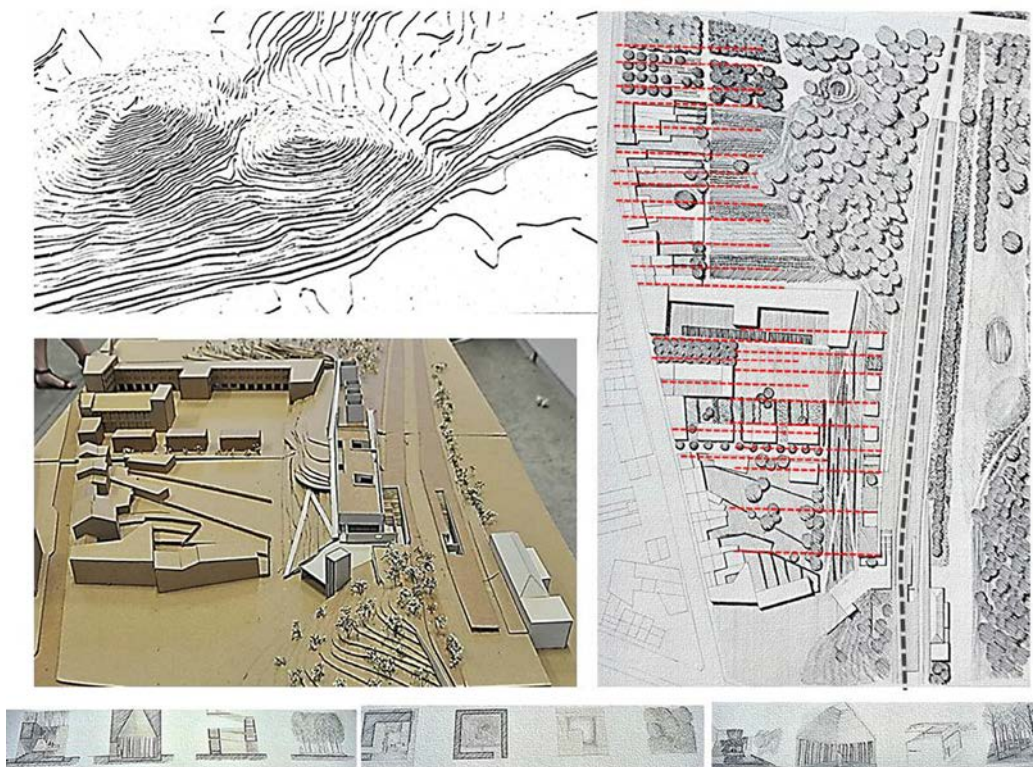
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## Illustrations and tables

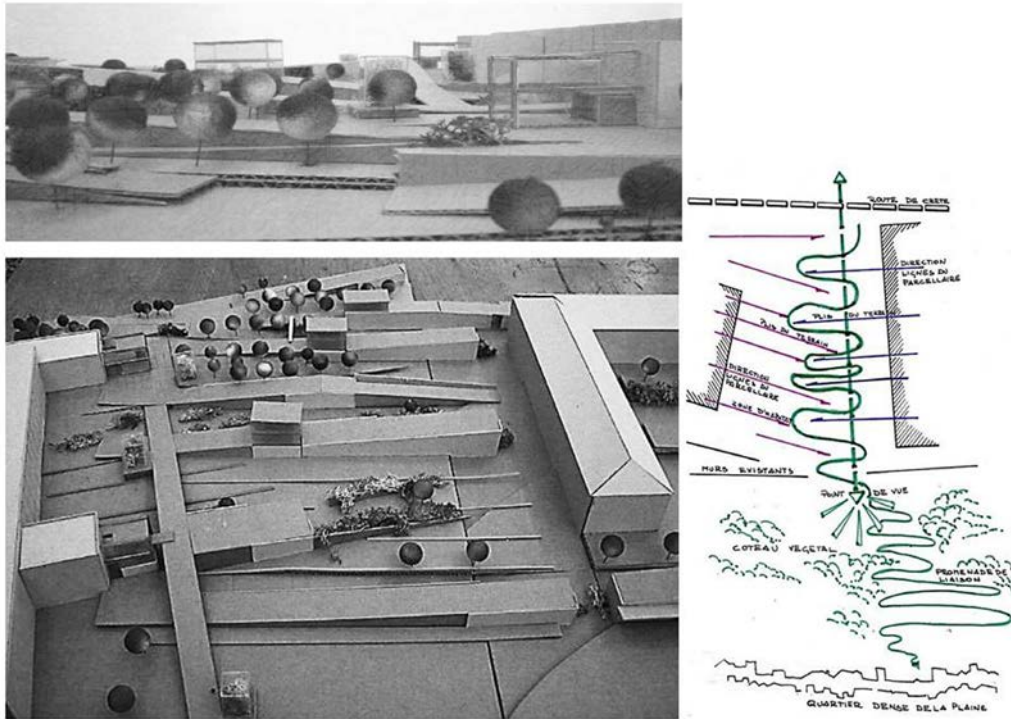


**Figure 1.** Botanical Garden of Barcelona - a.b. structure/mesh of the paths, c. equipment inserted in the folds of the ground.

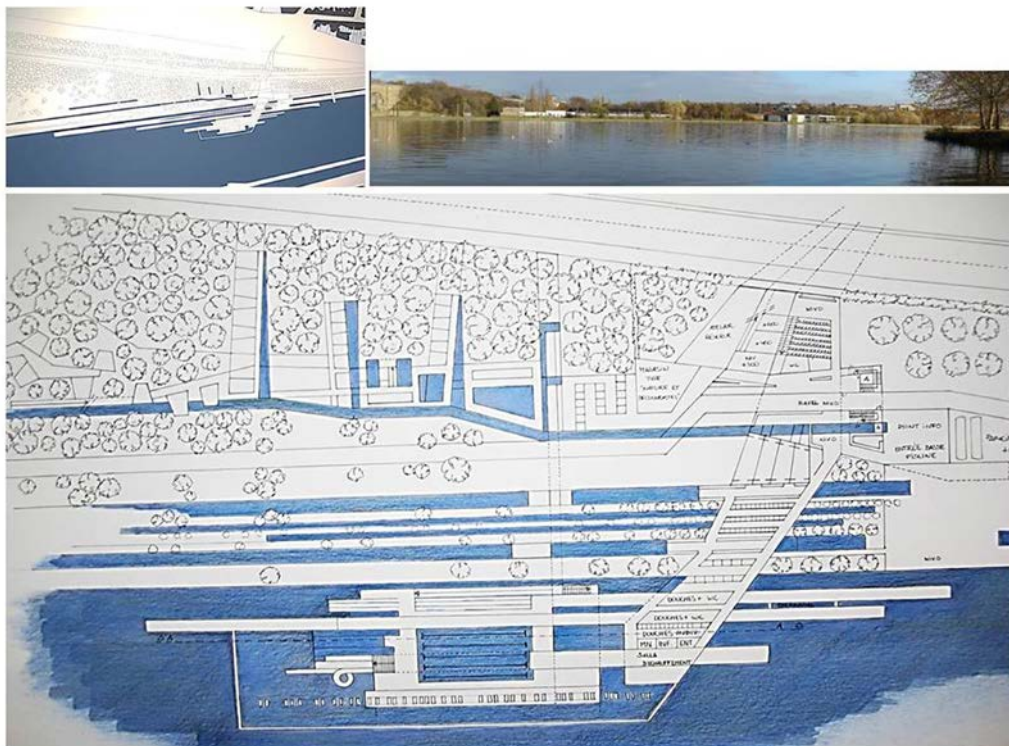


**Figure 2.** Herstal (Liège BE) Aurélie Peeters (2017-18) Master Course in Architecture ULiège- Prof. Rita Occhiuto. Plot of Land & Pailway embankment as guide lines for the project.





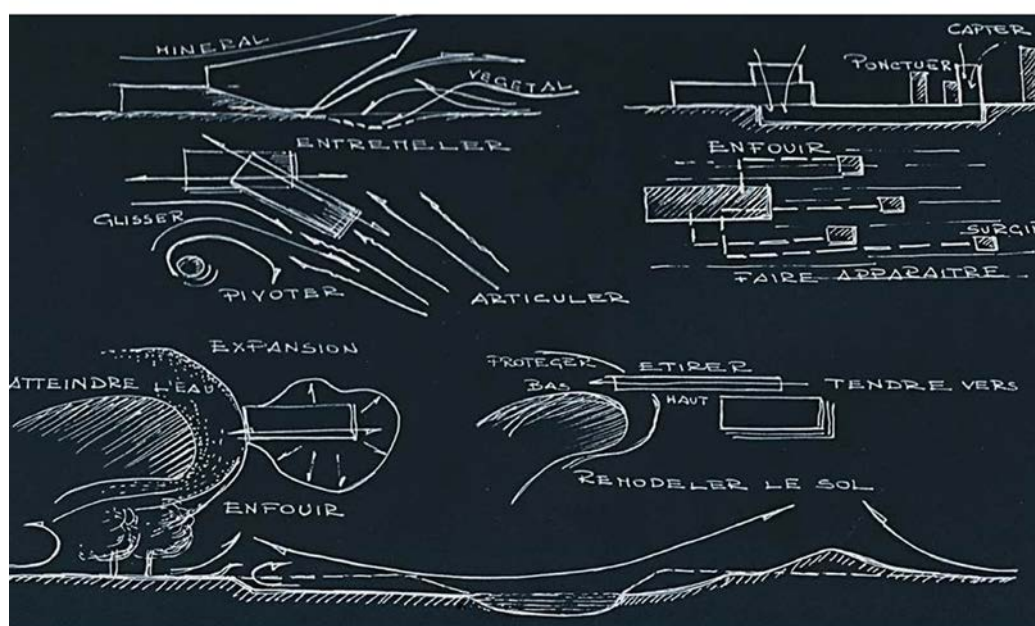
**Figure 3.** Liège (BE) On the slope of St.Laurent, Marie Martinus (2004) Master Course in Architecture ULiège - Prof.Rita Occhiuto.



**Figure 4.** Visé (BE) On the river Meuse, Amélie Lessire (2005-06) Master Course in Architecture ULiège-Prof.Rita Occhiuto.



**Figure 5.** Visé (BE) 'Time & Fluctuations of Water Architectures', Charlotte Delobbe (2020-21) Master Course in Architecture ULiège- Prof.Rita Occhiuto.



**Figure 6.** Actions causing interaction between land, water and architecture.



## New centralities in the widespread city

Camillo Orfeo

DiARC\_Department of Architecture, University of Naples, Federico II

E-mail: camillo.orfeo@unina.it

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**Abstract.** *In the last decades we have witnessed the limitless expansion of our cities and our suburbs, an undifferentiated diffusion with few rules and hardly ascribable to its known forms of the traditional city. This city, difficult to classify through the consolidated studies of urban analysis, generally gravitates around the historic nucleus that preserve the large public and collective spaces. This process generates an inequality not only in the urban quality but also in the quantity and quality of the services offered, which can be overcome with an alternative model to the monocentric city. One possibility can be traced in some advanced hypotheses starting from the twenties of the last century, through the construction of a polycentric city surrounded by nature. Hilberseimer's studies, and even earlier those of Möhring, Piel and Rogg, for the Gross-Berlin of 1910, indicated a direction for intervening to solve the growth problem, a city in which to coexist nature and urban construction. The process in an Italian territory, full of historical stratification and a complex geography, parallel to the individuality of the new models, alternatives to undifferentiated construction and the ability to recreate new centralities. An example was the result of the work carried out with the students in which projects were developed in the Buffer zone of Villa Adriana, already the subject of a competition to experiment with new settlement models and new centralities in which natural composition, architecture and urban history.*



In recent decades, we have witnessed the seemingly unlimited expansion of our suburbs, a phenomenon which has resulted in an undifferentiated and irregular urban growth that has generated forms that are difficult to ascribe to the morphological repertoire of the traditional city. Difficult to classify through consolidated urban analysis studies, therefore, these recent conurbations end up gravitating, without having any internal autonomy in terms of public and collective spaces, around the historic centers which, however, still preserve places of this type. The consequence of this phenomenon thus becomes an inequality relating not only to the mere urban quality but also to the quantity and quality of the services offered by the center and the suburbs which only an alternative model to the monocentric city can overcome.

Some hypotheses which, during the first decades of the last century, were tested in this sense are the studies of Hilberseimer, Le Corbusier and, even earlier, those of Möhring, Piel and Rogg, for the Groß-Berlin of 1910. In them, the direction to solve the problem of an exponential urban development was indicated, that of pursuing a model of a polycentric city, surrounded by greenery, in which nature and artifice coexist in a synergistic way. Instead of a city that seemed to be able to grow only according to a frayed expansion, unable to produce a landscape that kept empty space and built space in balance, these masters of the Modern Movement proposed radial schemes in which the insertion of elements capable of mending the center and suburbs, such as the green wedges of Groß-Berlin, represented an alternative model to a city that seemed to grow only in concentric circles devoid of any form of interaction between them.

If according to a first, superficial analysis certain projects may appear “dated”, a more careful and aware look, on the other hand, makes us understand that the modality of relationship between natural and built space that they propose can still be a valid solution today. In a territory like the Italian one where history and geography have always been inextricably intertwined, an operation of this type can help us rethink new alternative centralities to the undifferentiated expansion to which our cities seem condemned. But the adoption of a model of this type would not be limited to the mere resolution of today’s urban disorder; its main effectiveness, on the other hand, would lie in the enhancement of a specific character of the Italian territory, i.e. that *varietas* which defines the identity of the landscapes of our country.

In fact, a consolidated trait of the morphology of our cities is the proposition of settlement forms and models that conform to the soil by building an indissoluble bond with it according to an ancient and necessary wisdom that seems lost by contemporary expansions. The rapidity and intensity of the transformations that have taken place in recent decades has produced an indiscriminate occupation of the land which has led to the breaking of this bond. Cities have thus been transformed through expansions that have opposed nature and built, facilitated, in this sense, by technical advances that have allowed previously unthinkable modifications to the morphology of the soil. In fact, modeling it at will has made us lose comparison with the forms of nature, leading to a trivialization of the construction of places to which we have ceased to listen. The role of architecture, which has always been to interpret the reality of a territory making it intelligible, as in the city of history, thus ends up being denied. «The study of historical experience shows us how cities have never been built by turning their backs on nature, but in open dialogue with it. Lake, hill, peninsula, valley, plain, river and bay are archetypal elements of geography that often also become primordial elements of the city. If there is something permanent in the city, which transcends any vicissitude or transformation, it is the presence of places which, despite being fully urban, show a strong link with geography, despite



the fact that this link can go through phases of oblivion»<sup>1</sup>.

Natural places therefore have their own identity that human artifacts must help to strengthen. The project can only understand and enhance it rather than despise and ignore it, so that the relationship between nature and built is synergistic rather than conflicting. This attitude, consolidated through a practice historically adopted in the construction of the urban form, should not however be confused with the more recent experiments of morphological mimesis. «The value attributed to the forms of nature emerges from the order that governs the composition. This is the teaching of Greek architecture: to arrange the buildings according to exact geometries which interpret the formal characteristics of the natural orography. In this architecture, however, there is no built form that mimics the natural form. The forms of architecture, remaining distinct from the forms of nature, establish relations of “resonance” with them»<sup>2</sup>.

Indifference to nature does not manifest itself, as recent “fashions” suggest, through the adoption of a formal repertoire clearly distinct from organic forms, but through the mechanical cancellation of the morphology of the soil, through the generation of artificial and flat substrates which give place to spaces devoid of identity. This process is clearly found in the current trend towards the construction of a “generic city”, a mere extension of the city of history, capable of incorporating nature without enhancing it, ignoring its potential. Among these there is not only the ability to decongest the built environment or to generally improve the quality of the urban environment, but also the vocation to become a collective and aggregation space as happened with the “squares” or large urban parks of the 19th century. The urban expansions produced in recent decades have instead been characterized by the “absence of cities”, precisely because they lack those public spaces essential for the constitution of a community. Historic centers continue to be attractive because they represent the public role, although the functions of leisure and commerce are, today, more and more often, concentrated in special peripheral structures which, however, are unlikely to be able to form the polarity necessary for the determination of a space that can be fully defined as “urban”.

However, we know, as already mentioned above, that a project can entrust not only to history, but also to geography the task of structuring the territory, of producing spaces in which it is not the artifice but nature that acts as a catalyst element to represent in the new city what the monuments represent in the city of history. The goal is to remove the suburbs from marginality by returning them to an unitary design in which nature is not only an interstitial element of the built environment but an element of the project, a project in which the shape of the ground and of the buildings takes equal value, constituting a repertoire of forms that, with equal dignity, can contribute to the construction of the landscape. This road, apparently fraught with difficulties, opens up enormous possibilities for the reorganization of the territory by trying to restore a purely urban role to the dilated, widespread and fringed spaces of the current suburbs.

### The landscape project

The uniqueness of Italian cities, a synthesis of formal and spatial values, lies in having been able to resist the speculative and disorderly aggressions of recent decades. The relationships of the historic cores with the geography of the places, the urban stratifications, the relationship with the primary elements and the complex spatial articulations of the landscape remain stable. The expansion of the urban suburbs, which have grown immeasurably compared to the size of

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<sup>1</sup>Carlo Marti Aris, *La cèntina e l'arco*, Christian Marinotti editors, Milan, 2007, p. 53.

<sup>2</sup>Carlo Moccia, *Architettura misura della terra*, unreleased, 2018.

the historic cores in such a short period, instead needs architectural interventions capable of a strong characterization. One of the possible ways to reverse the current trend is to retrace the lessons of the city's history, in search of that relationship with nature that seems to be lost in the contemporary city. The shape of the land, the exposure and the typology of the soils have always been decisive in influencing the location, shape and quality of the space built by man. Often the architectures have had the task of enhancing the natural characteristics present through a process of non-conflictual dialogue with the occupied place.

A renewed relationship with nature opens up new possibilities for the reorganization of the city and allows, in some way, to reinsert the parts already built within a wider general order, challenging the absence of cities with forms capable of opening up to dialogue with the nature. Many designers, in the twentieth century, tried to work with open spaces, with architectures that fit into the landscape by configuring themselves as notable points which, like the ancient buildings, are capable of establishing a comparison with the geography of the places. Natural spaces thus have the possibility of giving shape and structure to the territory and no longer being interstitial residues.

The didactic experimentation conducted with the students of the ARC 5UE degree course of the DiARC\_ Department of Architecture of the University of Naples "Federico II", was developed in the Buffer zone of Villa Adriana, already the subject of a competition organized by the Accademia Adrianea - Piranesi Prix de Rome in 2018, experimenting with settlement hypotheses capable of dealing with nature, architecture and archeology.

The competition envisaged a thinning out of the volumes, mostly occupied by craft and industrial sheds, built along the Via Maremmana at the foot of the ancient Villa with a predominantly tourist and accommodation destination made up of three, four and five star hotels, a congress centre, a interchange hub, a shopping center, a gateway to the park, a rustic villa and small interventions, including a museum and service structures within the archaeological area.

The area between Tivoli and Villa Adriana is full of urban history and inscribed in an extraordinary landscape, between limestone reliefs and a vast plain crossed by the Tevere which extends towards Rome and the Tyrrhenian Sea. The ridge, which forms the backdrop to this territory, is characterized by a continuous sequence of mountains on which a transversal hilly system made up of narrow and elongated hillocks is inserted. The Aniene river, which descends from the mountains behind Tivoli, is first collected in an artificial basin and then falls, impetuous, towards the valley after passing the city with a narrow bend to calmly cross the plain passing under the Lucano bridge, near the Sepolcro dei Plauzi, before flowing into the Tevere.

This stretch of countryside, characterized by a regular geometric order given by the shape of the narrow and elongated lots, orthogonal to the river, in recent years has been occupied by the expansions formed by parcelling up the pre-existing agricultural structure. The whole territory between Tivoli, the plain, Villa Adriana and the ancient villas on the hills, seems to belong to a great territorial design, made up of a few guidelines, capable of giving order to the entire territory. The most evident plot can be traced in that system derived from natural evidence transcribed in the design of the countryside and in the great architectures that build the territory: the ancient Santuario di Ercole, Villa d'Este and the Canopo di Villa Adriana, which seem to line up in an orthogonal structure suspended between orographic complexity and the rational order of the construction.

Reading the geographical characteristics of this ancient territory opens up new possibilities for giving back to the anonymous periphery, which has grown too quickly, a new identity, with an approach that envisages the enhancement of natural elements, such as the Aniene river and

its valley or the remains present outside the perimeter of the archaeological area, often abandoned. Precisely the presence of the river and its valley have the strength to restore a new identity to the anonymous landscape of the suburbs, made up of industrial and artisan nuclei linked to the processing of travertine, shopping centers and a large inhabited area which has given life to a city without identity. However the ancient design of the ground is still legible, in the land division and in the road layouts and shows its bond with the earth.

The approach in all the projects has been to try to build a part of city alternative at the outskirts, relying on architectures capable of interpreting large open spaces to evoke the monumental classical architectures built on the nearby hills. And it is precisely in classical architecture, in the lesson and in the forms of the ancient city, that the models that have guided the formulation of the projects have been identified, experimenting with defined principles capable of dealing with the forms of nature and of the built city that surrounds it. Thus, devices have been identified that find their alignments in the ancient positions present, enhancing the existing without erasing it. The area between Villa Adriana and the river is rebuilt as a countryside, evoking the ancient splendor of the Horti Hadrianei that surrounded the ancient Villa. A complex hydraulic system, with a new accumulation tank, feeds the channels capable of guaranteeing balance to the entire system even in the less rainy seasons.

The "A project" uses a double grid, which derives from the ancient layouts of Villa Adriana and from the land divisions on which the city spread around the Aniene river was built. This double grid builds a permanent structure capable of ordering the territory and welcoming both new and existing buildings within it.

The project is constructed by borrowing a 2013 drawing by Franco Purini entitled *Interferenze Oblique*, a «trace for itineraries capable of drawing a problematic perimeter as inclusive as possible»<sup>3</sup>. This drawing, apparently a conceptual exercise, seemed to have the characteristics to transform itself into architecture, into a built space, facing the test of "implementation" through a complex elaboration capable of transforming it into volume. That physical and at the same time symbolic form was capable of synthesizing the traces deposited on the ground, in the form imprinted on it by the orientation of the countryside, occupied by a disorderly periphery but coinciding with the ancient alignments present in the territory. The larger building, which houses the hotels, is designed as a single building, overturning the logic of the speculative city that has disseminated micro parcellings made up of small residential buildings within the area. The sequences of courtyards intertwined in two locations and on different levels are able to deal with the measure of the widespread city and contain, within themselves, the complexity of the traces present. On the main framework, which gives a recognizable structure to the countryside parallel to the course of the Aniene river, the project buildings are built. They consist of an intermodal exchange hub with a commercial center and an *Domus Agricola*, built further upstream, the center of the reorganization of the ancient Horti Hadrianei.

The "B project" tries to build a part of the city using large urban voids aligned with the widespread periphery. The succession of courts, in their spatiality, derives from the hypotheses of reconstruction of the Villa Laurentina, admirably described by Plinio il Giovane in his letters to his friend Gallo. Of this, to date, only a few ruins remain but, throughout history, many architects, such as Luigi Canina, Hans Dollgast and Karl Friedrich Schinkel, have ventured into the representation of hypotheses formulated on the basis of this detailed story. These marvelous drawings constitute an inescapable suggestion to measure oneself with the history of those

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<sup>3</sup>Franco Purini, *Percorsi nell'architettura*, <http://www.franco-purini-didarch.it/testi/PERCORSI%20DELL%27ARCHITETTURA.htm>

places and with the greatness of the thought that supported those forms. The borrowed architectural model is used to explore the spatial complexity between inside and outside, the succession of open spaces and the relationship that these architectures were capable of establishing with the shape of the ground and with the landscape. So not a mimetic operation or a revival of the stylistic features of the ancient, but an investigation into the shape and quality of space.

An orthogonal tracked to the Via Maremmana leads to the entrance to the archaeological park, cutting cleanly through the plot of roads and greenery built in continuity with the existing countryside. The Horti Hadrianei have a less incisive design, only an orderly planted sequence that re-proposes the layout of the suburbs up to the great access axis to the archaeological area. A large park extends around the Aniene river, which represents the new centrality of the city spread over the plain.

The "C project" highlights the strength of the drawing present on the territory, capable of relating the positions of the great monuments with the layout of the widespread periphery. The hills, which will house the new Horti Hadrianei, take up the layout of the land division by extending it. The buildings intended to house hotels, interchange hubs and shopping centers also line up on this same position. The project idea is built around a large green space, crossed by pools of water, conceived as a large porticoed hole on two sides. On the long sides perpendicular to the portico, the hotel buildings are arranged like a comb, while on the north side, towards the Aniene river, stands the auditorium. On the south side, towards the hill, the agricultural domus is aligned, built taking the Villa di Diomede in Pompei as a model. The hub leans against Via Maremmana and is built with a large courtyard open onto the river valley and connected, via a passage, to the shopping centre, all while preserving the Case Galli, an old complex of rural houses, as evidence of the ancient activities peasants still fortunately present.

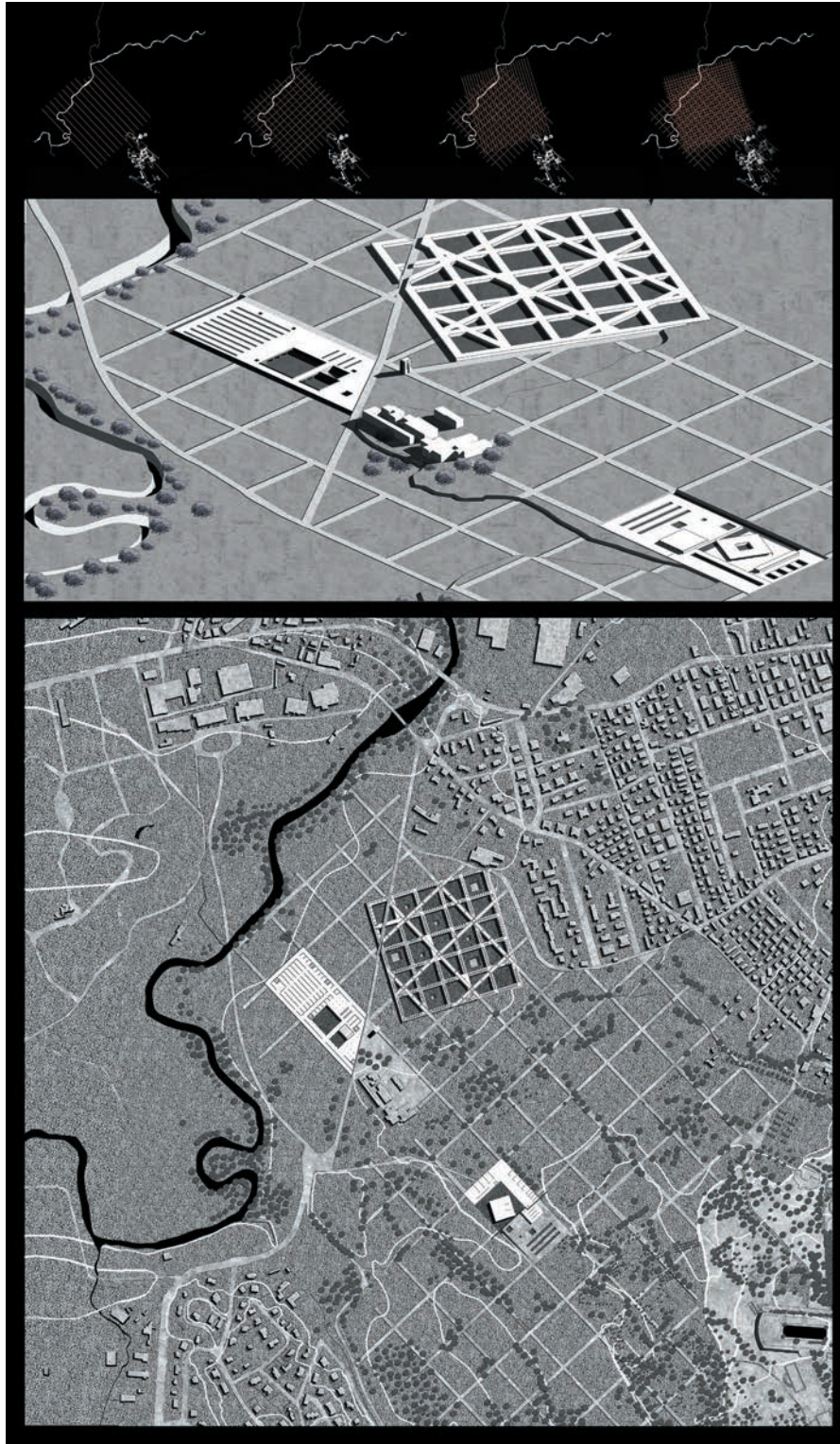
The reading and subsequent re-proposition of the traces present in the territory, both those of a geographical matrix and those of a historical type, therefore try, in all these projects, to reorder a place, bringing the built environment back into a unitary design capable of configuring new centralities and, consequently, a new landscape.



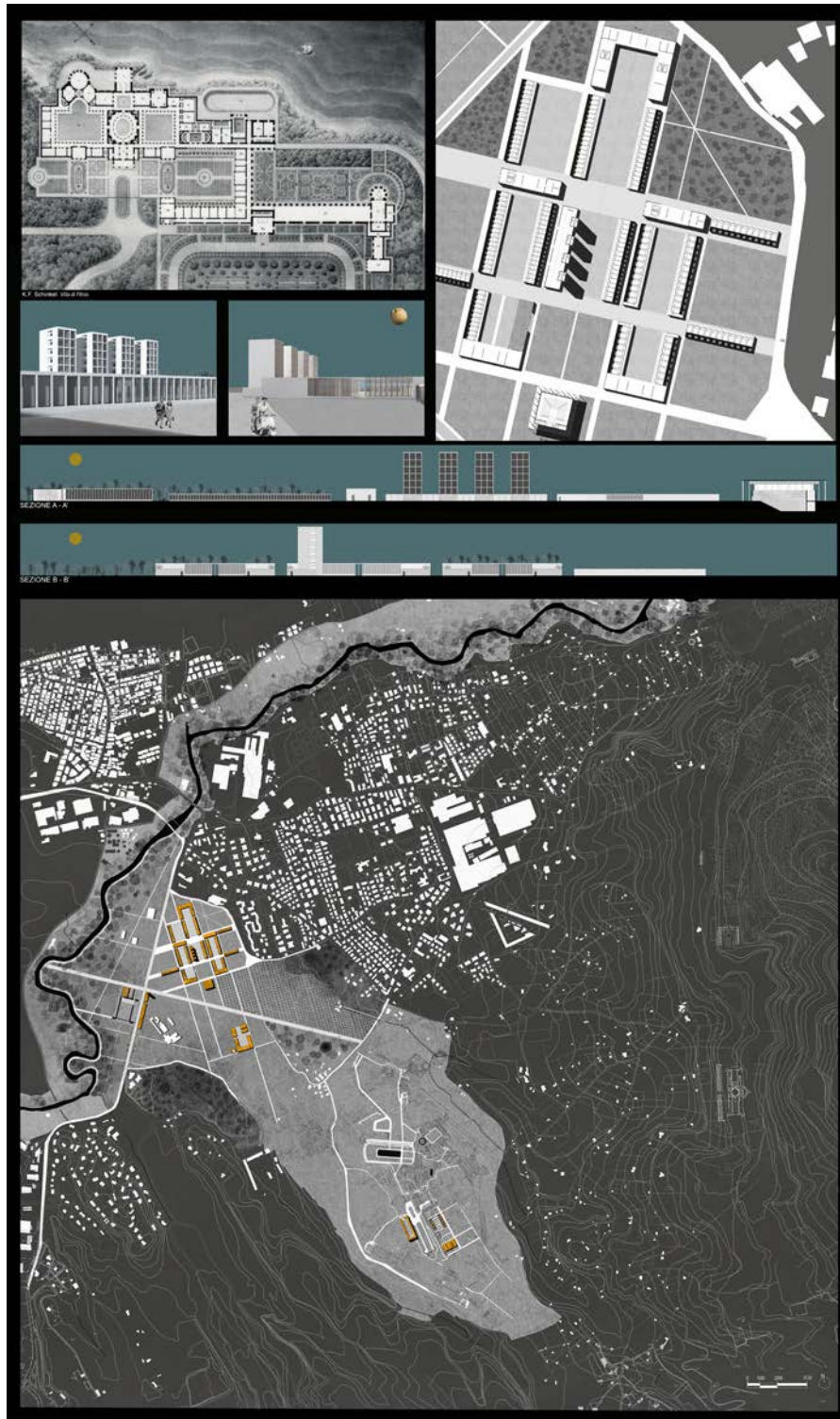


**Figure 1.** Project A: masterplan, plan and sections of the hotel building; general project master plan.



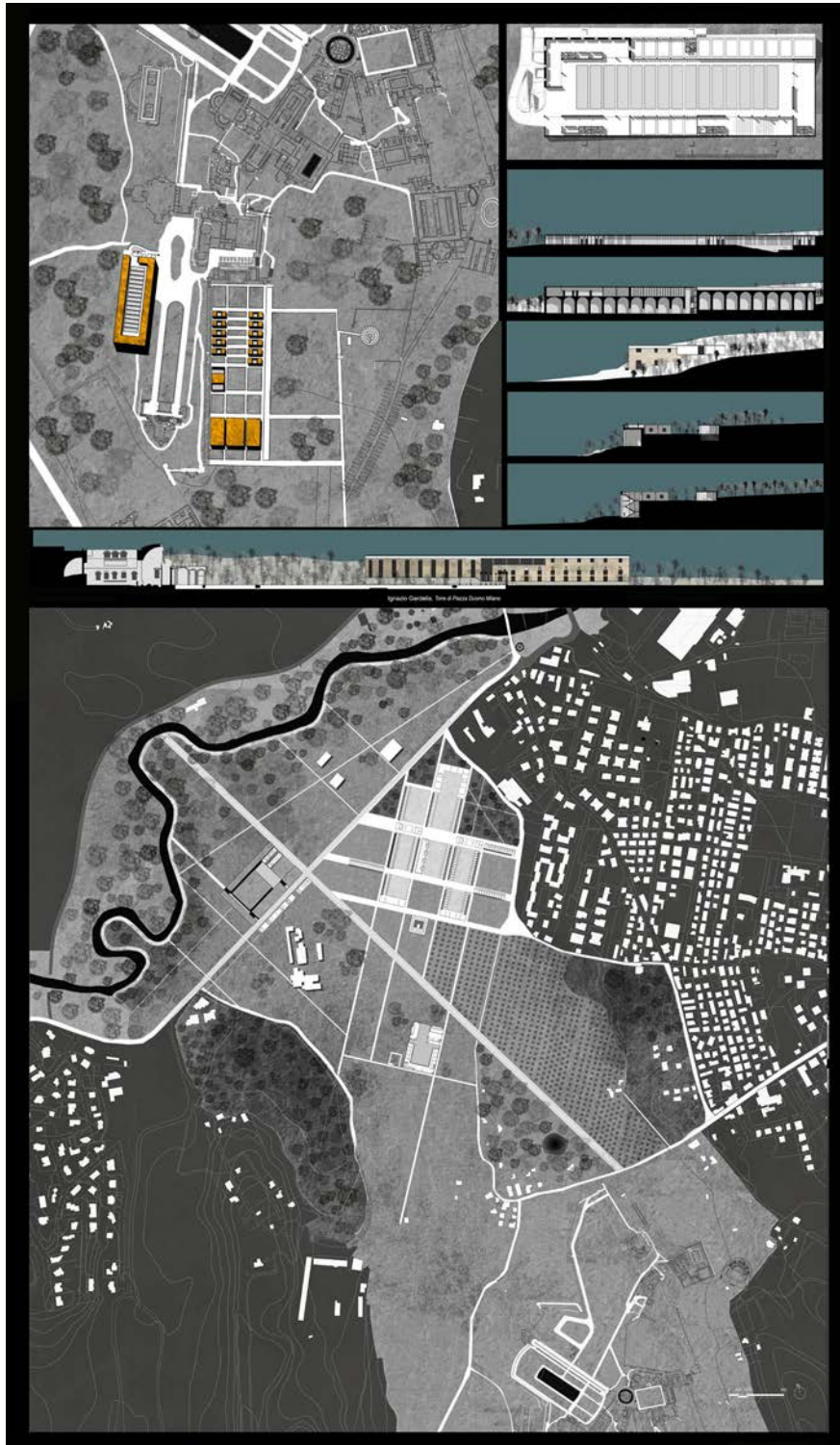


**Figure 2.** Project A: overlay patterns of the grids used in the project; plan of the buffer zone with hotels, congress centre, hub, Domus Agricola; axonometric view of the buffer zone.

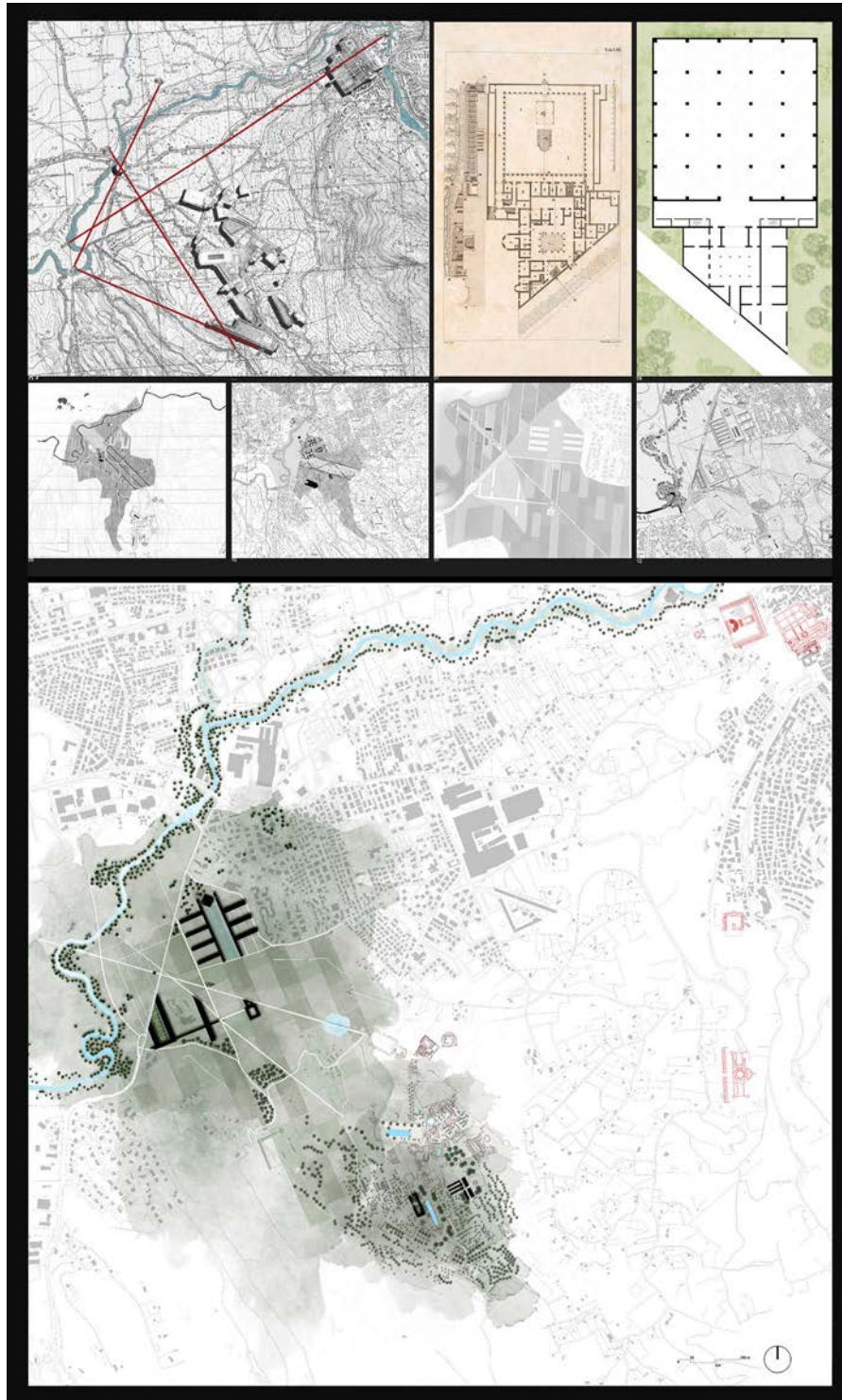


**Figure 3.** Project B: views and sections of the hotel area; general project master plan.





**Figure 4.** Project B: project masterplan within the archaeological area of Villa Adriana for the expansion of the antiquarium and a village for archaeologists.



**Figure 5.** Project C: diagram of the territorial axes used in the project, the Villa di Diomede in Pompei compared with the project Domus Agricola, project diagrams; general plan of the project.





**Figure 6.** Project C: plans and model of the interchange node; plan of the buffer zone with hotels, congress centre, hub, Domus Agricola.



## Continuing to Write in Small Historic Cores. A Design-Led Strategy for Meda's Urban Blight

Laura Anna Pezzetti<sup>1</sup>, Helen Khanamiryan<sup>2</sup>

<sup>1,2</sup>Department ABC Architecture Built Environment Construction Engineering. Politecnico di Milano. Piazza Leonardo da Vinci, 32. 20133 Milan.

E-mail: <sup>1</sup>laura.pezzetti@polimi.it; <sup>2</sup>helen.khanamiryan@polimi.it

Keywords: *Historic centre, regeneration, architectural and urban rewriting, public space design, old and new.*

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *The phenomenon of abandonment and decay of historic settlements affects not only secluded villages but also the core of small towns where inhabitants prefer to quit former rural nuclei to live in terraced houses. Over time, this has provoked the decline of economic activities, vitality and finally urban blight. The historic core of Meda, a town north of Milan known for its dynamic economy and design furniture brands, has lost its urban role, vitality and character although is a morphologically defined settlement of ancient formation and is part of the monumental area on the top of the hill. While urban regeneration is usually studied in terms of economics and policies, this research funded by the Municipal Government has tested the regenerative role of the architectural project, exploring its operational nodes at different scales within the culture of the "urban project". Based on the reading of urban structures and tissues, it defined a contextual design-led strategy to re-imagine and enhance the town based on rewriting strategies. The strategy defined the heads of the urban system by rewriting dilapidated buildings and urban ground, extending to configure a sequence of space-places of encounters while penetrating into semi-private courtyards and gardens to prolong public space as a dynamic and fluid element. By interpreting the urban form potential, the multi-scale design-led strategy was conceived as a driver to enhance historic buildings and courtyards by cultural industries and private-public partnerships, to attract and support new neighbourhood commercial activities, to create pedestrian areas and places of encounter and social interaction.*

### **Urban Blight in the Historic Centre**

The phenomenon of abandonment and decay of historic settlements affects not only secluded inner areas and undeveloped towns but also, unexpectedly, the core of flourishing small towns where inhabitants prefer to quit historic nuclei to live in independent terraced houses. Over time, along with higher consumption of land in the town outskirts, this phenomenon has provoked the decline of economic activities, vitality and finally urban blight.

This paper presents a set of integrated design-led regeneration and enhancement strategies developed for Meda in the framework of the Research Contract between the Meda Municipality and the Department ABC, Politecnico di Milano, led by the author.

Meda is a municipality of 23,528 inhabitants in the Brianza area, north of Milan, a town well known for its dynamic economy and design furniture brands. Set between the plain and the margins of the hilly region, it is the epicentre of a linear conurbation of 13 municipalities.

Although its historic core is a nucleus of ancient formation, morphologically defined and part of the monumental area on the top of the hill, it has lost urban role, vitality and character.

The present weakness of the historic core may be ascribed to a couple of dichotomies characterising this centre's structure. The first dichotomy is the combination between the peculiar origin of the town, linked to a Benedictine monastery rather than a village, and the geomorphological features of this medieval nucleus. The toponym of Meda itself, probably originating from the Latin "meta" (bump), explains the topography since the medieval Monastery of San Vittore has dominated the territory and later the village from the top of the strip of moorland descending from the Groane, at the foot of the first hills of Brianza. The second dichotomy is that when the monastery was abolished and transformed into Villa Antona Traversi by Leopoldo Pollak, around the early 800s, the hill foot was included in the villa's park and encircled by a high wall. The Heritage Superintendency's refusal to consider any alteration of the wall that would allow opening the park to the city life, has determined the separation of the centre's monumental core, deprived of any activity, from the nucleus of rural formation developed downhill. Besides, the other wall of Palazzo De' Capitani's garden (1600s) and the long abandoned Ca' Rustica (1500s) have contributed to the lack of vitality of the old core.

Paradoxically, the strength of the town, its heritage, coincides with its main weakness.

As requested by the Municipal Administration, the first phase aimed at outlining a proposal for the regeneration and revitalisation of Corso Matteotti, that is, the historic axis currently largely neglected and dilapidated. Despite its emphatic title of "Corso", the axis of the historic Contrada Pozzobonelli has a small road section, entirely devoid of public spaces, widenings or trees. The long and high walls of the two historic villas form a physical and visual barrier that keeps their gardens hidden from view.

Overall, being devoid of life, environmental quality and attractive activities, Corso Matteotti is hardly a place where citizens would want to live or even just have a walk.

### **Methodology: Spatialisation of the Temporal Dimension and Iconism of Urban Form**

Urban regeneration is usually studied in terms of economics and policies. On the contrary, this research funded by the Meda Municipal Government has tested the regenerative role of the architectural project, exploring its operational nodes at different scales within the Italian culture of Urban Project and in the light of rewriting ontology (Pezzetti, 2020). Based on the reading and interpretation of urban structures and tissues, it has defined a contextual Design-Led Strategy to enhance and re-imagine the town through insertions, rewriting and infills.

The Meda PGT, conceived around 1965-68 has an eminent author, Giuseppe Samonà, who described the principle of courtyard aggregation "followed until the middle of the 1800s" as a

principle "of considerable urban interest even if expressed in a simple form, adequate to the rural economy of which it was the expression" (Samonà, 1968). Notably, he suggested demolishing the wall of the Villa Traversi, "leaving free to pedestrians the view of the park and the slopes", as he foresaw the Corso Matteotti as an almost pedestrian street.

Some theoretical concepts expressed by Samonà were also taken in consideration by the research: the identification of "contexts" on the base of the historic and morphological character and the permeability of historic spaces.

The research began with an in-depth 3D Laser scanner and photogrammetric survey conducted by the ABC Department, producing through points cloud a 3D model and graphic reconstruction of the facades of the whole Corso. These graphic renderings integrated our elaboration of specific data sheets related to each single building, serving as a knowledge base of the status quo to advance precise Guidelines for the refurbishment and enhancement of the private properties in the framework of the overall regeneration project<sup>1</sup>.

The research performed a series of synchronic and diachronic readings of the centre's urban form based on historic maps and documents.

The combination of information derived from the Lombardo Veneto Cadastre (1850-73) and the Brenna Map (1850) was particularly interesting since it allowed capturing the forma urbis of the primitive fabric of the rural and proto-industrial formation that developed around the hill, on the plain ground, as a necklace.

Two orthogonal pristine axes were identified highlighting the persistent urban role of Contrada Pozzobonelli's axis and two types of rural courtyards. This northwest-southeast axis featured a twofold character, the northern part being less developed given the presence of the hill slope and walls fencing wide properties, while the southern side was defined by a compact building curtain formed by U-shaped courtyards open to their backyard vegetable gardens, given their position on a flatter ground.

A first analysis made use of diachronic and synchronic historic sections. By spatialising time in layers, the diachronic sections clarified permanencies and modifications of the fabric, often performed on the same plot footprints.

Along the Contrada Pozzobonelli's axis, the mapping by historic sections also showed that the vegetable gardens and farmland patterns became the footprint for the urban development south-westward. The 1914 map records the opening of two new roads necessary to the blocks formation. Although this new grid was not filled until the 1980 section, it entailed demolitions in the central part of the building curtain. Besides, all historic sections mapped the persistence of the two old municipal country roads and of the "Salita delle Benedettine", clarifying that the second "salita" (alley) did not exist at the time of the Theresian Cadastral map (1721).

The courtyards of the northeast-southwest axis (now Via Santi Aimo and Vermondo) were, instead, mostly enclosed and weakly related to farmlands, which were limited by the Taro Stream. Besides, while the Contrada's axis coincides with Corso Matteotti and still structures the east part of the centre, the northeast-southwest axis underwent a shift since the early 1900s, as the boundary wall of Villa Traversi soon became an obstacle to the life of the village. The axis shifted to the new Via Solferino, while eastward, since 1879, the Milan-Asso Railway (Northern Lines) reinforced the separation of the historic centre from the modern expansion.

The already-written urban text appears, therefore, as *tabula plena*, that is, a stratified accumulation of architectural objects and voids; forms, signs and material textures; memories,

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<sup>1</sup>The survey was conducted by the team of prof. Cristiana Achille, while the Data Sheets and Guidelines were drawn with the specific contribution of Prof. Rossana Gabaglio.

traces and absences, whose meaning needs to be understood.

It is in this marked "canvas" that successive remodelling finds its own place (Machado, 1976). Diachronic maps and their overlapping show the core of Meda as a Composite Landscape Unit, "a superposition of largely extended presents" (Focillon, 1934), that is, a stratified time in which succession and synchronism, anticipation and survival coexist juxtaposed at the same time.

If time is spatialised in layers, architecture, similarly to archaeology, becomes interpretative (Pezzetti, 2020). The perspective of working by stratification and continuing to write on an urban text already dense with signs becomes constitutively hermeneutic.

Therefore, our descriptive analysis intentions the object and becomes reading: it starts from a question and is critically oriented with respect to the analysis. It interprets rather than merely illustrating the pre-existing status (Norberg-Schulz, 1996).

The synchronic reading of the centre's settlement structure is aimed at grasping the gene of its constitutive essence resulting from the ascertained superimposition of different writings, in its potential of form, figure and function. It is a matter of grasping the latent order (Pezzetti, 2019) underlying a composite structure consisting of multiple writings that need to regain meaning for the present.

Interpretative Readings bring to light the iconism of the urban figure, that is, a synthetic image revealing the town's essential meaning bridging form and contents, signified and signifiers. As Samonà stated in 1980, "the signs of visual language (...) are not partly conventional or partly significant, but only significant; they are in fact iconic signs, that is, images".

Therefore, reading the iconism of the urban form is more than just reading the aggregation of "edilizia elencata" (building-in a list, Samonà) or the process of "basic buildings" (Caniggia), and the polarisation at a distance of primary urban facts (Rossi, 1966) alone. It means reading the entirety of urban form in terms of figure and landscape to which the project aims.

### **Continuing to Write: the Regeneration and Revitalisation of Corso Matteotti**

In 1980, Samonà wrote that the City is a system of spatial relationships linked by interdependencies. Continuing to write (Pezzetti, 2020) on an already-written text defines design project as a new inscription and layering of signs connected by formal and semantic relations and based on the reading and interpretation of principles, themes and traces inherited from the previous text.

The ontology of rewriting disambiguates it from any reconstruction strategy, as it is rather operating in contexts that require comparison between multiple writings and overlaps, and in the constant work of decoding and recoding of the project.

Architecture itself is a genre of writing that is not only written on, but also actively writing. It defines an interpretative, critical and, therefore, creative act. In rewriting, the reading, interpretation and resignification for the present become decisive.

While buildings are open to changes, the urban figure is the ground where the traces are inscribed and retained. The city, meant as the object of architecture, is always a rewriting of a previous city.

As Samonà stated, working in the Historic Centre means confronting the solidarity between buildings and street and the re-definition of a porous fabric, in its absolute diversity compared to the contemporary city. This solidarity particularly affects the narrow Corso Matteotti, the central part of which is also dominated by the walls of two historic villas that could not be altered in any way.

Besides, the principle of the courtyard type offered a potential key to the regeneration strategy, expanding public space into courtyards themselves as a dynamic and fluid element. Together,

by modifying the Matteotti road tracing, a sequence of space-places for encounters were retrieved, while two dilapidated historic buildings were identified as the system "heads" to be renovated for attractive facilities. The required design strategies, moreover, entailed subtle relationships and readings of the spatial character.

### **Questioning the PGT historic centre boundary in light of urban form**

On the basis of the identified settlement structure and recognition of the centre as a "voluminous text of multiple writings", a first consequence was calling into question the perimeter of the historic centre set by the PGT Urban Plan. It coincided neither with the historic status of the Lombardo Veneto Cadastre nor with the built historic assets forming Meda's "voluminous text of writings". For instance, it excluded arbitrarily some major buildings built before 1927, while including generic fabric built after 1950. This becomes particularly objectionable in relation to the exclusion of the system formed by the municipal complex and Palazzo Mascheroni, as they constitute the node reconnecting the two historic axes. Our project turned this node into one of the heads of the public space sequence and regeneration strategy.

The strategy proposed, therefore, a different boundary including this node that would allow the extension of the Solferino axis as far as the Church of Santa Maria Nascente, while including the farmsteads Bergognone and Pieoda to mark a meaningful fixation line.

Besides, the topographical figure of the historic centre could not be disjoint from the original upper nucleus seen as the head of the territorial strip that is now part of the "Brughiera Briantea" PLIS Park.

#### *Writing the ground: a strategy by themes and figures*

The strategy needs, therefore, to coincide with the topographical figure to reinforce the legibility of the system structured by the two historic axis.

The design study was implemented through the integration of multiple strategies at the urban and architectural scale. The main urban aspects of the strategy include:

- the redevelopment of the historic axis of Corso Matteotti into a 30Km/h area to introduce gradually its entire walkability and pedestrianisation;
- the system-making of historic or disused buildings to be enhanced architecturally for new uses;
- the identification of courtyards as a potential extension of public space also in the perspective of economic revitalisation, to attract and support new neighbourhood commercial activities;
- the formation of "circuits" and thematic routes departing from the Matteotti axis in order to give continuity and attractiveness to a historic centre that is now devoid of vitality, activity and long affected by urban blight.

To start a virtuous process, this strategy needed to be implemented according to three main architectural strategies and related themes:

1. Continuity: the unitary rehabilitation of the entire Corso Matteotti to support walkability through modification of the road tracing to enlarge walkable area, abolition of raised sidewalks, and unity in paving materials in natural stone, urban furniture and lighting.
2. Space-Places, or turning discontinuity into sequence: the identification along Matteotti's sections of the nodes to be remodelled as a sequence of space-places, that is, places of encounter and social interaction with seats, water mirrors, written plaques and trees.
3. Landmarks: the historic buildings located at the two heads of the route, to be redesigned as landmarks introducing and closing the urban sequence, in order to create an attractive pedestrian path along the entire axis.

The design drawings reflects both reading and design re-figuration by integrating the



“omniscient” zenithal reading provided by interpretative maps with the landscape view experienced through peripatetic walk. The first gives account of the settlement form, that is, of the context in its historical becoming and as an intellectual and iconic construction. The second, on the other hand, allows perceiving, also with the senses, only one framing at a time, while requiring the movement of the subject along a designed sequence, exploring the experiential dimension.

The themes to be developed include material textures used as system of signs, restorativeness, and figures of the ground.

The patterns of paving surfaces and material textures were conceived as signs that orient the legibility and use of space: white Apricena stone to identify the places of encounter, Luserna stone for road and level pavements, “rizzada lombarda” (river pebbles that constituted the original flooring) to distinguish the boundaries of the carriageway and some driveways to private spaces. While the colours recall the original paving, between white and grey, the richness of patterns and textures aims at integrating contemporary design with the historic atmosphere.

Restorativeness is a concept borrowed from environmental psychology. It is understood as a quality of physical space producing emotional responses and the necessary regeneration of the physical, psychological, social resources that are diminished by our continuous efforts to adapt to a noisy and confused urban environment. The design introduces restorativeness by water and trees elements. Water recurs in the main space-places according to different themes but always as a quiet and mirroring surface: a restorative element that reverberates a feeling of well-being and quietness in the spaces of encounters, while mirroring the sky and trees hidden by the walls. Trees are also restorative elements and recurring signifiers. The system of pairs of trees that provide shade, screen walls or solve a couple of setbacks are also symbolic references to Meda’s founding myth – the one referring to the Saints Aimo and Vermondo who sought refuge on a laurel tree and later chose that spot to build the church that started the settlement.

Finally, each space-place has its own referential figure of the ground. Following Samonà’s methodology, the Corso was subdivided in contexts according to both formation and contemporary character. We identified six contexts to retrieve the possibility of creating public spaces in this very narrow road. The design developed the contexts through iconic figures of the ground, meant as signifying signs.

Contexts A-B relate to compromised parts at the initial section of the Corso, due to incongruous buildings and setbacks. Design turns these unresolved setbacks into space-places of encounters. The symbolic signifier of the recurring pairs of trees establishes visual targets that announce the sequence and encourage space exploration. The space is also rhythmized by stone benches whose position is identified by “stone carpets” inserted into the flooring.

The C-D-E contexts are denser in terms of superposed traces and memories. Along the narrative sequence, they are identified as space-places by the recurring use of white stone.

In these three contexts, the restorative water element, a recurring presence in local geography and history (the Tarò Stream, minor streams and ponds), is repeated to act as a unifying component that marks the continuity of the urban story within variation.

The D context is characterised by the high wall of the Villa Traversi. Design turned the problem into a theme. The existing signs disturb and at the same time orient the new writing. The design of this space-place is composed according to the wall, underlined by a narrow Water Line, a shallow veil of water reflecting the sky and trees hidden by the wall. Two trees and the patterns of a set of benches articulate the writing of the ground, treated as a bas-relief.

Across the road, the C context enlarged the pedestrian area with a mall space-place in correspondence to the intersection with the old Roccolo road (via Orsini), where the last two surviving commercial activities are still located. Particularly, the design recalls and reinterprets the figure of the old Water Well recorded in an historic picture.

The last figure is the Water-Table in E context, where Corso Matteotti meets with the Salita delle Benedettine, the ancient alley leading to the monumental core. Here, the sloping topography emerges, that is, the foot of the hill spur, together with a fragment of the ancient pebble pavement. The reflective Water-Table is a dark triangular-shaped solid collaborating to assume, describe and shape the topographical "mise en forme" of the E site.

### **Continuing to Write: Palazzo Mascheroni as Urban Catalyst**

The two landmarks selected as the heads of the regeneration axis are Palazzo Mascheroni and its square, right behind the Town Hall, to be refurbished as a Youth Centre and extension of the Solferino axis (I context), and the complex formed by two abandoned courtyards in an advanced state of decay, which are going to be purchased by the Municipality (G Context). Palazzo Mascheroni is an abandoned building dating back to the 1920s, selected to be one of the landmarks of the regeneration strategy and recovered as a new urban catalyst, namely the Meda Youth Centre. It used to be the representative and residential part of a furniture workshop. In the PGT, it is listed as a building of testimonial value linked to a craftsmanship traditionally based in Meda.

The mapping revealed that it was originally a U-shaped courtyard, subsequently expanded. Between 2004 and 2007, after production ceased, the wings were demolished to build an underground parking, an unused square and a looming residential building. As only the front building survived, the rear elevation became a self-standing façade. The building underwent an contestable partial rehabilitation of the exterior facades and roof, which falsified its character by making its austere architecture clumsy. The research, instead, has clarified that the reference to the local type of farmstead, characterised by interconnected rooms opening onto a double-order arched loggia, was still operational in the 1900s and the Palazzo was quite similar to Cascina Bergognone.

The restoration and adaptive reuse of Palazzo Mascheroni can be understood as an architectural rewriting just as the regeneration of the historic centre is an intervention of urban rewriting. The design intended to recover the character of the internal façade that used to be an exterior overlooking the loggia. Taking some analogies with Hans Döllgast's reconstruction of the Alte Pinakothek (1957) as a reference, the void of the loggia became by translation the void of a full-height gallery where the staircases were replaced by two elongated stairs facing each other. Treating the staircases as amphi-seatings, internal walls as facades and crossing the void by suspended decks that visually relate levels and dramatize activities, the emptied loggia acts as the Commons, making the space dynamic and suitable for a Youth Centre.

The design writes on the existing site and building through overlapping, allowing the traces and erasures of the historic palimpsest to be seen by uncovering the masonry or keeping it bare, only coated with a light washing. Acting on the character, type and openings through subtle design writing, an unexpected and severe monumentality also emerged.

The design also reshaped an urban courtyard to extend activities outdoor, paying homage to the diaphragms designed by Terragni, who was born in Meda.

By writing again, design performed a twofold action: on the one hand, it restored the building's sense of depth due to the stratification shaped by man and events; on the other hand, it revealed orders that are latent in the type and in the text. This new possibility of existence

strengthened the character of the enunciations independently of the original enunciation, namely in the depth of time in which they exist, are preserved, reactivated and used today.

## Conclusion

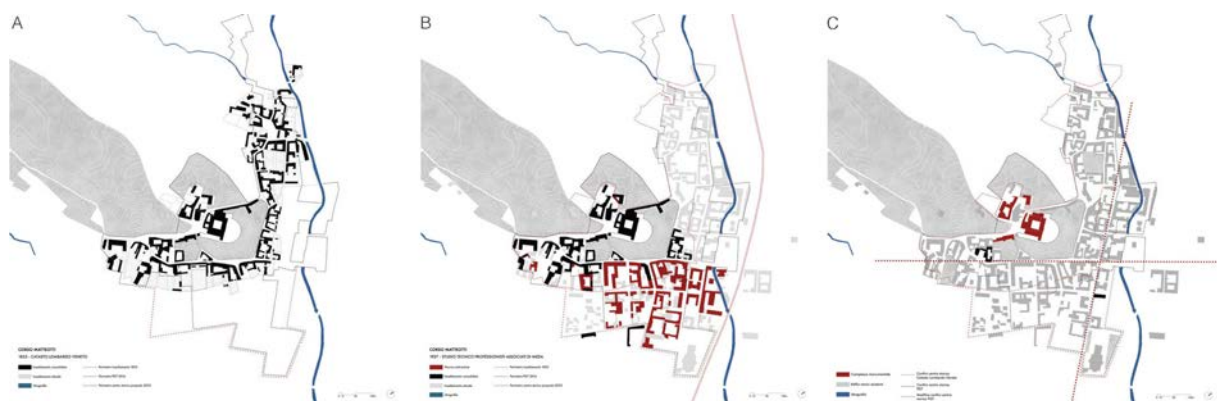
The city, as the object of architecture, is always a rewriting of a previous city. Architecture itself is a genre of writing that is not only written on, but also actively writing. It is in this already-written text that successive remodelling finds its own place and coherence.

By reading and interpreting the urban form potential, a multi-scale design-led strategy was conceived as a driver to enhance the historic axis as a pedestrian area and sequence of places of encounter; historic dilapidated buildings as catalysts of cultural activities; courtyards as extension of public space attracting commercial activities of neighbourhood.

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## Illustrations and tables



**Figure 1.** A. Synchronic section of Meda in 1855; B. Diachronic development of Corso Matteotti in 1927; C. Redefining the Historic Centre's boundary, main axes and the two urban catalysts (by the authors).

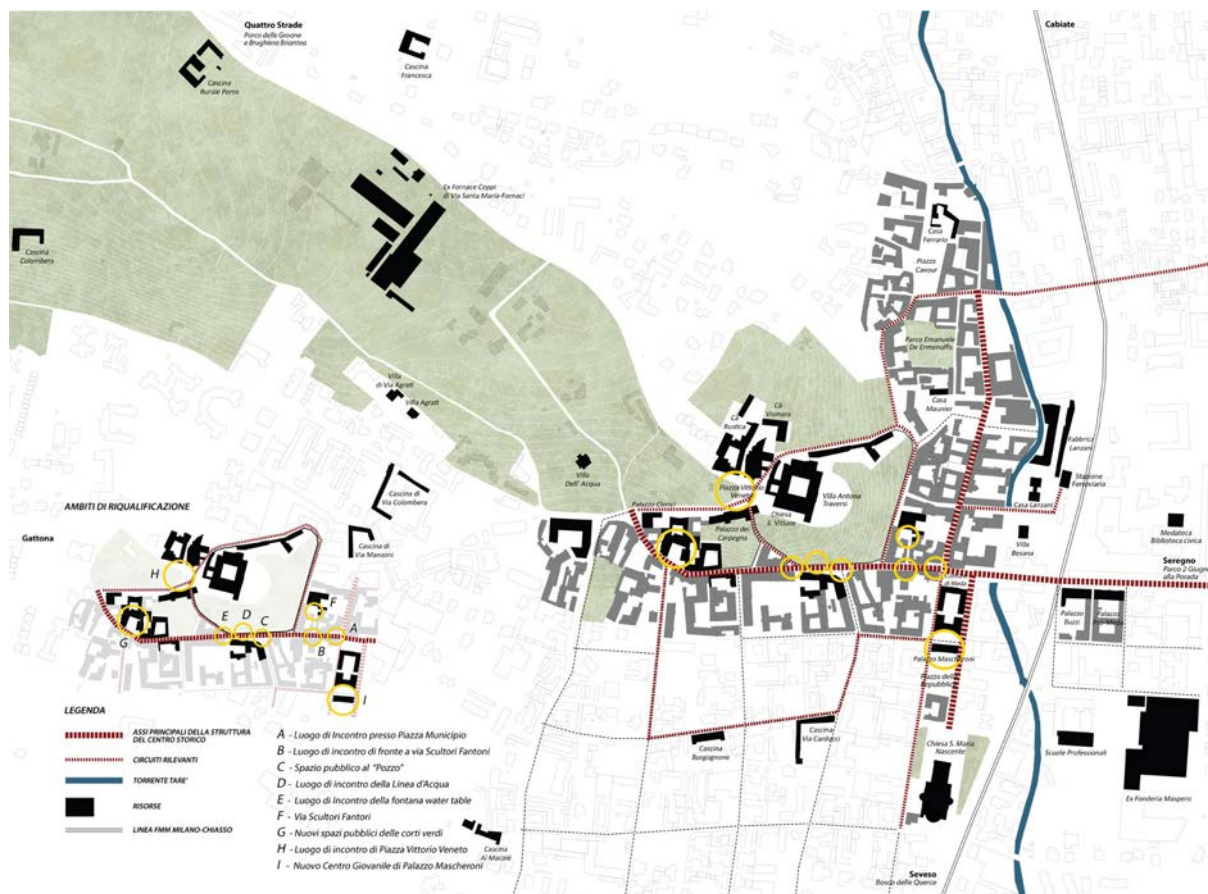


Figure 2. The regenerative strategy and design contexts (by the authors).

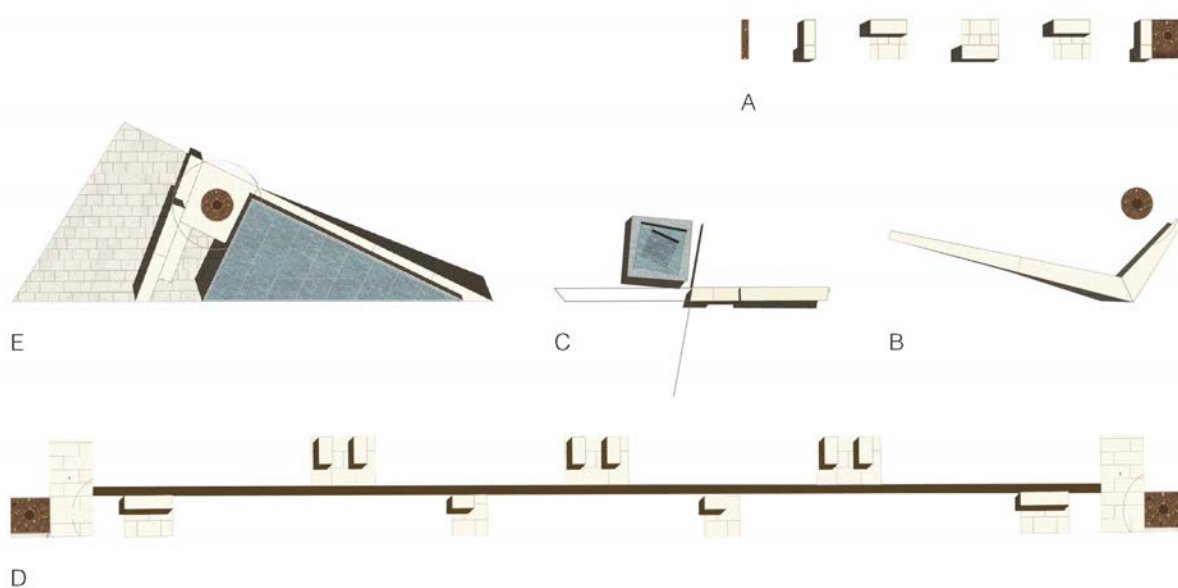
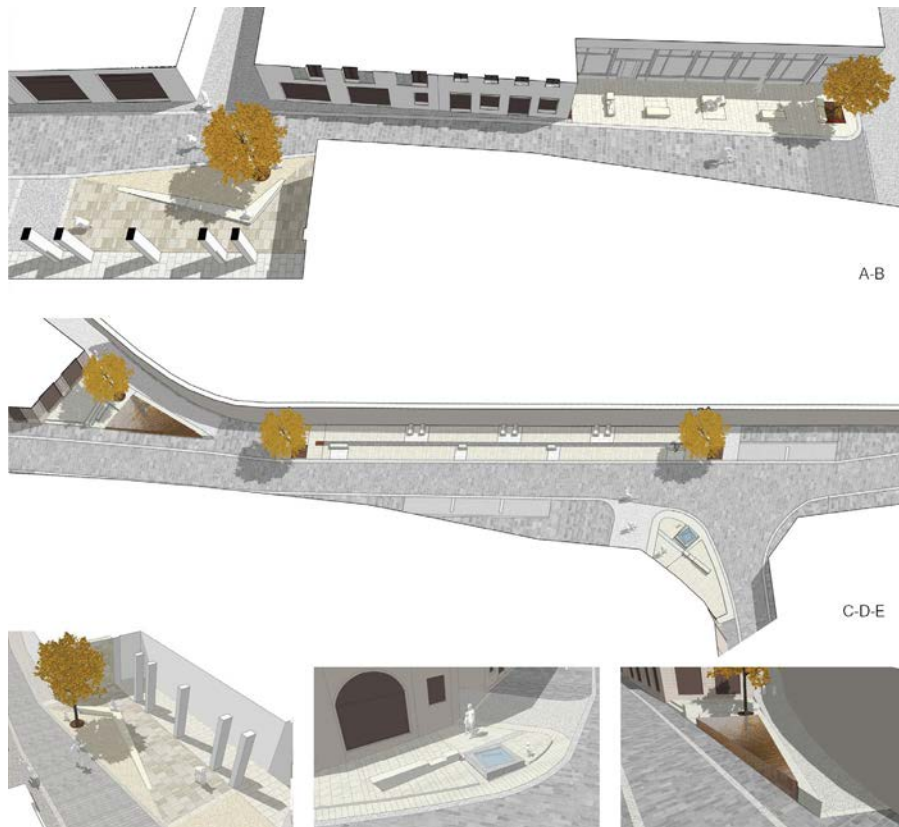
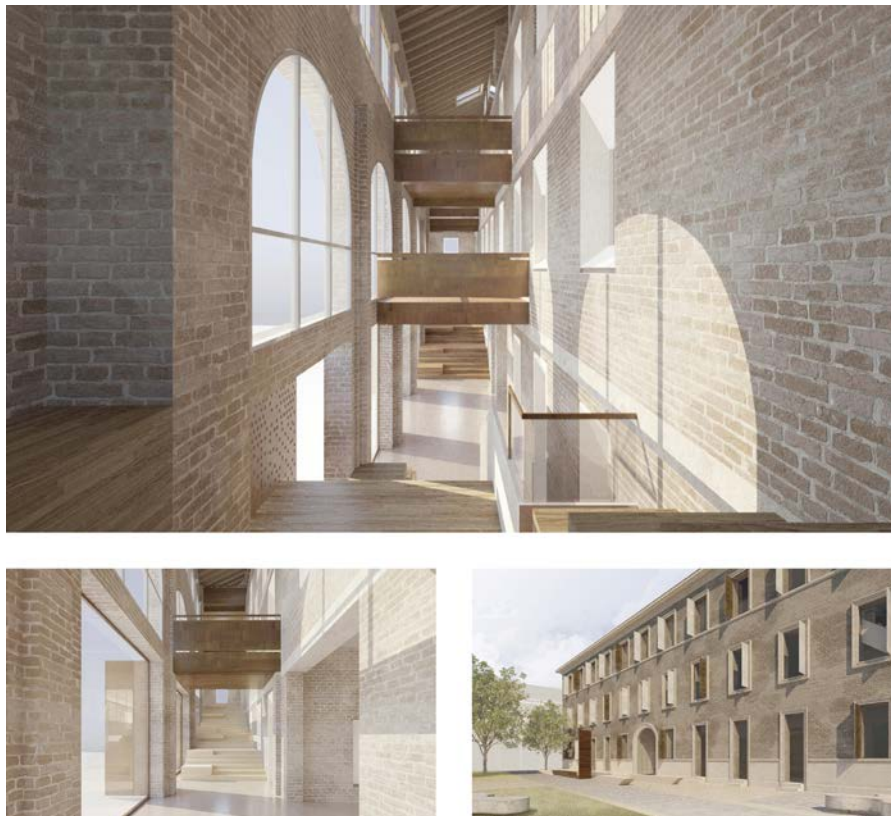


Figure 3. The "figures of the ground" of the space-places in Corso Matteotti (by the authors).



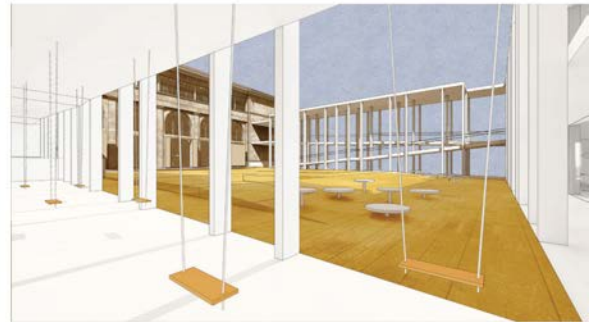
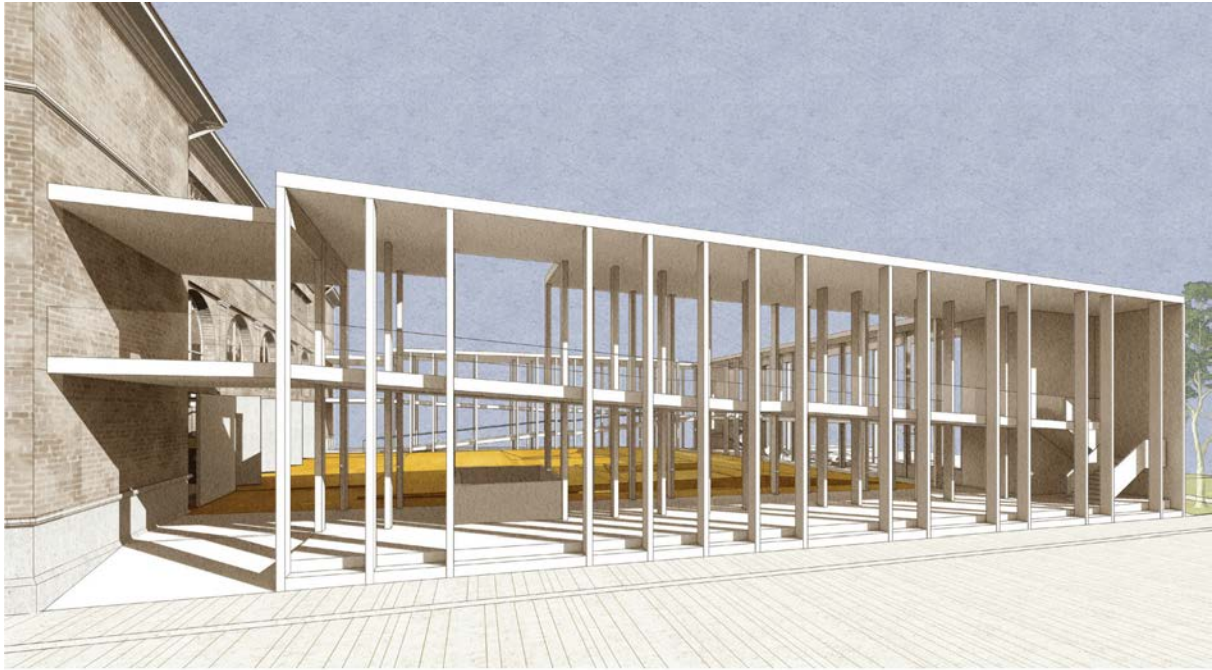


**Figure 4.** The space-places in contexts A-B and C-D-E (by the authors).



**Figure 5.** Architectural rewriting of Palazzo Mascheroni as a Youth Centre: the Commons, the entrance, the façade (by the authors).





**Figure 6.** Palazzo Mascheroni's new courtyard: connecting to the existing facade, framing the courtyard and playground (by the authors).



## Recovering a lost identity: the ancient riverside village forming the original settlement of Noventa Padovana

Enrico Pietrogrande<sup>1</sup>, Alessandro Dalla Caneva<sup>2</sup>, Massimo Mucci<sup>3</sup>

<sup>1,2,3</sup>Department of Civil, Environmental and Architectural Engineering, University of Padua, Italy.

E-mail: <sup>1</sup>enrico.pietrogrande@unipd.it, <sup>2</sup>alessandro.dallacaneva@unipd.it,

<sup>3</sup>massimo.mucci@unipd.it

Keywords: urban morphology, urban regeneration, Noventa Padovana

Conference theme: Design a Sustainable Urban Form

**Abstract.** The debate centred on the regeneration of large cities helps to inspire urban planning strategies. In this case, however, we examine a smaller settlement, the river village on the Piovego canal in the territory of Noventa Padovana. This is the area where the population lived that was originally carrying out work activities near the bridge and the port and where noteworthy historical and artistic landmarks emerged over time, such as the monumental Villa Giovanelli. In this part of the territory, which gave rise to subsequent construction phases, the accumulation of buildings over the centuries has compromised the distinctive formal character of the village, with consequences on the quality of everyday life. Historical photographs depict the old medieval bridge with its downstream wharf where the barges used to dock and the houses close by. The construction of a new reinforced concrete bridge in a new location and the subsequent demolition of the historic one-arch structure have resulted in the marginalisation and further degradation of the ancient settlement. The Noventa Padovana Municipal Council, in agreement with the Department of Civil, Environmental and Architectural Engineering of the University of Padua, has defined strategies to recover the formal identity of the original residential nucleus, which has traditionally opposed the diffusion of the patrician villas built by the Venetian aristocracy. This is the topic addressed in this study.

## Introduction

This research is focused on the urban regeneration of the small riverside settlement formed by the municipality of Noventa Padovana, just outside the city of Padua (Italy). The research is the result of an agreement between the University of Padua (Department of Civil, Environmental, and Architectural Engineering) and the Noventa Padovana Municipal Council in order to explore strategies to recover the formal identity of the original urban settlement of three urban areas. One of these cases is presented here: it is a small village built on the Piovego canal at the intersection with the road that connects Noventa Padovana and the outer suburb of Padua called Camin. The Piovego is an artificial canal dug at the beginning of the 13th century to connect Padua to Strà, and then on to Venice by continuing along the River Brenta. The village assumes the function of a river port, which was previously positioned on the River Brenta, and has an important passage over the canal provided by a bridge (Baldan, 1979-1981; Broetto, Gallo, 1977). After Venice took control of the area (from 1405), many villas were built by Venetian patrician families. The Piovego canal became an important transport route because of the "burchiello", which is a traditional boat for transporting passengers. Among the most important villas is Villa Giovannelli, built next to the village. Therefore, there is the coexistence of two important contrasting characteristics. On the one hand there is the large scale and the monumentality of the villa, and on the other the development of a small district across an important infrastructure. Historical photographs depict the old medieval bridge with its downstream wharf, where the barges used to dock, and nearby houses (Gallo, 1998) (fig. 2). The construction of a new reinforced concrete bridge in a new location and the subsequent demolition of the historic one arch structure have resulted in the marginalisation and further degradation of the historic settlement.

It is clear from analysing the urban evolution of the village on the cadastral maps that the urban form at the end of the 18th century was already characterised by two shared courtyards, almost completely closed (fig. 1). Continuous façades were built along the main road and there were also buildings next to the access to the bridge. In the 18th century, terraced houses belonging to the villa were also built and finally the two courtyards were completed in 1914 and the urban morphology became very distinct. The fragmentation of the property inside the courtyard space in the post Second World period (1954) can be clearly seen. There is still the remnant of the old street and bridge, with the river being widened for the port. Forty years later it can be seen that the accumulation of buildings over the centuries in this part of territory, which gave rise to subsequent construction phases, has compromised the distinctive formal character of the village, with consequences for the quality of everyday life (fig. 1). The urban form remains incomplete and fragmented, and the village is marginalised on the edge of a larger and more recent residential neighbourhood.

At the time of writing the continuous front of the façades is still visible, but the main internal courtyard has lost its original unity (fig. 3). The shared space of the courtyard is fragmented into many private properties and the façades have been altered with balconies and modifications have been made to the windows. Moreover, some volumes that have been added are inconsistent with the original morphology. The second smaller courtyard still has the original shared space although the façades and floors have been altered by heterogeneous elements and materials.

## Methodology

The research method includes both the analysis of the context and the development of design proposals aimed at exploring the potential of urban regeneration. The students were guided

by the principle of transformational development compatible with the identity of the place. The activation of a process of regeneration that affects the area under consideration by the present contributors starts from a premise that contemplates three fundamental questions. The first considers the city as a reference paradigm to be used as a critical opinion of the project. The second conceives the city and the planning project as a spatial phenomenon where the quality of places depends on the order in which the physical objects are arranged in the space. It is true that the methodological approach taken by the discipline of architecture and especially in architectural and urban composition now seems to be the rethinking of the quality of the space that according to many not only triggers ethical processes affecting the economy and the environment but also social ones, too. "Growing and gaining ground in the field of architecture – a discipline that is generally occupied with building on and in spaces – is the conviction that a more substantial consideration of the spatial design conception of the buildings and the city may not only reflect on the form necessary but also lead to an approach capable of solving various current social questions". (Schröder, 2017, p. 31). There is a line of thought that refers to this position, that is, the neo-rationalist tradition so the enhancement of space and the values rooted in it are not only the premise of a useful society but also a beautiful one. The third question considers the area to be inserted in a historicised context. Consequently, the regeneration project cannot leave a discussion of the existing and the new out of consideration. From the point of view of the architectural forms, this means the direct comparison of a tradition of city building that is rooted in the idea of the closed city inside which "not only instruments and techniques but also the same reasoning for constructing the collective space" can be drawn upon (Gravagnuolo, 1997, p. 169). On the other hand, "when we operate, we cannot leave this type of city out of consideration because this is still largely the idea of city that we have today" (Grassi, 2000, p 31).

Conservation of restorations in the area is currently diverse in nature due to which the general condition of transformation must be the integration of restoration transformations and new building developments. Restored existing buildings and new buildings (which substitute those demolished) must coexist and reinterpret the settled character of the place with special attention being paid to the sequence of the spaces in order on the one hand to emphasise the closed character of the transformation environment, and on the other to increase relationships with the whole community. A historical analysis clearly reveals that the fundamental and original character of the area – stripped of the additions that have hidden its identity - is built on the idea of courtyards as closed spaces, recognisable in the form of the space that the buildings around the perimeter define.

The urban planning project is not required to intervene with surprising effect by using muscular architectures that only value themselves and the personal ambition of the planner. Architecture is required to enter the context by discretely interpreting the settlement rules in it, the characteristics of the place, and its atmosphere and then constructing spatial sequences by arranging volumes – substituting those demolished – in continuity with the existing ones, respecting their alignment as much on the horizontal plane as on the vertical. There is no need for the form of the planning project to mimic the historic form of the city. Above all, the form needs to interpret the reasons for building the space in which the planning project is to be inserted.

### Measurement and analysis

The research was also a didactic (educational) experience putting various design principles of urban regeneration into practice. The ideas of "transformation" and "protection" transmitted



to the students can be seen as a unitary process in the study of the context and the reworking of archetypal architectural forms such as the courtyard and the portico. Consequently, the planning proposals of the students are above all concerned with the recomposition of the shared public space which has been compromised in the town of Noventa Padovana by various incoherent architectural alterations and additions.

Analysis of the current situation reveals a great deal of fragmentation in the urban fabric and the tendency to lose the distinctive features and characteristics of the original town. In particular, the shared courtyard has been subdivided into small private properties which have been fenced in and partially occupied by paving, hedges, and storerooms. The dwellings are no longer connected together by the shared courtyard. Furthermore, the more recent additional parts of buildings have architectural and material languages lacking coherence with pre-existing buildings.

Consequently, the shared area of the main courtyard was recovered in the first project presented by students Marco Sottana and Ilaria Zoccarato by demolishing all of the recent additional buildings and volumes that are not consistent with the original morphology (fig. 4). The construction of a third courtyard to the north is planned in the existing courtyard and communicates with the first courtyard through a narrow passage using the public space to reconnect the existing houses. The internal façades of the courtyard are made uniform by the addition of a double-height wooden portico, which is an archetypal element that recalls the character of the arcaded public space. The new façade on the south side of the courtyard is built with a double-height portico which clearly provides the characteristic of unity to the courtyard. The porch is a private space on the first floor, and it is a public space on the ground floor. Therefore, it is a threshold space, acting as an intermediary between the public courtyard and the private homes. The existing carports on the north side are reconstructed and new collective functions have been added. In place of the degraded garages and storerooms, a multipurpose (multifunctional) building for collective use where the inhabitants can socialise has been designed. The multifunctional buildings offer spaces for the community, for social relations, for study, and for recreation. They repeat the wooden grid of the arcades on the façade and have exposed brick walls like the perimeter wall of the courtyard. Furthermore, the existing brick wall that closes the courtyard to the right of the multipurpose building is preserved. In addition, various spaces for small craft and artisan activities are provided for in the large main courtyard replacing the existing garages and storerooms. The road network has been changed so that cars do not pass into the internal space because the courtyard is pedestrian only. In fact, cars can only park outside in a nearby street.

The second project by students Filippo Baldan and Marco Baratto starts from the same design principles but ends with different results (fig. 5). For instance, there is the same choice of demolishing the parts of buildings that are not consistent with the morphology and history of the village. Moreover, they try to homogenise some façades by using the wooden porch as well because the façades are currently too fragmented and inconsistent. However, they in their project also propose two new design strategies. Firstly, three new public connections between the three courtyards by opening covered pedestrian paths in reference to the traditional Venetian “calle”. Secondly, the shared space is improved in order to recover the original sense of community. Each of the three courtyards has a specific collective function: the main courtyard is dedicated to socialising, so the construction of a multifunctional building is planned; the small one is dedicated to resting and reading, with the construction of a portico on the façade; and there will be social gardens in the new third courtyard. Three new architectural elements correspond to the three functions: the multifunctional collective building;

the wooden porch; and the greenhouses and flowerbeds of the social gardens. Therefore, a system of interconnected courtyards was designed in order to give the village a character of unity. The shape of the two-storey volume of the multifunctional collective building is consistent with the heights and the typology of the roofs of the neighbouring buildings and the transparent façade represents its public character, open to social relations. The wooden structures in the small courtyard are not monumental and recall the spontaneous nature of the architecture in the village. Finally, the new courtyard and its social gardens and greenhouses represent the rural tradition of the village and serves the purpose of strengthening the sense of community its inhabitants have.

## Conclusion

The urban planning project should be concerned with the form, spaces, relationships, hierarchies, and sequences that define character in the city. The aim is to meet the aesthetic expectations of architecture, the memory of the places, and the identity in which a citizenry is recognised. Today methods of urban transformation have abandoned this purpose. Plans, laws, and regulations have been substituted for the aesthetic purposes of architecture. The regulations have fixed quantity without giving information about the form and quality of places. Architecture has consequently lost sight of the role it plays, that is, giving form to the city through a clear idea.

The plans proposed result from applying the opposite trend by considering the plan as an integral part of a wider situation: the city. Intervening inside urban contexts means comparison with history and the formal tradition that gave rise to those places. The outcomes presented are inserted within an idea of urban landscape that is understood and respected by these outcomes.

The dialogue the project establishes with the hereditary techniques of composing the historic city means continuity with the character of the place can be re-found. Above all, from a spatial point of view, architecture is principally the art of building the space. Clearly the values that define the environmental atmosphere rich in content and meaning, which the citizenry recognises as its own, are collected together in the space. This continuity is reflected in the methods of arranging the volumes in the space and in the relationships that these volumes establish between each other and with the pre-existing historic environments.

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## Illustrations and tables



**Figure 1.** Austrian cadastral map, Noventa Padovana, foglio 7, 1845 (source: Archivio di Stato di Padova); aerial photograph, 2007 (source: Sistema Informativo Territoriale di Noventa Padovana).



**Figure 2.** Historical photographs: the old bridge, 1900 (source: Broetto, Gallo, 1977, p. 19); the small village of Noventa Padovana, 1910 (source: Gallo, 1998, p. 25).

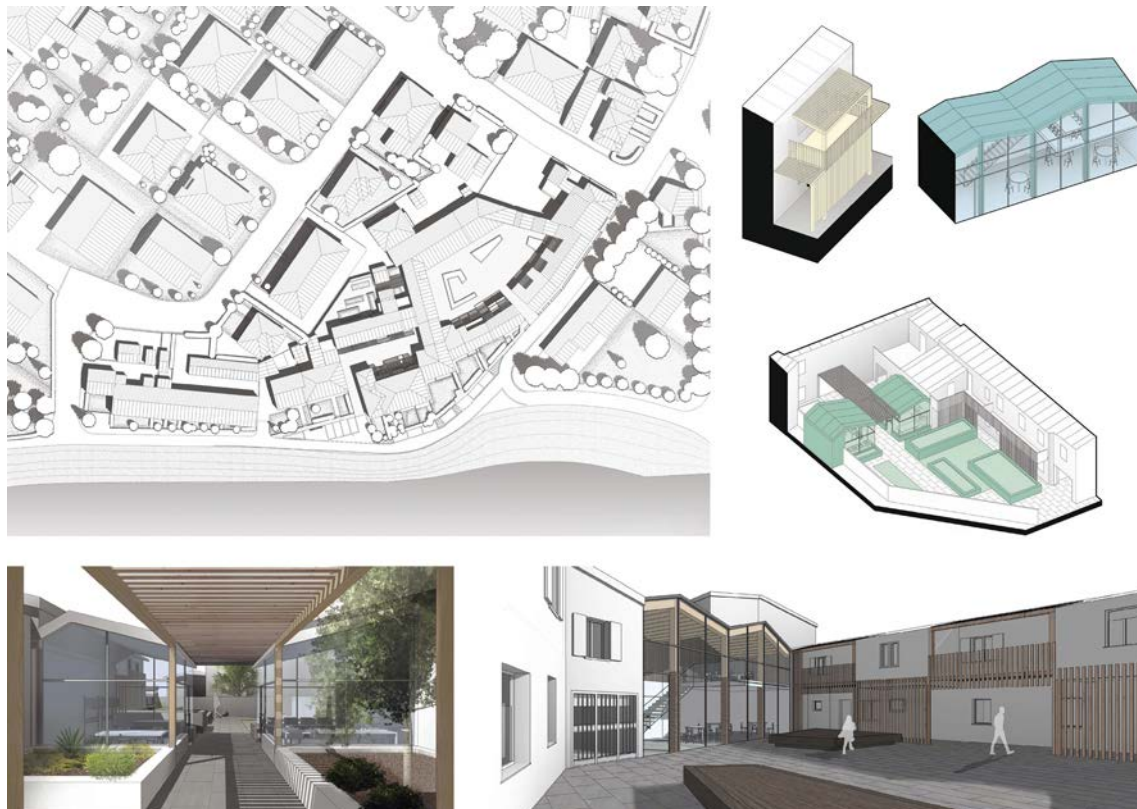


**Figure 3.** The old village of Noventa Padovana in the present: the main internal courtyard.





**Figure 4.** Marco Sottana, Ilaria Zoccarato, urban regeneration design of the Noventa Padovana old village near the Piovego bridge: general plan; view of the court to the south; view towards the multifunctional buildings.



**Figure 5.** Filippo Baldan, Marco Baratto, urban regeneration design of the Noventa Padovana old village near the Piovego bridge: general plan; the three new architectural elements, the multifunctional collective building, the wooden porch, the social gardens; view towards the new courtyard of the social gardens; view of the main courtyard towards the multifunctional collective building.





## From Mastercampus to Mastertown: a project of a self-reflective urban community

Carlo Quintelli

Dipartimento di Ingegneria e Architettura. Università di Parma Via delle Scienze 181/a 43124  
Parma

E-mail: carlo.quintelli@unipr.it

Keywords: *campus, city, community, urban project, urban physiology*

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *The research on how the concept of self-reflective community can be the basis of a methodological characterization for architectural and urban design, especially in its regenerative task on the existing city, arises from the redesign experience of the Science and Technology Campus of the University of Parma named Mastercampus and the resulting urban project Mastertown.*

*The not only intellectual and cognitive but also socio-behavioral potential that resides in the university community conditions the tools of the project understood in a transcalar morphological and physiological process sense, investing the research logics of complete form, of innovative functional performance and semantic characterization of the pre-existing settlement.*

*This experience also had an experimental result applied through the so-called Mastercampus project from which a first methodological framework was derived. This design research has given rise to a subsequent field of application, that of the historic center of the city of Parma which is undergoing, as in other cases, an unprecedented process of peripheralization, that is, a loss of role and image. In this case the self-reflexive mechanism is more composite but uses a similar logical procedure. The MASTERTOWN project has been developed at the moment only on the proposal level..*

## Introduction

The research on how the concept of self-reflective community - that is, capable of evaluating one's own needs thus adopting choices and actions that fall upon itself - can be the basis of a methodological characterization for architectural and urban design, especially in its regenerative task on the existing city, stems from the redesign experience of the Science and Technology Campus of the University of Parma called Mastercampus and the resulting urban project Mastertown. A project developed between 2014 and 2017 by Mastercampus-lab when I held the position of building university vice-Rector. An experimental project in the hermeneutic and methodological path of an Italian tradition aware of the necessary and unavoidable relationship between architecture and city.

## Analysis and methodology

The scope concerns the university campus located south of the city, near the left bank of the Parma stream, which extends for about 77 hectares and where all the scientific and technological departments are currently located, with the exception of Medicine and Veterinary, in addition to the CNR, the Regional Technopole and important sports equipment also for use by the city. A campus, however, whose initial design was interrupted in particular in terms of quality, compared to an initial design based on a coherent settlement model at all scales, from the territorial to the building one.

To better understand this qualitative deficit, let's look at the campus foundation phase.

We are at the end of the sixties and the team of Fernando Clemente, architect and urban planner at the University of Bologna, hypothesizes a linear suburban settlement attested to the south of the hills, near the ducal residence of Sala Baganza and the Boschi of Carrega. It was a question of conceiving the university campus as a driving factor for a great urban development that would also involve the function of management services, in that historical phase considered decisive in supporting a renewed industrial dynamics in the country.

A later variation of the project, less modeling and more proportionate with respect to the characters of the pre-existing urban core and the real functional needs, resizes the settlement projection and keeps the campus closer to the city. From a formal point of view, the interpretation of the ancient Roman centuriation that characterizes the context of the plain is adopted as a settlement matrix albeit through an angular deviation in accordance with the course of the waterways and a reasonable degree of freedom of adaptation to territorial signs.

Through a settlement matrix shaped through mathematical models of optimization of the distribution and functional relationship, and here the influence of contributions such as Christopher Alexander of Notes on the synthesis of the form is evident, a modular morphological fabric is created that can be adapted to the morphology of the territory.

A modular plate settlement system of a macrostructural and systemic nature, according to a modernist conception of the city, derived also from the CIAM of the 1950s and from the experience on the theme of business centers of the early 1960s. A modularity based on the orthogonal principle, with horizontal development through which to develop the positional hierarchies and distribution paths.

A systemic of urban design that is reflected, deterministically, in the same typology and language of the plate elements that make up the mosaic of the overall system. According to an architecture that asserts itself not so much on the building as object, but rather in its extension and urban morphological continuity.

But as often happens in the Italian context, over the last thirty years of the twentieth century the character of this design approach is lost while the settlement dimension of the large suburban

university complex remains. To date, only one pavilion has been built, making up the original fabric and most of the rest, according to a logic dictated by contingency, has structures of more or less high architectural quality according to heterogeneous typological characteristics. Faced with this situation, almost sixty years have passed since the founding phase of the campus, university governance, the one that began its action in 2013, aware of the importance of the settlement quality of the structures for teaching and research and to respond to needs of the new generations of students and teachers, inaugurates a new programmatic season focused on the urban regeneration of the campus called the "Mastercampus Project". A project that consists of concerted actions of densification, linking, re-functionalization and redefinition of a completed formal structure of the university campus as part of the city.

But Mastercampus is not just a project for the formal completion and reconstitution of an unfinished university settlement. It also represents the attempt to shape the contents of life, starting from the potential that this particular urban ecosystem presents in terms of people, environments, equipment, activities particularly focused on research and training.

We could define an assumption of a sociological nature and functional attitude that was already well present in the ideogrammatic sketch intended as an initial concept of recognition of the resources present on campus in terms of knowledge and skills. A nebula of subjects and related activities that releases its contents on the applied field of the project in which the physical, functional and identity world meet and feed each other. A relapse that systematically makes the campus a field for applied science experimentation, through professors, researchers, students. According to this strategy, the shape and functionality of the campus reflect the community that inhabits it and vice versa.

The project sought to understand which components, including teaching and research, could be involved for the achievement of the objectives. The result is a synoptic framework where all the scientific specialties, called to actively collaborate in the Mastercampus project, have been reviewed, positioned and put in synergistic relationship. From biology to chemistry, from engineering and architecture to environmental sciences, from food science and pharmacy to geology and ICT science. A powerful inter-sectoral mechanism, with composite interdisciplinary groups (in the quadrangles), or in more homogeneous disciplinary groups (in the circles) all oriented towards a single goal, that of the renewal of the campus within which they live.

The effects and the expected results of this common effort are different on the actual level, some remained at the project level, others achieved. First of all, we are faced with a regeneration and settlement densification intervention capable of reducing by 40% the use of agricultural land provided for by the Municipality's planning tool in terms of settlement expansion of the university destination. An emblematic result of the expansive containment of the city that can be assumed as a model for other settlement needs that can find an answer within empty spaces and abandoned areas or constructions of the fabric already built.

In a process of formal and functional restructuring of this kind, another fundamental design move concerns the definition, or rather foundation, of a central place for the entire settlement: a square if we are talking about the city, a mall if we are referring to the tradition of campuses. However, a reference space for the whole university community.

The choice of this centrality derives from analyzes that involve pre-existences, existing and potential relational fields, the logics of accessibility and mobility, orientations and angular deviations of a composite and hybridized orthogonal system.

Obviously the centrality is defined through the concentration of the collective services of the campus such as canteen, library, museum, etc. etc. and the project hypothesizes different

combinations capable of involving pre-existing voids and volumes in the economy of drawing. A concretization of full but also empty volumes in terms of morphological definition, according to a dialectic that shapes the central space by catalyzing the entire settlement organism on itself in terms of functional offer but above all of the presence of life and symbolic value.

The project describes the size and shape of the central space intended as a forum on the campus within which the diverse community of teachers, researchers and students can not only meet and aggregate but also express their identity.

Between 2014 and 2017 many interventions consistent with the design of the Mastercampus were carried out: the library, study rooms, technopole, soft mobility and signage. In addition to these interventions, a significant photovoltaic system is also capable of characterizing the architecture of the meeting spaces.

In particular, what we have called the photovoltaic Garden-Square, a hypostyle structure that returns a large area of shade and shelter for the spaces frequented by students overlooking the large plexus of the Science Classrooms, at the same time capable of supporting an extensive battery of photovoltaic panels able not only to make a significant contribution to the energy demand of the campus, but also as a case study for teaching and research activities in engineering and applied physics.

The strategy of densification and urban development of the pre-existing settlement provides for additional functions such as that of the research carried out by companies to be connected and complemented with the university one, while maintaining the latter all its autonomy of direction, especially with respect to basic research.

The settlement translation of this idea contemplates the insertion of new linear type blocks in spaces still available between the campus pavilions, capable of hosting selected companies of advanced research, that of process and product innovation in the perspective of patentable results over average times long (5-10 years).

Companies in particular in the chemical pharmaceutical, food, biotechnology, computer science sectors able to correspond to as many research departments present on campus.

The new bodies of this added research component, called Innohub, according to a clearly identifiable configuration within the campus, are conceived through a modular logic that guarantees the distributive flexibility of functional spaces, plant systems and equipment to correspond to the needs specific to each research area.

Following a call issued at the beginning of 2016, the final balance of the expressions of interest by the companies was of considerable interest. About seventy advanced industrial companies, start-ups, small and medium-sized enterprises but also large groups such as Sidel, Elettric 80, Chiesi, CFT and later Bosch have shown their willingness to join the project already in the preliminary drafting phase. This initiative has stopped due to different choices determined by the change of governance of the University of Parma (2017) but which in the future, it is hoped, will be able to be resumed in the interest not only of the University but of the whole context of the city and its territory.

A further intervention of strong characterization of the Mastercampus concerns the so-called Food Project Area, where research laboratories, schools of advanced studies, country food labs for companies in the sector, equipment such as an experimental canteen on food issues are concentrated. In general, components supporting the context that sees Parma at the center, which can be extended to a large part of western Emilia, of the so-called Food Valley. A context not only where to enhance and improve the peculiarities of traditional products (Parmigiano Reggiano, ham, cured meats in general, balsamic vinegar, etc. etc.) but also to focus, through research, on objectives of innovation and sustainability of food production by

looking at to the international market and also to the nutrition needs of the most depressed areas in the world.

The reference to the rural courtyard, which was partially pre-existing, and the tower house revisited according to a typology in height intended for offices and teachers' studios, characterize the layout of the complex currently under construction.

The internal courtyard and the laboratory greenhouses also interpret the university site as an urban opportunity for aggregation and identity recognition on the food issue.

The set of interventions is aimed at producing a finished, hierarchical and articulated urban form through different places, while characterized by a significant relationship with greenery, open spaces and rural territory. The comparison with the morphological structures of other European campuses also confirms an urban conformation of the Parma campus according to the perspective of the Mastercampus.

An urban strategy of the university settlement that then involved other places and facilities, capable of characterizing Parma in its entirety as a university city.

The experience of the Mastercampus project was an opportunity for further developments extended to the city, those of the Mastertown project.

In fact, following the public presentation of the project for the campus, the municipality of Parma asked us to adopt a project plan for the historic city by borrowing the experimental methodology adopted for Mastercampus. A historic center now subject to phenomena of functional impoverishment, reduction of the commercial offer and services in general, including public ones, loss of cultural role not only or so much in terms of tourism but above all towards the inhabitants of the city.

The Mastertown project elaborates a program articulated on three main themes: 1) the central urban fabric, the so-called New Town, actually of Roman foundation and still today a civic center, so named for the continuous historical monumental increase; 2) the Oltretorrente district, the historic village of the city built just to the west of the stream along the Via Emilia; 3) the riverbed intended as a large river park connecting the city and the countryside.

The analytical knowledge of the great functional themes that affect the historic center, the places that interpret them, the criticalities but, above all, the potential also in terms of induced factors, bring out relevant design objectives. In the case of the western central urban fabric, the so-called New Town, the project focuses on restoring a district of taste and arts.

Objectives in turn characterized by specific project actions, on the regeneration of places and functions, for example commercial and cultural, but also of mobility, access to the town center and of an environmental nature in a coordinated way.

Just by way of example, it was a matter of prefiguring the commercial regeneration of Piazza Ghiaia, the historic market of the city of extraordinary ethno-anthropological value, and of the adjacent commercial stretch of Via Emilia, with the aim of better representing Parma as the capital of the Emilian Food Valley.

In particular, in the Piazza Ghiaia the project operates the placement of a structure dedicated to a permanent food market capable of recalling the values of tradition as well as the innovative ones of a contemporary agri-food culture.

Taking up the urban image of the old Beccherie luigine, the demolished slaughterhouse of the city located in Ghiaia on the bank of the stream, a project of Nicolò Bettoli, the architect of the Teatro Regio, it is a question of conceiving a place of sale, of local production representatives, of tasting, of training and education on the culture of food that today we also mean in terms of nutrition as well as taste.

The Mastertown process framework, adopted on the three thematic areas mentioned,



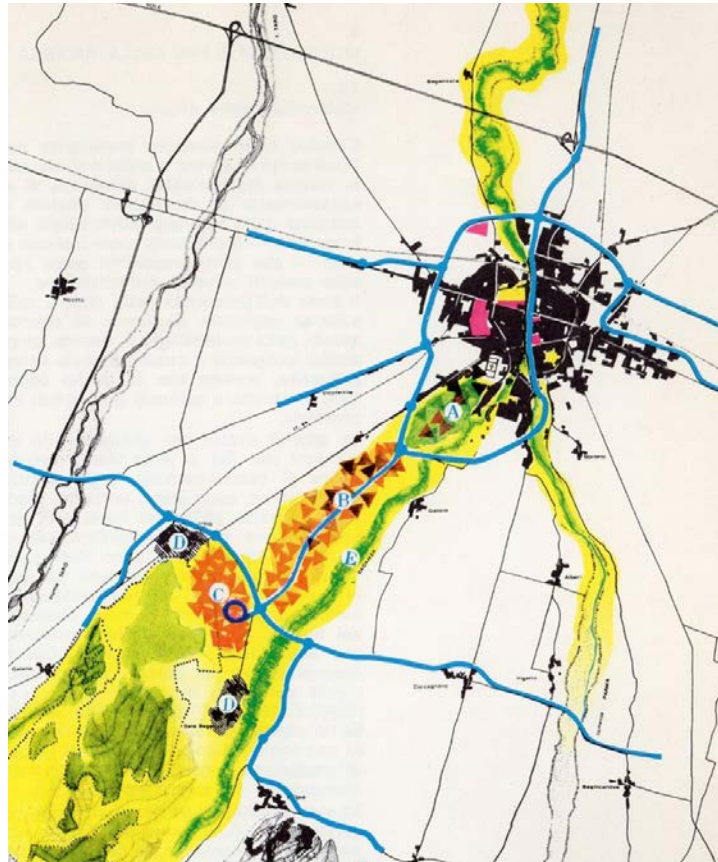
envisages activating over thirty specific project actions as repercussions of an urban culture that can and must rethink itself in the various sectors. That is, in this case too, to be self-reflective.

### **Conclusion**

The experimental experience described, albeit with some parts carried out with regard to Mastercampus, even before a constructed outcome that will in any case have to cross the difficult conjunctures of urban planning, has already produced an awareness of the need for a design culture capable of grasping in the essence of the resources of the existing city, from a semantic, material and anthropological point of view, the keys to its continuous regeneration. The university campus acts as a solvent for the pre-established models of the city, a sort of "anti-city", in the words of Guido Canella, capable of activating, in that reciprocal autonomy that encourages exchanges and possible synergy in intent, evolutionary processes unpublished and of great significance based on knowledge, culture, the sense of an articulated but open and participatory urban community.

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**Figure 1.** First settlement development project with university and urban facilities south of Parma, Prof. Clemente group, late 1960s.



**Figure 2.** The grid system characterizing the settlement structure of the university campus according to the design development of the early 1970s.

ORTOFOTO - MONTAGGIO MASTERPLAN DI PROGETTO



Figure 3. Photozenital plan of the Mastercampus project between pre-existing and new interventions (2017).

MASTERCAMPUS: IL CONCEPT E L'IDEOGRAMMA DI SISTEMA

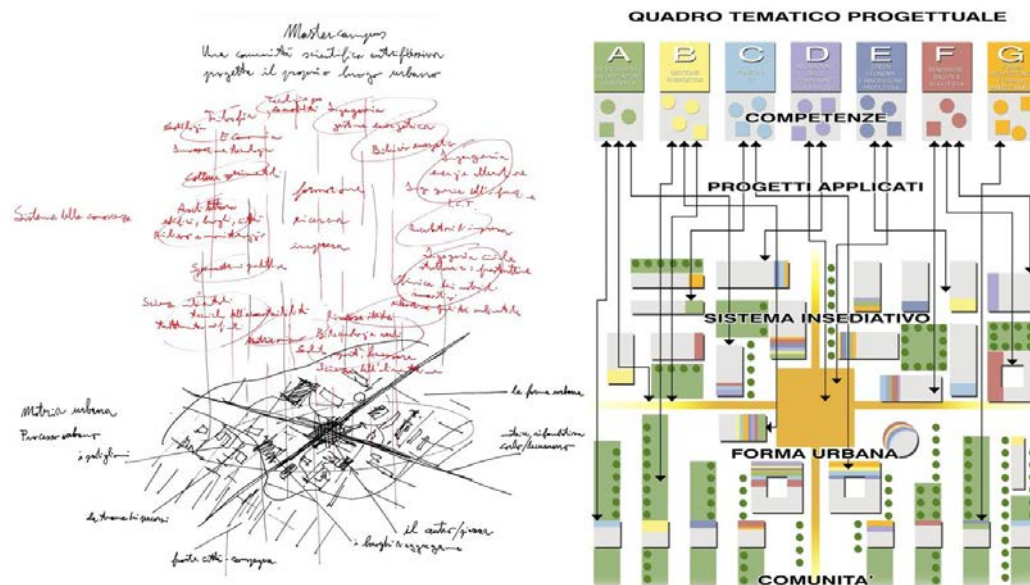


Figure 4. Ideogram and framework of functional contributions according to the Mastercampus model.

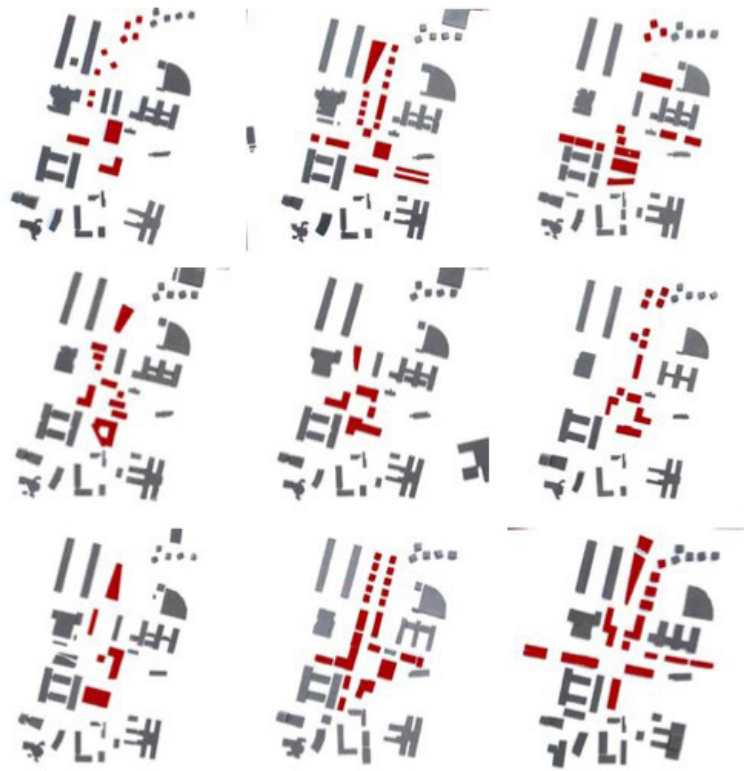




**Figure 5.** Identification of axialities to support a renewed morphological order of the campus.



**Figure 6.** Identification of central areas as places of settlement condensation and aggregation of the inhabitants of the campus.



**Figure 7.** The central square of the campus according to the Mastercampus project. Comparison of the dispositive solutions.



**Figure 8.** The Mastercampus project in a bird's-eye perspective.



## Formal / informal / syncretic. Towards a different notion of sustainable city

Antonio Vito Riondino

Dipartimento di Architettura, Costruzione e Design - Politecnico di Bari

E-mail: antonio.riondino@poliba.it

Keywords: *organic / inorganic, dialectical / contradictory, syncretic*

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** Massimo Cacciari says: “never before has the city been subjected to contradictory questions. Wanting to overcome this contradiction is only a bad utopia, it would be necessary to - instead - give it shape. The city is in fact the perennial experiment to give shape to contradiction”.

*This contribution investigates this hypothesis, assumed as a theoretical-methodological foundation.*

*The contradictions characterizing the city, the territory, the contemporary landscape, whether they regard the roots of the ancient city, or which concern the territories of the new globalizing vision, represent this condition as never before in history. In fact, the city seems to manifest itself more and more as a place of the unfinished, that is reflected in the forms of its languages, in the fraying of every relationship with history and of every type-morphological regulation.*

*For this reason it's necessary to review the traditional notion of organicity as the basis to face the processes of sustainability and redevelopment according to new critical forms.*

*The dissertation is on this specific topic, comparing the type-morphological and the linguistic systems of history with those derived from the new phenomena, to recognize a possible different “organic” reconfiguration.*

*The methodological hypothesis concerns the exercise of the dialectical contradiction based on the recognition of the difference, based on analytical-design examples-studies aimed at finding traces of a “critical upheaval” in the urban crisis, by proposing formal (and cultural) syncretism useful for redefining the concept of sustainable living, according to a newly established relationship with the language of city.*

### **Theoretical-methodological framework**

Massimo Cacciari says that, never as today, "the city is subjected to contradictory questions. Wanting to overcome this contradiction is only a bad utopia, it would necessary - instead - to give it shape. The city is the perennial experiment to give shape to contradiction".

This is a hypothesis to which this contribution adheres, assuming it as its theoretical-methodological foundation.

The contradictions that characterize the city, the territory, the contemporary landscape, whether they develop on the roots of the ancient city or affect the territories used by the new globalizing vision, represent this condition as never before in history. In fact, the city seems to manifest itself more and more as a place of the unfinished, an incompleteness that is dragged along in the forms of its languages, in the fraying from any relationship with history, from any type-morphological regulation. Hence the need to review, today, the traditional notion of organicity, investigating new bases through which sustainable forms of settlement units can operate, capable of connecting to the consolidated city what deforms its codes.

This contribution is right on this topic, focusing the reflection on the comparison and on the limits that this organic relationship can recognize in the relationship between the type-morphological and linguistic codes inherited from the history of the cities under consideration, and the informal ones present in their regressed places.

The aim of the study is to experiment with possible methods through which to resolve the pathologies generated by the contemporary city with regard to the urban palimpsest, focusing above all on its peculiar areas, in order to suggest redevelopment methods capable of extending to the processes of re-signification of the general form urban.

The methodological hypothesis is that of the exercise of the dialectical contradiction based on the recognition of the differences that cross the set of such phenomena. It makes use of examples-studies conducted on an analytical and design level, aimed at finding traces of their possible "critical upheaval" in the urban crisis, proposing formal (and cultural) syncretisms useful for redefining the concept of sustainable living, according to an intersection between the language of the city, and the new social demands, not yet well defined.

The city appears, in fact, as the outcome of a process inherent in the contradictions caused by the different instances that have occurred over time; requests to which architecture has responded, often organically referring to the inherited palimpsest; often, on the contrary, subverting its own codes because of the unprecedented mutative needs.

Marc Augé has written that "Contemporary architecture no longer seems to have eternity as its goal, but the present". A haphazard and transitory present, chosen in some cases as the analogical form of the consumer product, subverting its original function into that of the mass-media image, programmatically lacking its own linguistic and temporal stability.

In fact, its prevailing character seems to manifest itself more and more in the incompleteness of its phenomena, an incompleteness that is dragged into the semantics, the languages, the fraying of the relationship with history with regard to the inheritances that are nevertheless present and often operating in the urban organism. Hence the need to review its form today, characterized by a growing condition of "imperfect", which leaves openings for new interpretations, if accepted in the opportunities within its own crisis.

It is an approach that involves reading methods and design methods differently acting with respect to urban planning practices; "probabilistic" approaches determined by the vulnerability of the data, resulting from the instability of the phenomena, but which for this reason should be brought back into a new gnoseological framework necessary to undertake a different consideration of regressive and "waste" phenomena.

It is an approach that intersects, in a certain way, the thought expressed by Gilles Deleuze regarding the value of difference, as a necessary foundation for the recognition of the identities that structure the complex world of knowledge and the relationship between things.

As an alternative to the unilateral vision of the organic city, this instance represents, in our architectural reasoning, the premise for a new way of thinking about the urban form, which finds its reforming premise in *fieri* to contradictions. The goal is in fact to consider the contingent (or errant randomness) as an entity equipped with potential signifiers which, due to their inconsistency, must be traced through a tortuous and anti-linear relationship with the legacy of history. Hence the need to consider the self-deterministic methods based on the cause-effect relationship of phenomena insufficient, and the need to rely, instead, on anti-consequential and relativistic methods of intervention.

The instrument of this procedure is the development of guiding entities obtained from the organic city, given to construct pro-mnemonic patterns destined to mutate in comparison with random phenomena, to then re-signify themselves in possible similarities of meaning and in desirable logical-critical neo-contextualizations.

The aim of this operation is to search in the "disorder of events" for possible relationships of interdependence between the invariants of the city and the elements that contradict them; that is, to reformulate them in logos capable of developing a dialectical dialogue aimed at uniting the differences in a perspective of critical syncretism within which the multiple instances find dignity.

In summary, the thesis set out aims to underline the value that imperfect phenomena can assume in the reformulation of areas capable of overturning their own crisis in an unprecedented ethical and aesthetic resolution with regard to the organic city.

Hence the need to attribute languages a-priori to the design of these places, or systems that are grammatically and syntactically recognizable, as parameters by which the random can be traced back to the forms of architecture and the resulting updates and any congruity.

Assuming an a-priori language means, that is, building a cognitive plane through which to experience the underlying reality, providing it with a comparative parameter through which to "scientifically" identify its inaccuracies or errors. Following the Aristotelian thought, it is a process of knowability corresponding to the will of induction, therefore contrary to the deductive approach that is typical of the project as a direct result of the analysis.

In Noam Chomsky's cognitive theory, language is in fact the result of the mutations that have occurred in the generative structure, resulting in a hereditary schedule destined to leave traces in subsequent developments, to the point of producing variations, even changes in meaning. This happens in all forms of language, including architecture.

The hypothesis that language therefore has an innate basis (in architecture, represented by the very meaning of living in its primal forms) and that it develops and regenerates itself in relation to the conditions of chance induced by cultural and anthropic mutations, represents, albeit broadly, the matrix of any evolutionary act and the thesis shared by our discussion. The studies dedicated to cognitive processes regarding the forms of representation and communication of knowledge, have also shown how thought coincides and develops, through the trajectories implemented by language itself, in the moment of its crisis due to new instances, often even outside his needs. Fundamental, in this process, is the "arbitrary" component, meaning by arbitrary the action produced by the contingent, by the random, by the unexpected, which asks us to discover the hidden possibilities (perhaps) in unusual phenomena. By translating them into the architecture of the city, they are the places of the absence of meanings, of conforming measures, of unprecedented perspectives and of inaccurate and

problematic visions that, if grasped, would invite us to experience capable declinations of a new inclusive and sustainable city.

By applying the concepts so far exposed to the projects illustrated in these pages, the a-priori language finds correspondence in structures which, derived from the invariants of the city of reference, have become a parameter of involvement of the underlying structures of the intervention sites.

Here, undergoing the conditions, they have, in reverse, borrowed their assumptions, transforming themselves into schemes intrinsically subject to the pre-existing context. This is a fundamental step in our design method. Referring to the thought of David Hume, it in fact aims to base its strong ideality on the truth of reality, which is, by its nature, the set of induced forms and those of a derived randomness.

Providing the project sites with an a-priori linguistic structure therefore means providing them with a semantic system capable of developing an awareness of one's own condition, being able to refute it in the unfolding of the relations produced by the new tensions.

In this sense, the places of the informal not only become an extraordinary gnoseological field capable of producing the coordinates necessary to resolve the condition of "shattering" that crosses the contemporary city, but they are also, at the same time, the field within which to develop the evolutionary possibilities of grammars inherited from history.

Fundamental, in this process, is therefore the way to interrogate these phenomena, and what use to make of the hypothetical induction of the linguistic parameters coming from the innovative requests.

In our theoretical-design hypothesis, this process corresponds - as has been said - to the preparation of a "generative" grammar which, derived from the interpretation of the place, is synthesized in the definition of its urban-territorial-landscape invariants. The next step is the one dedicated to the use of these invariants, in the construction of an ordering structure capable of making a logical synthesis of the reformulation processes (ideal / conceptual) of the place. The consequent passage is dedicated to the definition of evolutionary variables, activated by the critical reaction between the ideal order and the informal components of the place.

It is therefore a question of a non self-referential or deductive procedure, but, on the contrary, concausal-inductive, that is, based on the following transversal alternation: analysis / comparison / mutation-transformation; it is a method that, by exploiting the project, can tell us - following Kantian thinking - "what - first of all - we can know" with certainty, and what we can reinterpret from it.

Central to this concept is the recognition of the limit of our knowledge; a limit which, as the philosopher of the "Critique of Pure Reason" still warns, finds its measure in the legacy of acquired experience, that is, in an a-priori that precedes the phenomena of the object to be known. This legacy concerns both tangible forms and intangible phenomena that have built our knowledge and our memory, providing us with the basis of our awareness of reality. The a-priori language is what therefore offers us a concrete perspective on how to recognize the different truths that make up the unusual and deformed pictures of reality; truth that, subject to the increasingly conspicuous influx of heteronomous instances, becoming increasingly decisive in transforming the meaning and form of the city. The reverberation of random phenomena in the consolidated city, and above all in its peripheral areas, in its natural landscape, is what constantly upsets the possibility of combining order and transformation / past and future. Vulnering the veracity of the project's answers, this condition is the one that opens up great opportunities, however, to return to considering the project itself as a place of knowledge and development of further truths.

### The areas of design interest

The area of general interest is the Mediterranean city, relevant not only for the complexity of its urban, archaeological, naturalistic schedule, but also for the urgency due to the transformative movements which, especially since the last century, are undermining the formation principles and its same historical heritage.

These are cities, which, crossed by strong settlement contradictions, have therefore proved useful in developing design approaches based on the critical reformulation of the relationship between permanence and mutations, and on the role of "preservation of history" in critical continuity with renewal processes. Objectives, which, deliberately angled, have tried to explore the wish made by Vittorio Gregotti, namely a project intended primarily as a reorganization and reinterpretation of the existing.

On the operational level, they correspond to morphologically complete superstructures, which, by incorporating the components of the place, recompose them in "new relations of designation" and similar "relations". The clarity of this approach means that the expressive components of the project are delegated to a few but essential urban and naturalistic signs; signs capable of simplifying the urban history palimpsest of the city of reference, translating it into the anti-specular re-signification of the persistent contradictions in the different and indecipherable language of its informal environments.

The intervention area is the Sant'Anna district, located on the coastal edge south of Bari, the capital of Puglia, in southern Italy. It is an area characterized, until a few decades ago, by the fundamentally agricultural use of the land, but which due to its proximity to the sea has produced a rapid transformation of a settlement character, completely devoid of planning and coherence with the characters of the organic city, that is, with the recognizable characters in the formative processes that took place up to the beginning of the last century.

The city of Bari is mainly made up of four urban macro-areas. The first concerns the ancient city, the second, that of its nineteenth-century "appendix", the third, that of its expansion, the fourth, that of the widespread periphery that surrounds the consolidated city.

The ancient city is the result of the processes that, from the first Roman settlement, have been transformed during the Middle Ages through obstruction processes and transformation of the original building types. The Norman-Swabian domination and then the Arab, French and Spanish incursions, are still testimony today through a building fabric that shows its prevailing data through the pseudoschiera type, in part by now transformed into in-line houses. Inside - in addition to the residential fabric - the cathedral, the basilicas and some prestigious buildings confirm the organic nature of the building languages that span the different eras. The supporting structure is made up of the paths which, by fulfilling the main urban training laws, connect it to the territory and its first disorganized phenomena. In fact, the subsequent expansion of the city was built on the ancient "cardo", wanted at the beginning of the 19th century by Gioacchino Murat, Napoleonic vice-king in the Land of Puglia, in order to resolve the strong densification of the city and provide the necessary urban hygiene works. Rising to the south of the ancient city, it is configured as a perfectly four-shaped system organized on a regular grid, with a system of blocks composed by originally row-houses, then transformed, during the 1900s, into in-line houses. Very often the result of demolitions that have reconfigured the original heights, the new building types are those that have upset the original relationships and general urbanological characteristics, importing languages from those forms of architectural internationalism typical of the culture of the second half of the twentieth century. This is the period of the growing of the original Murattian district according to an expansion of the settlement grid and the consequent extension of the blocks towards the coast, that keep alive the organicity with its



own reference system. This is not the case for the subsequent expansion, the one which, which began in the 1960s, deformed the consolidated city according to interventions completely devoid of organic relationship with the already different characters imprinted in the two inherited urban forms. This process has configured the widespread "peripheralization" that innervates the main territorial directions of Bari: the coastal one and that of the hinterland, the latter affected by major industrial interventions. This theme was addressed by Ludovico Quaroni in the context of the New Town Plan which, produced at the end of the 1960s, had the aim (unique in Italian culture) to understand the city as a set of active parts of a planning that were, in reality, territorial.

The effects produced by that defeat are now more evident than ever in the regression activated by the current process of peripheralization. Which, paradoxically, sees the naturalistically most valuable parts of the territory as its object of conquest, namely those of the ancient rural hinterland and the coastal ones. The neighborhood of our intervention is located south of it and is characterized by the widespread use of single-family houses and small in-line buildings which, which arose as a temporary residence, then became a place for permanent living.

Lack of planning, the current district is equipped with routes originating basically from the ancient agricultural use of the land and subsequent small infrastructure works dedicated to connecting the district to the city.

The projects presented take note of this condition, trying to decipher possible morphological laws in order to translate the informal that presents itself as the first evident fact, into that of a potential perspective of "re-signification" critically adhering to the characteristics of the territory.

The matrices of this operation are the connection between the type-morphological nature of the informal neighborhood, and the differences inherent in the two organic cities: the ancient one and the Murattian one. Matrices, which, assumed as iconic of the Bari system, have gone to define the first measure and the settlement beginnings of the new tissues, in order to open relationships of critical continuity with the reference city.

By overturning the perspective, the projects have thus become a historical-critical field through which to borrow and "join" the imprecise condition of the existing to the forms inherited from the city of reference.

The method of historical-processual reading, aimed at understanding the formative phases of the city and identifying the data that make up and characterize its peculiar phenomena, has in fact used that double condition, not only as an active knowledge, but as a construction of a superstructural network necessary to consider the contradictions inherent in the informal, as its different but parallel invariants.

The sine qua non condition of the projects is therefore the search for a contact capable of resolving the disproportion between the type-morphological data of the place of intervention and the structural and linguistic characteristics of the organic city. In fact it is the "difference" caused by the superimposition of these phenomena that has indicated the "admissible" combinations, trying to reformulate what appears shapeless in a project structure capable of its own "critical organicity".

The effectiveness - in our opinion - of this method therefore lies in the relationship between the resistance assigned to random (pre-existing) signs, and the plot introduced as its ideal ordering. As in aleatory music, these phenomena are in fact the ones that highlight the "case", making it a transfert of new conceptual, thematic, formal affinities within the ordering structure.

By mutating contradictions into dialectical contradictions, the projects have become promoters

of possible situational and linguistic relativisms, mirroring the duplicities that form their sign palimpsest. In this new context the informal in fact finds the key to try to resolve itself in the operative affirmation of one's difference, bearing witness to the anthropology of the place, and not a metaphor of an urbanological archeology.

Equipped with a "readable" support, the informal has now become a system capable of suggesting diversity, involving and "repositioning" itself. It is produced by the anti-directionality of the ideal and informal system, as well as their coincidence in some points, elements or directions. These phenomena are destined to provide the new system with hitherto unexpressed spatial areas, such as - in accordance with the assumptions of Saverio Muratori - polarities, knottings, hiatus. In other words, areas capable of generating their own attractive contexts, transforming the morphogenetic mutation into a de facto polycentric structure.

Inside, the fragments of fabric, the gaps, the uncertain paths, the sporadic obstructions, the conspicuous thinning, from being "extraneous" phenomena have become "parts" of a "hypertextual" settlement unit in which the diachronies and linguistic heteronomies they find the possibility of balance and possible syncretisms. By iterating the existing to the ordering network, the overall structure has in fact (perhaps) assumed a degree of congruence, unfolding in an urban form now contributing to its differential motions.

As in "proportional geometry", the ordering network disappears once the support action to the compositional process was completed, perpetuating itself instead in the concinnitas that orders its figurative outcome and its very elements. To express it is the maximum thinning that characterizes the plants, those that, by converting the strong urbanological identity, in direct analogue to the cultivated countryside, ensure that the solutions adopted are perpetuated as a hinge of a selected schedule of the phenomena that cross the city.

The overall result is that of "exact" urban forms, almost always regular; forms that, appealing to the geometric aesthetics derived from the New Town Plans, express an urbanological order similar, albeit in the difference, to the characteristics of the consolidated city and its anthropized landscape. Characteristics that are also perpetuated on a typological level and that we could synthetically define "point-like" (building types such as single-family houses derived from the agricultural use of the coastal edge), or "linear" and "fenced" (aggregates composed of multi-family houses, or in-line houses, or row-houses and pseudo-row-houses, types belonging both to the historic city and in the contemporary suburb).

Specialized buildings are disposed in the new nodalities and polarity of the ordering grid, fixing the hierarchies with respect to the housing continuum and equipping the system with collective functions.

### Closing remarks

Through the specific theme of the dissertation, the topics dealt with made it possible to tackle a broader spectrum of theoretical-methodological problems dedicated to the contemporary project. Having rethought these places in fact meant making a critical reflection, first of all on the notion of organicity, and with it, on the necessary reformulation in the light of the demands of our time. Instances that today require a new gnoseological field through which to understand the meaning, the logic and the ways in which to make our interventions sustainable, starting from critical continuity with urban history. This is a theme that requires us to accept the weakness of our answers as inevitable. In fact, cultural, anthropic and social transformations require not only the renewal of operational tools, but also the ways in which to express new sensibilities, focusing research on what the history of the city could not have foreseen; that is, those territories of our living within which the informal, the regressive, the unfinished could give us perspectives

of new synchreses for a contemporary, differently sustainable city.

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## Illustrations and tables

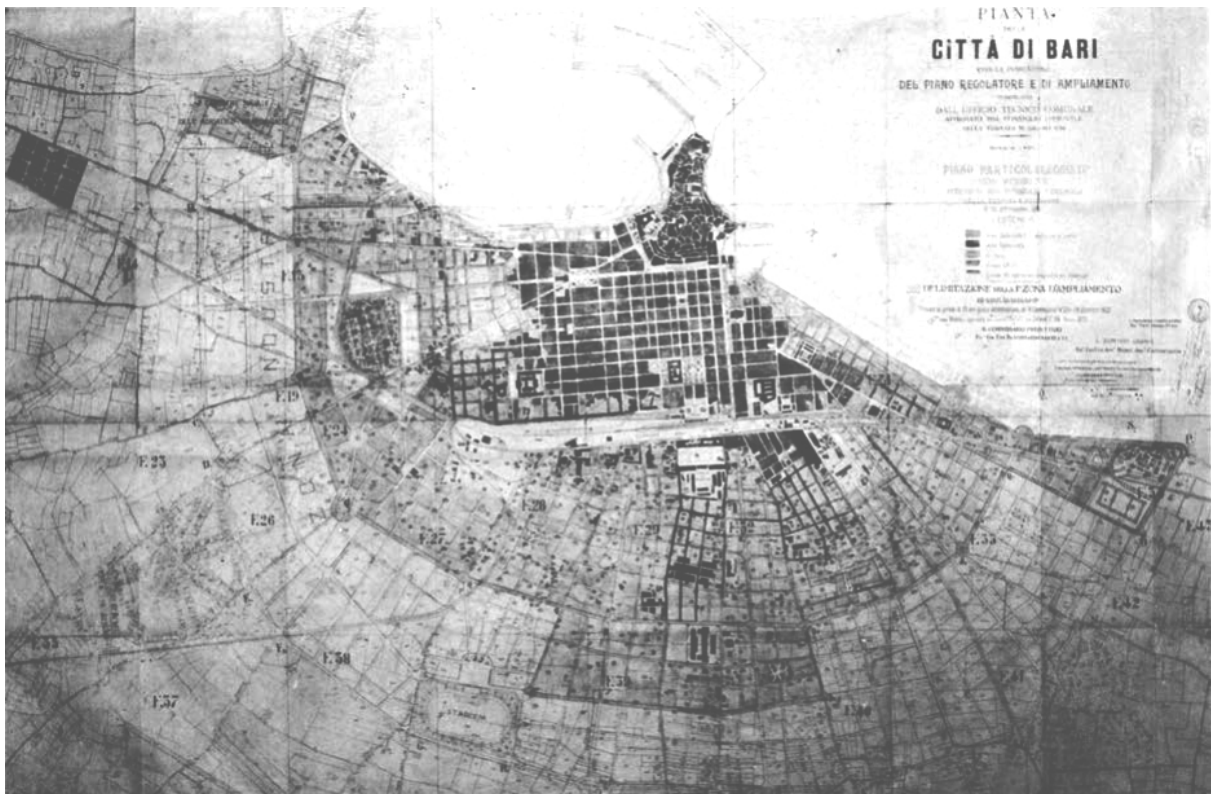
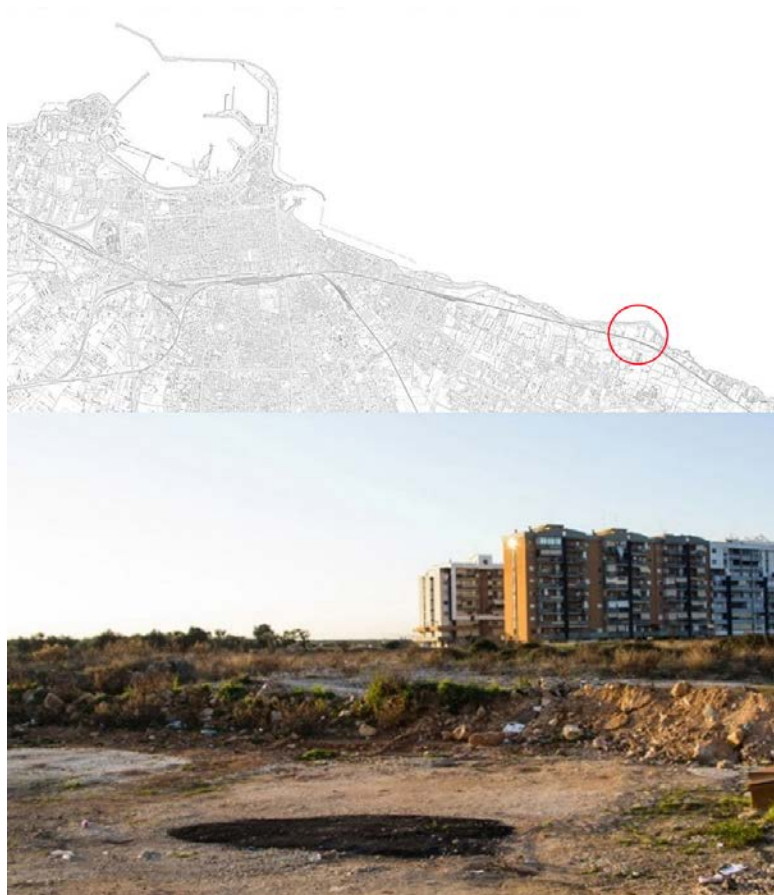
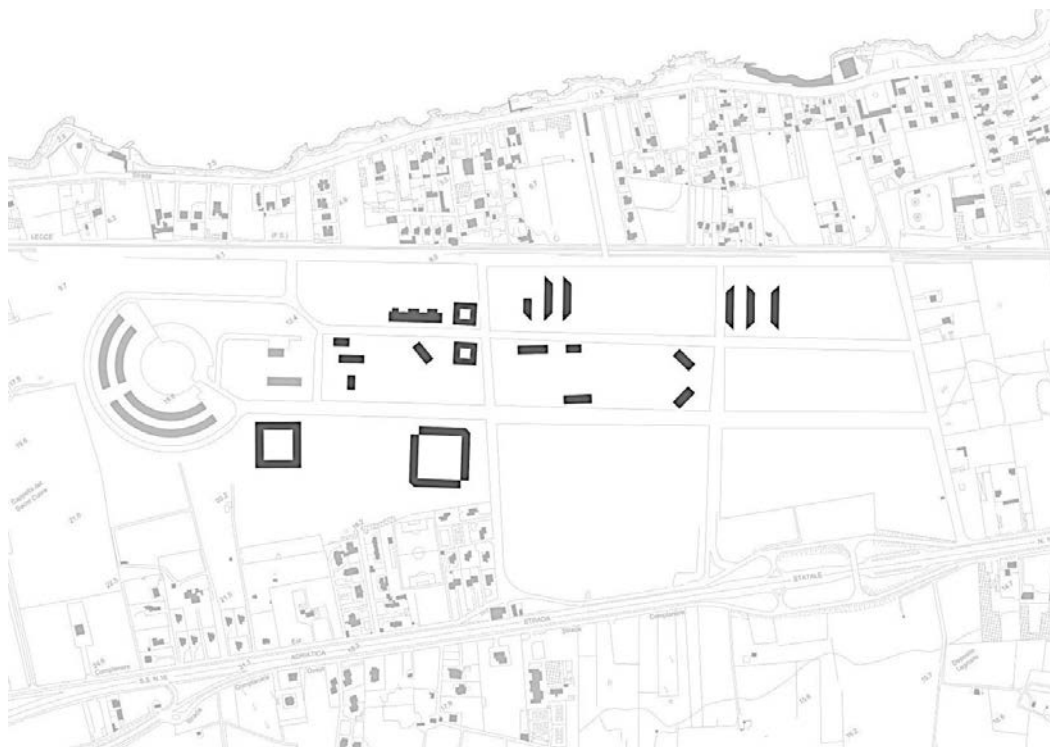


Figure 1. Plan of the old city and the Murattiano district.

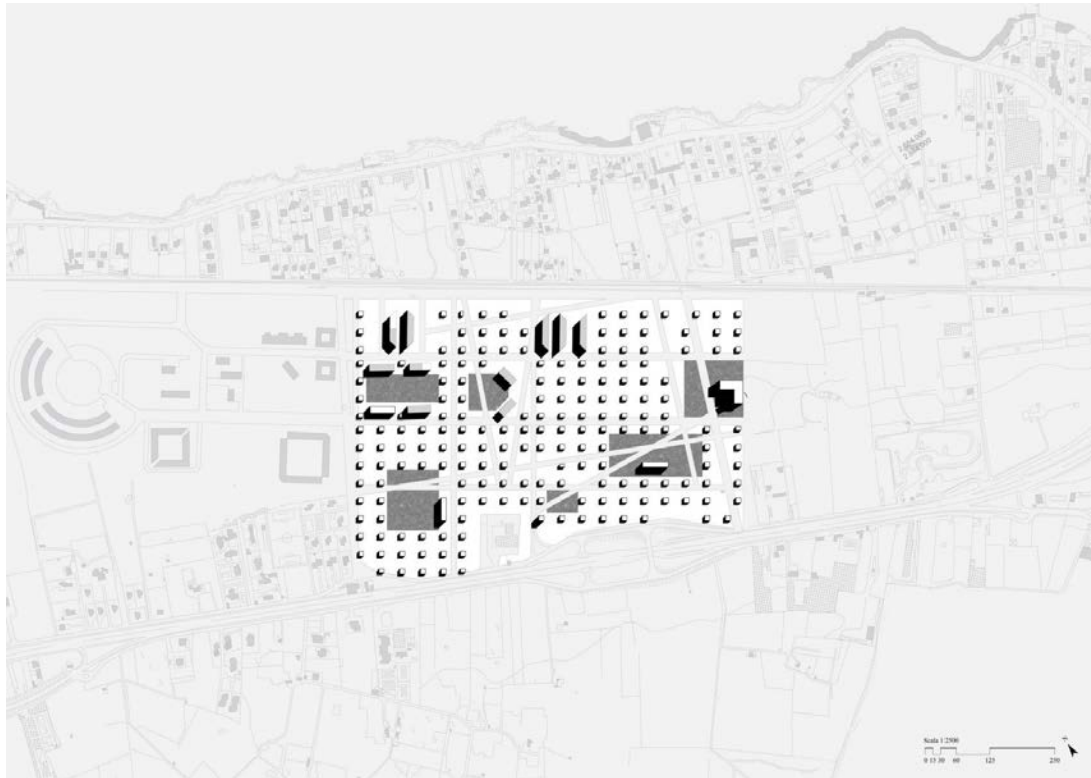


**Figure 2.** Above: the current urban structure and the project site. Below: the outskirts of the south coast.

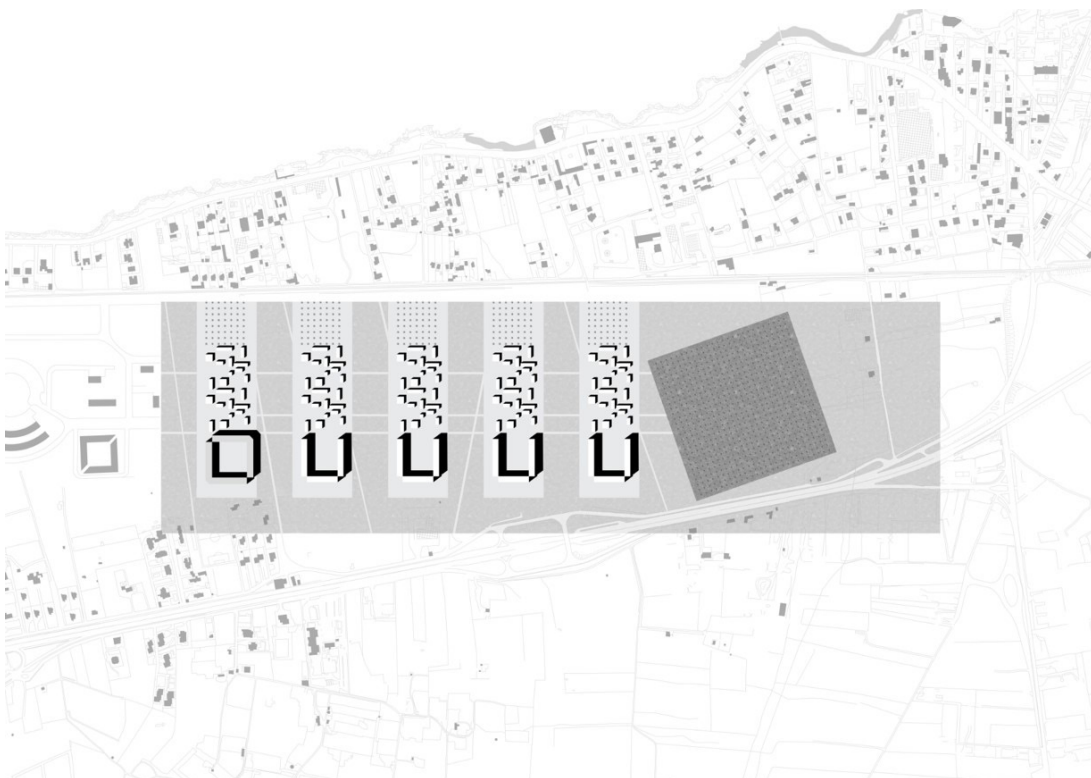


**Figure 3.** The Sant'Anna district: project area.





**Figure 4.** First solution: "point" system based on the single-family building type.



**Figure 5.** Second solution: system of "urban islands" composed of a "point" system and blocks of in-line houses.



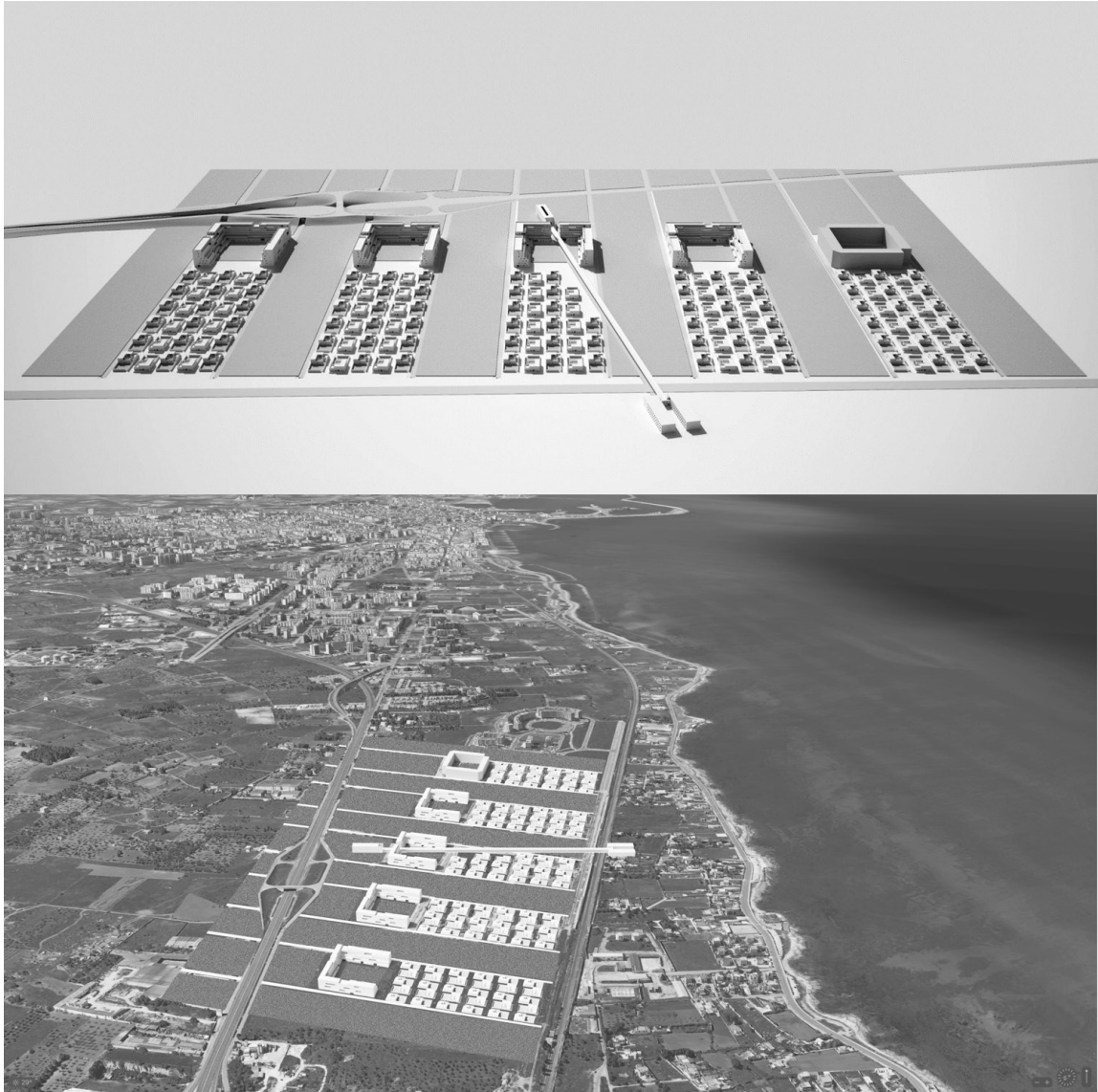


Figure 6. Model and perspective view.



## Margins in contrast: the quarry landscape of Matera

Giuseppe Francesco Rociola

Dipartimento di Architettura, Costruzione e Design - Politecnico di Bari

E-mail: giusepperociola@yahoo.it

Keywords: *landscape, urban morphology, quarries, brownfields, re-use*

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *This study concerns the suburbs in which two opposites coexist: the degradation of the brownfields and the historical-cultural-environmental value of the context.*

*The topic is about Matera north, whose tissue is characterized by the conflicting coexistence of the rocky landscape of Via Appia, the ravine on which Sassi neighborhood rise, the modern and contemporary districts and the industrial area, the latter including blocks spread in the landscape. Among the brownfields there are several abandoned quarries absorbed by the suburb, raising interesting issues about the future role of these spaces.*

*Case study is the former quarry of Palomba, located at the intersection among Via Appia, the belvedere towards the ravine and the contemporary fringe belt. A space "in between" summarizing the morphological indeterminateness of this urban-rural node, that is an opportunity to try to define new "places of transition" that seek to build links between abandoned areas and the urban-landscape cultural heritage.*

*In particular, the study includes the analysis of the settlement processes, understood as an introduction of the design hypothesis developed within the Thesis laboratory in Architectural Design at the Course in Architecture of Matera, followed by the author as supervisor, and aimed at verifying some of the analysis results.*

*The dissertation goal is to investigate the morphology of the settlement margin described, who expresses the contrast between the abandonment and the cultural values of the place, finally proposing a design hypothesis that verifies a possible analytical-planning critical path that can be generalized to other analogues cases.*

## Introduction

### *Field of investigation*

Urban studies on the suburbs, as we know, have long since expanded their borders, freeing themselves from the topological connotation of city-countryside border, once justified by the phenomenon of transition areas generated by settlement development in the second half of the twentieth century, now focused on those settled areas characterized by a widespread absence of formal quality and spatial control, as well as social criticalities, not always physically referable to an edge, especially if we consider the big cities that have long since lost their borders, replaced by dispersed blocks and infrastructures spread in the open landscape.

However, especially in the less industrialized territories and small cities that have undergone a minor demographic increase, it is still possible to identify a marginal belt that has edges that make it possible to distinguish the built of an urban fabric from the plots of a planned countryside, or from a wooded structure, or from a humid area, or in general from a landscape with a high environmental and naturalistic gradient that represents a certain type of spatial rarefaction compared to the density of an urban organism. This is the case, with few exceptions, of the inland areas of southern Italy.

This study addresses some aspects of this second type of urban-landscape structures, in particular by addressing the theme of the peri-urban from a specific angle in which two opposite values coexist: the degradation of abandoned areas and a historical-cultural-environmental value of the landscape context in which they are located.

This dyad constitutes one of the most problematic aspects of the "peripheral" condition, as it highlights the paradox between abandonment and decay, on the one hand, and cultural heritage, on the other. A coexistence between opposites that becomes more complex when it involves an iconic landscape such as the one being analyzed.

### *Case study*

Among the rocky landscapes of the Mediterranean, Matera is unique, thanks to a rock settlement stratified for millennia that collects numerous variants of excavated architecture, from the Neolithic to the nineteenth century, widespread both in the residential nucleus and in the rural landscape.

However, the northern part of the current settlement has an urban fabric characterized by the conflicting coexistence among the rocky landscape, crossed by the Via Appia and the ancient system of sheep tracks, the "gravina"<sup>1</sup> on which stands the Sassi district excavated in the tuff, the well known thousand-year palimpsest declared Unesco site, the modern and contemporary districts, and finally the industrial area, partly abandoned, consisting of warehouses, service areas and fences, dispersed in the landscape as isolated monads without any formal meaning as a totality.

The abandoned areas include several disused quarries, which raise interesting questions about the future role of these spaces in relation to what they represent for the urban history of the city and the landscape heritage.

Among the quarries, one in particular stands out, due to its multiple centrality with respect to the elements of the dyad described above: it is the former Palomba quarry, located at the intersection of the Via Appia, the belvedere towards the "gravina" and the current marginal belt. A space "in between" that summarizes the morphological indeterminacy of this urban-rural node, which is an opportunity to try to define new "transition places" that build links

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<sup>1</sup>"Gravina" is the local term for the ravine.

between abandoned areas and the urban-landscape cultural heritage.

Starting from the analysis of the settlement processes of this dual periphery, swinging between historical-environmental palimpsest and contemporary fragmentation, the study proposes a hypothesis of reuse of the quarry, aimed at verifying the critical issues emerged, through a "re-meaning" project that has involved two students of the Thesis laboratory in Architectural Design of the Architecture Course of Matera, followed by the author as supervisor.

### *Aim*

The goal of this essay is to contribute to the debate on the morphology of urban-landscape margins that express contrasts between the dispersion of industrial areas, with consequent phenomena of dismission and decay, and the cultural heritage, proposing on the basis of the analysis results a design hypothesis that verify a possible analytical-planning critical path that can be generalized to other similar cases.

### **The north-eastern margin of Matera between thousand-year legacies and contemporary amnesias**

The current criticalities of the Matera suburbs derive mainly from the growing fragmentation of urban processes starting from the second post-war period, when began the progressive collective "removal" of the ancient rupestrian part, the so-called "Città dei Sassi", with its pastoral landscape and Neolithic traces, because of the sociological researches which, between 1949 and 1951, highlighted the precarious living conditions of the inhabitants and gave the impetus to the "Recovery program of the Sassi" with the building of new neighborhoods and the colonization of the countryside, culminating in the first Luigi Piccinato master plan of 1954.

In that period Matera became a design laboratory in which designers such as the aforementioned Piccinato, with Quaroni, Aymonino and De Carlo among others, sought an updated synthesis between housing models of the "Land Reform" and the spontaneous languages of rural building, giving a local contribution to the neorealist issues, through the tectonic-expressive simplification applied to projects that had the goal of responding to the urgent need to displace the population from the Sassi district. From that debate arose a series of experimental neighborhoods such as Spine Bianche, Serra Friday and Lanera, La Martella, united by the search for alternative housing strategies instead of excavated terraced lamione<sup>2</sup>. It is under the pressure of that renewal, favored by the national uproar aroused by the writings of Carlo Levi on the primitive living conditions of the inhabitants of the rupestrian district, that the destinies of the two cities, that rock and the modern one, were divided, giving rise to the contradictions that they express the maximum intensity especially in the north-east part.

If we compare the settlement structure of the first half of the twentieth century with that of the second half, in relation to the open spaces, big divergences emerge and in particular the growing morphological and cultural distance of the modern city from the rocky landscape. In

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<sup>2</sup>The lamione (plural: lamioni) is the building type which extends the cave space, using the excavated material transformed into regular blocks. The surface of the basic module is about 4x5 meters, enclosed within a bearing structure of tuff. The roof usually is a barrel vault eventually completed with a pitched roof. Even the maximum interior height is about 5 meters, thus composing a cubic spatial-building module that can be aggregated in three directions: along the path, orthogonally to the terracing, in height. In many cases the module has a rectangular plan, with the depth prevailing on the width. The entire proportional system is based on empirical static observations regarding the thickness of the walls in relation to the light of the vault. The awareness generated by the continuous refinement of this technique, is transferred to the buildings and urban tissue, which maintains numerous references with the experience of the excavation.



the first case, the excavated terraced settlement, arranged on the west side of the ravine, has two territorial ridge routes as its upper limits: the first, parallel to the ravine, connects Matera with Altamura and Montescaglioso, linking to the Via Appia; the second crosses the first one transversely and retraces one of the oldest paths that continue towards the Tyrrhenian coast of Campania. A series of pastoral sheep tracks completes the road structure that is linked to the Citadel of the Sassi. The described double system of north-south and east-west paths constitutes the backbone of the settlement structure which, from the Middle Ages and especially from the 15th-16th century, has connected around it the main specialized extra-moenia buildings, among the which are distinguished the convent complexes and the Tramontano Castle, located at the point of intersection between the transversal path and the north-south one. The development of modern districts, starting from the end of the 1940s, takes place mainly towards the east, overcoming the previous limit of the north-south ridge route, and towards the north, gradually occupying the area enclosed between the nineteenth-century urban limits and the Via Appia. But, while the neighborhoods of the Olivettian urban renewal program attempted to define relationships with the existing settlement and road structure, linking to it and occupying the apical areas of the hills, the incremental development of the following decades absorbed those interventions, further expanding the urban boundaries with "additive" fabrics that have occupied the Murgian landscape without investigating a specific morphological and spatial quality.

The north-east part, in particular, is a sum of parts which, while sharing the edges of the ravine and its views, are separated by irreconcilable settlement and linguistic principles, in which the karst ravine, which contains in its bowels millennia of urban and landscape history, is the current theater in which the most emblematic dichotomies of this city enter the scene: the rocky landscape of the Murgia hills, the excavated district of the Sassi, the medieval monuments that act as visual fulcrums emerging from the residential fabric, the modern and contemporary neighborhoods, the industries and factories, the abandoned areas, the quarries.

It is a coexistence of opposite terms that can be perceived in the entire peri-urban area, and in particular in the areas bordering the ravine to the north, which have a problematic relationship between city and natural spaces, with a valley-front compromised by speculative subdivisions which, in several cases, have nullified the relationship previously existing between the historical path network that crosses the countryside and the Sassi, and the rocky border overlooking the stream. At the same time, the perceptive references in the rural landscape, previously characterized by clear altimetric hierarchies between the ravine, the Citadel and the rocky core, has been obscured by the vast urban development that has enormously extended the city, occupying the pastures indiscriminately. A widespread problem of which the north-eastern margin of Matera contains the main pathologies.

The general framework described calls into question a common narrative focused exclusively on the extraordinary palimpsest of Sassi, a UNESCO World Heritage Site, highlighting a syntactic dichotomy between the heritage-city and the peripheral-city formed by accumulation of disjointed and inconsistent parts. The thesis project presented is an attempt to enter in this dichotomy, trying to fine-tune an intervention method that seeks possible syntheses between thousand-year persistences, current criticalities and the search for new meanings for abandoned areas inserted in urban-landscapes contexts of significant cultural interest.

### **The quarry landscape**

The peri-urban area between the north-eastern limit of the city and the Via Appia fully expresses the duality between the rocky landscape heritage and the current contradictions. It is in fact

bounded by two opposite edges joined together by the rupestrian ravine; the southern one is dotted with scattered fragments including factories, a prison, hypermarkets, while the northern one includes a system of quarries joined by Via Appia. These are two opposite limits for two reasons, both for location and for meanings in terms of historical-cultural values, between which the ravine with the rock architectures insinuates itself.

Extending the view from the quarries to the excavated district of the Sassi, the diachronic coexistence between the two phases of the historic city emerges strongly. On the one hand, The Sassi district indeed expresses the archaic phase of settlement rock activity, as a synthesis of a widespread cultural landscape in which the technical of the excavation pervades the thousand-year update that from the Neolithic culminates in the lamione and in the urban type perfected during the Middle Ages, summarized in the excavation-construction cycle in which the subtracted matter, the calcarenite, is transformed into ashlar to become constructive elements of the buildings built above the cave. On the other hand, the system of quarries on the Via Appia represents the technical evolution of the same building thought, because the demographic increase in medieval times and the consequent urban development west of the ravine<sup>3</sup> made the excavation-construction symbiosis insufficient, making it necessary to specialize and separate the quarrying areas and the settlement. In this way, especially after the sixteenth century and up to the mid-twentieth century, the quarries on the Appia played a strategic role for the construction of the city.

This relationship between the quarries and the Sassi district, linked by the ravine, is counterpointed by the multiple forms of decay due to the multitude of isolated buildings and factories, partly abandoned, which dot the edge of contact with the contemporary city, entering into relationship with the rock heritage, interfering and intersecting the landscape and the connecting space. To this inevitable coexistence is added the current condition of the quarries bordering the city, all dismissed. They represent a particular kind of abandonment, since these are areas that can be defined as brownfields but which, unlike their common definition, are a part of the landscape heritage, due to the current cultural trend which is attributing dignity and value on those deep wounds inflicted on the morphology of the soil, arousing debates and researches on the possible ways in which to intervene. One of the most interesting issue in the current debate is the oscillation between two main strategies: the first, concerning the environmental restoration aimed to naturalize the quarries; the second, focused on the re-signification of the quarries as excavated spaces, through searching of new purposes, opening design scenarios on how to reconcile the "violence" from which the quarries gradually take their shape with the demands of our time, particularly regarding new cultural values that they can reveal.

What distinguishes the landscape of the Matera quarries from other similar cases is the organic relationship that makes them partakers of the thousand-year rocky landscape of the ravine, with its rock churches, the medieval monuments, the dry stone walls that delimit the pastoral enclosures, with the barren and steppe nature of the hills surrounding the city. All this emphasizes the importance of the Matera quarries as a cultural heritage, because the ancestral memory of the excavation as a tectonic matrix of the rock civilization thickens in them, because they are the testimony of the grow-up of Matera which, overcoming the limits of the archaic rupestrian "citadel", who represent the balance between excavation and construction on site, it became a real city and for this it was necessary to organize an autonomous stone excavation district.

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<sup>3</sup>The so-called "city of the plan", which identifies the urban fabric grew-up towards the rural hinterland, which encompasses the transformations from the fifteenth century to the contemporary.

The heritage described is contrasted by the contradictions of abandonment and decay of the abovementioned dispersed buildings. These are critical issues that act as a conflicting coexistence between opposites, within which the recovery and enhancement strategies of the quarries can be interpreted from a particular angle, because the aim is not to interpret the disused quarry as a “container” for new functions, but to design the quarry space in critical continuity with its mining history, re-interpreting the rock culture in a non-vernacular meaning, re-discovering their tectonic principles, the materials, the relationship with the landscape, the language. It’s a critical work that, in short, starting from a space involuntarily caused by the excavation activity, has the purpose of defining an architectural space that, on the contrary, expresses in the contemporary some essential elements of the very rich urban-landscape rock heritage of Matera, becoming a new testimonial element of the history of that territory and, in general, of the Mediterranean rupestrian world.

### **Re-thinking the Palomba quarry**

As mentioned in the introduction, the case study chosen to verify the reflections set out so far is the former Cava della Palomba, a quarry that summarizes several antithetical issues. On the one hand, it is part of the rock cultural heritage that, in that point of intersection, encloses a segment of the Via Appia, the Sanctuary of Santa Maria della Palomba, the edge of the Gravina di Matera, the paths to the main rock sites that face towards the citadel of the Sassi. But on the other hand, this quarry currently suffers a long process of decay, due both to the dismissing of the mining activity a few decades ago, and to the effects caused by the settlement processes which, wedging among these precious cultural testimonies, have produced the current peripheral dispersion. Overall, the quarry is therefore the point of convergence between opposing instances, but which reveals unexpressed potentials in order to rethink it as an attractive place capable of expressing the cultural values of Matera and its landscape through a project updating its principles, materials, spatiality, language.

The opportunity to develop these reflections was born within the municipal and regional programs for Matera European capital of culture 2019, with particular regard to the recovery of degraded areas and the creation of cultural meeting places. The former Palomba quarry, for the reasons set out above, was the ideal testing ground for the possibility of bringing the two opposite instances together, rethinking that gigantic excavation as an educational and exhibition center linked to the culture of tuff in its constructive and artistic expression. The intent was to translate the thousand-year tradition of rock civilization into an updated reinterpretation within the current social needs.

In particular, the functional program includes an artistic training school, an auditorium, an exhibition space for permanent and temporary exhibitions, a series of workshop-houses for sculptors.

With regard to the settlement principles, the general weave of the project was first defined, establishing links both with the routes and with industrial buildings and its lots, thus generating a series of alignments that made it possible to create the reference system of the project. Consequently, the design strategy was focused on the reuse of the stone material already quarried and abandoned, thus inserting itself in an ancient process but with current methodologies, reinterpreting both the archetype of the excavation, with the direct relationship between matter and material, and the industrial phase of extraction that concerned the quarry in question. A story that has been translated through the disposition of clear volumes characterized by the “expressive reduction” to only the tectonic values of walls and terracings, representative of the layered rocky landscape. In this way, inside the lower level of the quarry,

a vast rectangular chasm more than twenty meters deep, the different functions are articulated, through the overlapping of terraced volumes whose plano-altimetric configuration reinterprets the typical "neighborhood units" of the rupestrian fabric of Matera. The language is consistent with the relationship among the volumes, and is characterized by the simplification of the facades, marked only by a few passageways and some cuts in the walls to capture the light, in turn controlled and filtered through skylights and stone diaphragms, reinterpreting another architectural theme of the Sassi.

The lower external space of the quarry has been redesigned as a public space in which the steps and cutting planes, residual of the previous mining activity, have been reshaped to create spatial and visual links with the surrounding landscape, currently impossible due to the absence of vertical connections. According to this logic, starting from the stone material abandoned at the bottom of the quarry, the abovementioned landscape link includes: the open-air theater, the ramp that leads to the first level of the sculpture school, the system of ramps that, going up towards the edge of the ravine, connects the quarry at the Sanctuary and, finally, the underground passage that connects the Palomba quarry with the existing "Sculpture Park", built inside another adjacent disused quarry. In this way, an attempt was made to overturn the current insurmountable limit represented by the excavation and its vertical walls, which until now has been the main impediment to recovery and reuse hypotheses.

## Methodology

The analysis of historical cartography and archival documents has allowed to outline the territorial structure in relation to which, first the rock nucleus, then the medieval, modern and contemporary city, was formed, in close relationship with the ravine and the rural landscape. Thus, the main characteristics and persistences that characterize the Matera suburban area in the main phases of construction of the urban organism have been identified, necessary to understand the contradictions introduced by the development of the industrial area and the contemporary phenomena of decay and dismission. In this way we tried to determine the morphological and critical structure from which the project has been originated.

## Conclusion

The analysis of the urban-landscape cultural heritage of Matera has highlighted the dual relationship between two contradictory conditions: on the one hand, the extreme richness of its thousand-year palimpsest, on the other the strident interference of the peri-urban area, in which the factories and the abandoned areas press the limited spaces of the ravine edges. A kind of settlement short-circuit that has particular complexity in the case of the quarries, because they iconically testify the mining activity at the base of the rocky spaces that characterize the city of Matera and its landscape, but at the same time are emblematic of the pathologies resulting from the dismission of the production activities.

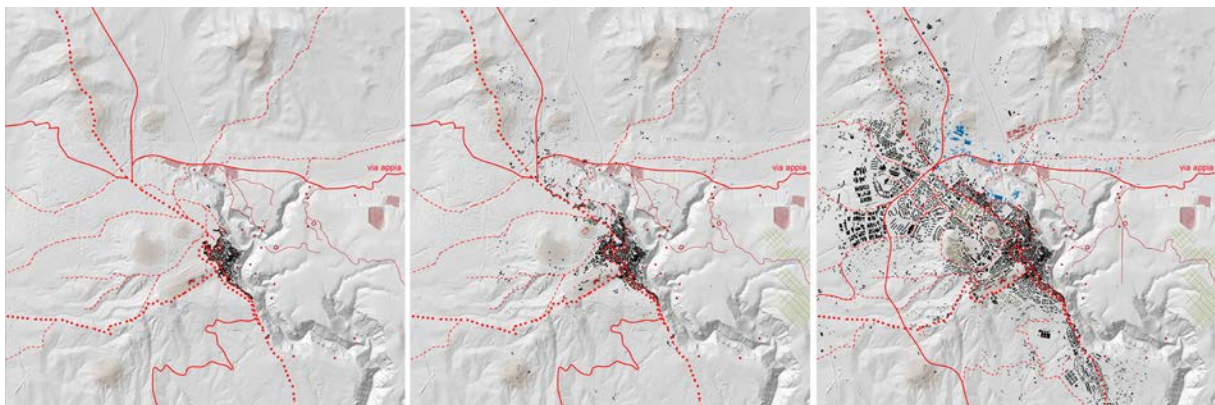
To these critical issues, the project presented wanted to propose a design method applicable, in general, in case studies characterized by the coexistence of an abandoned industrial area and a historical-cultural context of extraordinary importance, as a verifying application of the issues arising from the study of settlement processes. According to this method, the reuse of the quarry has been interpreted to transform a dismissed "landscape void" into a significant place that attempts to synthesize the thousand-year values of the rock city in relation to its landscape. The aim, as has been said, is not to affirm nostalgic references to erase the settlement disasters of recent decades, but to find possible forms of coexistence between the stratified rupestrian cultural heritage and the pathologies caused by the disjointed and at times atopic constructed

reality, trying to confer compositional dignity to its alignments, introjecting them into the articulations of the cultural center inside the quarry and, at the same time, putting it in communication with the cultural invariants of the place, of which it summarizes some essential features of its extraordinary settlement process.

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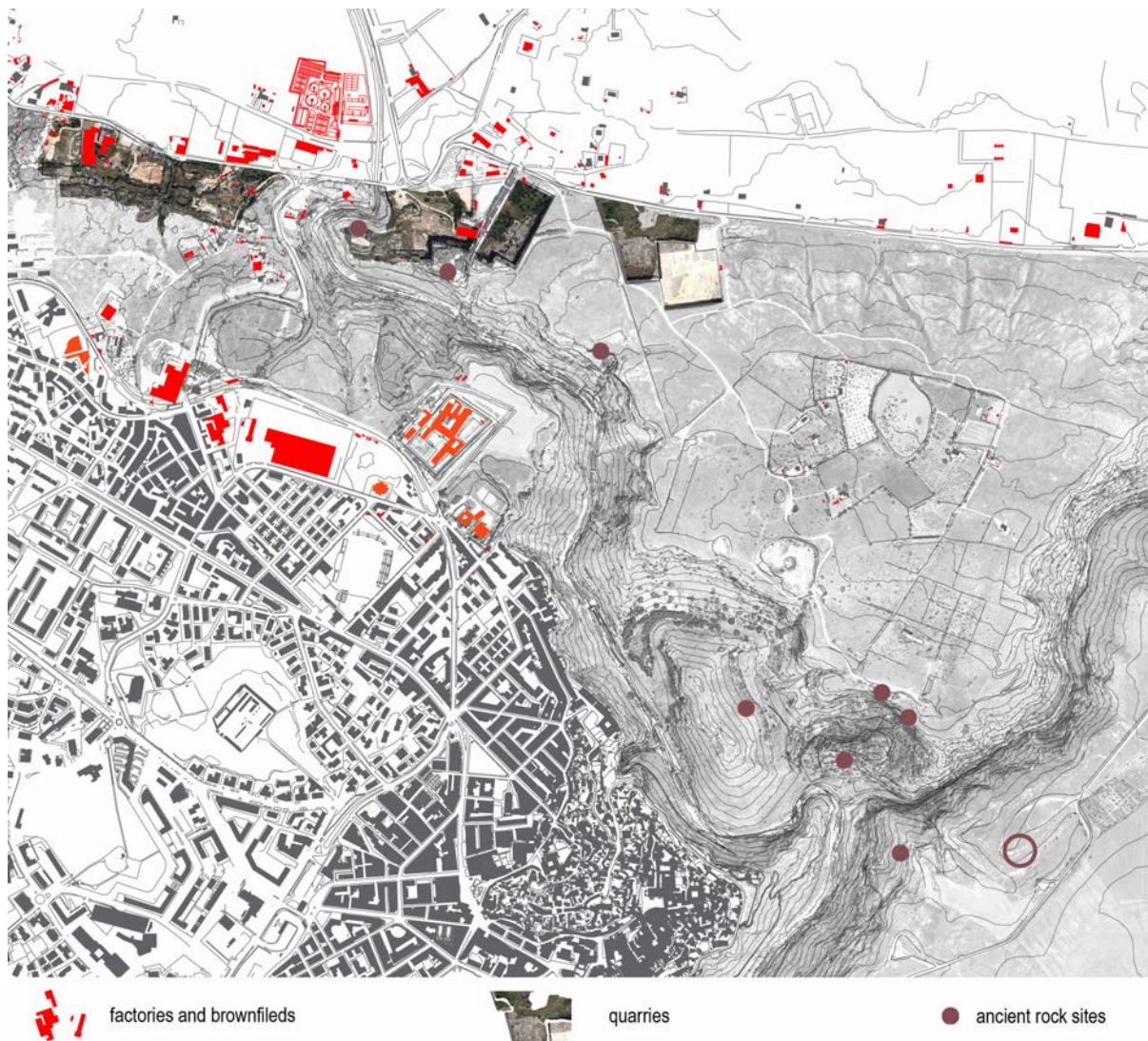
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## Illustrations and tables

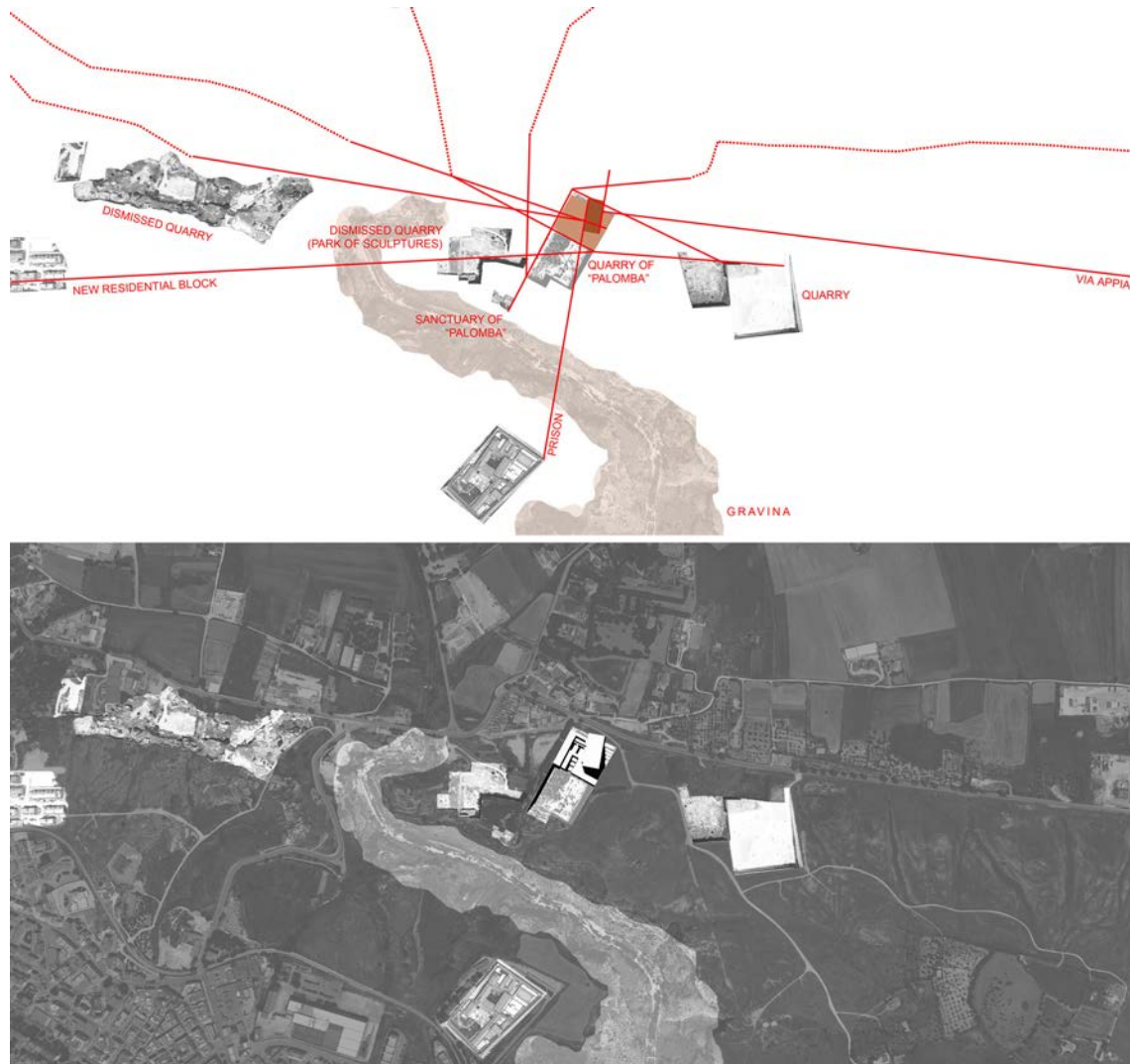


**Figure 1.** The main phases of the urban-territorial structure of Matera in the twentieth century. First half of the twentieth century: the rock core and the city "of the plain" grew-up from the Middle Ages to the nineteenth century, develops on the edge of the ravine, through clear relationships with the system of the ancient paths. The quarries along the Via Appia are clearly visible. Mid-20th century: The construction of the new neighborhoods begins to expand the city to the north and west, while the countryside begins to be urbanized by "Land reform" programs, with the creation of new arable land (the structure of the farms is marked in green). In the current phase, the peripheral dispersion and fragmentation of the northeastern part are evident: the industrial and abandoned areas (in blue) coexist with the quarries and the rocky landscape. The new residential districts are mainly concentrated towards the west.





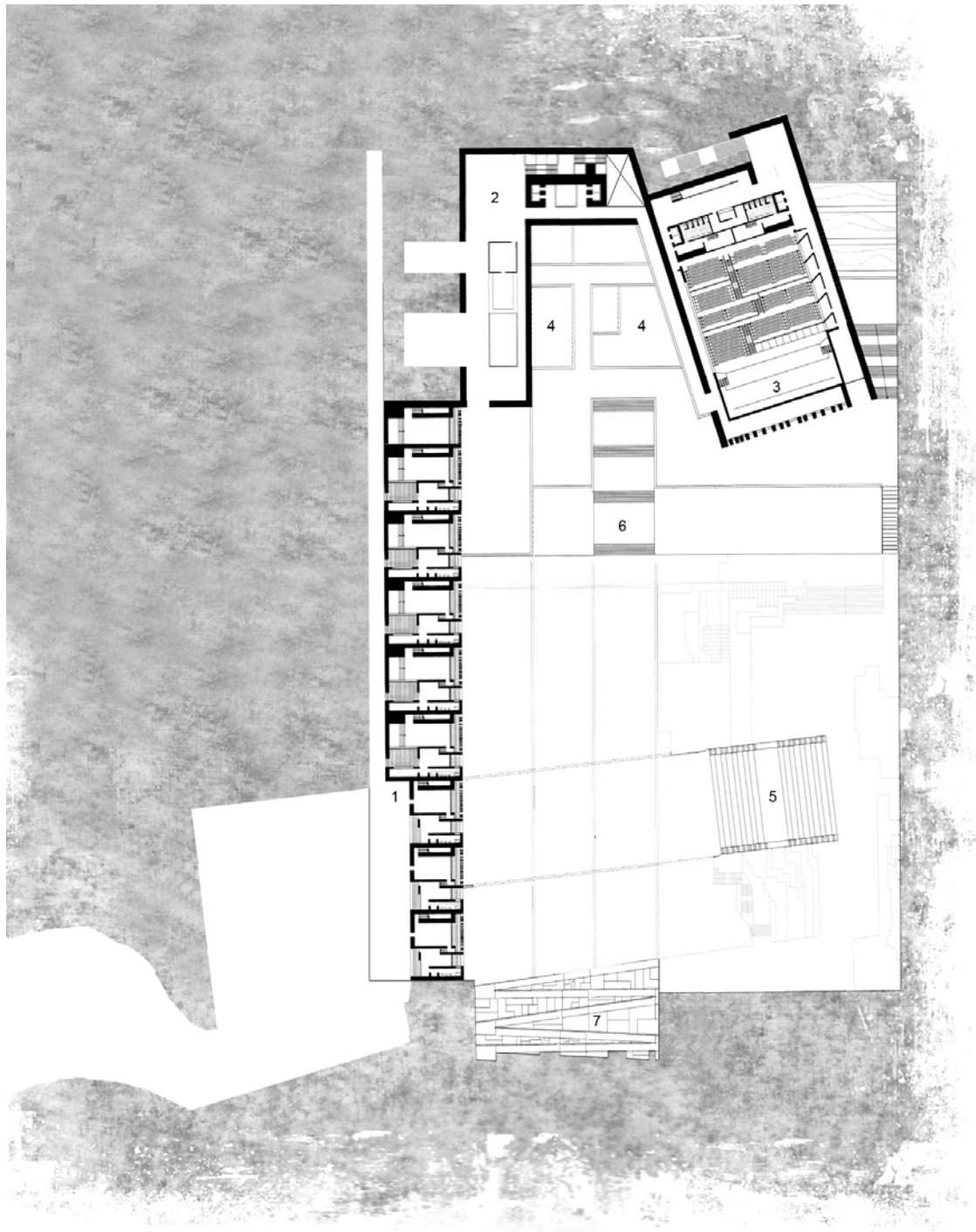
**Figure 2.** The quarry system compared with factories and brownfields and more generally with modern specialized buildings partly abandoned. The ravine is the unifying line.



**Figure 3.** This figure and the following ones are the result of the re-elaboration by the author of the Thesis project: "Re-quarrying a new identity. The Palomba quarry: from subtracted space to landscape architecture". Supervisors: Prof. Giuseppe Francesco Rociola (ICAR / 14), Prof. Antonella Guida (ICAR / 10), Prof. Antonio Conte, (ICAR / 17), Co-supervisor: Prof. Ferdinando Mirizzi (M-DEA / 01) Students: Valentina Margiotta, Francesco Ricchiuti University of Basilicata, Department of European and Mediterranean Cultures (DICEM) - Matera.

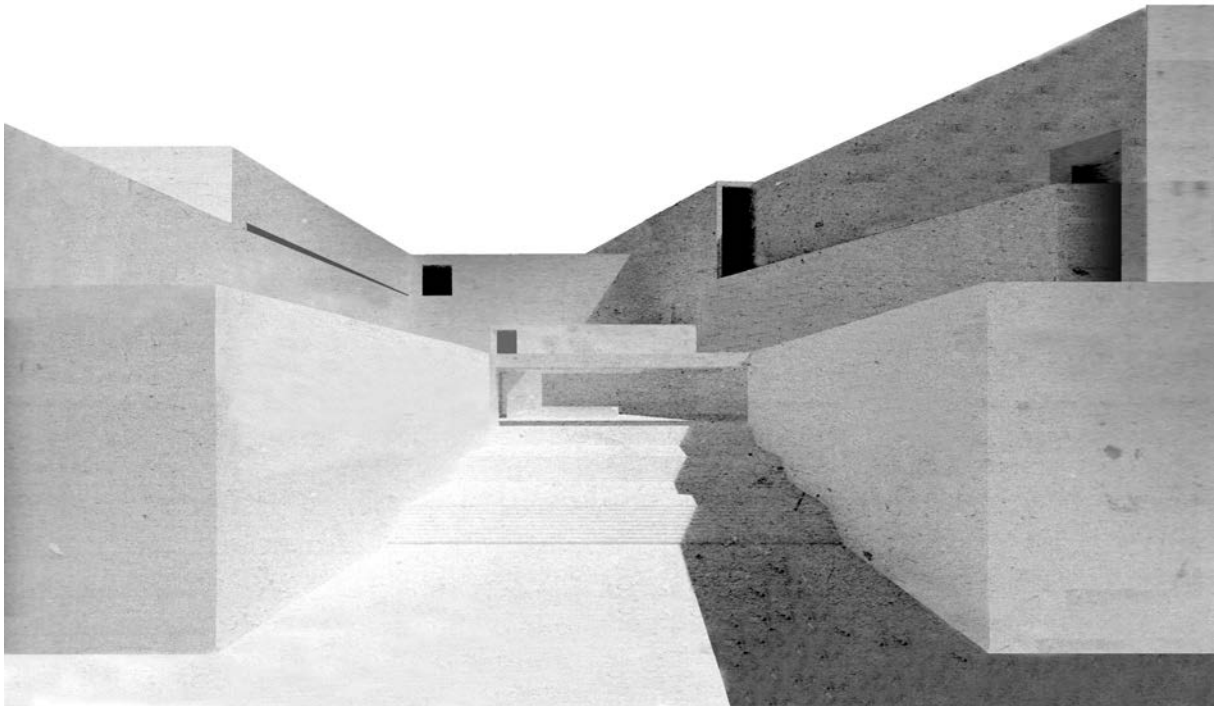
Above: the concept of the project for the training-exhibition center for tuff sculpture.

Below: the planovolumetric in relation to the contradictory copresences.

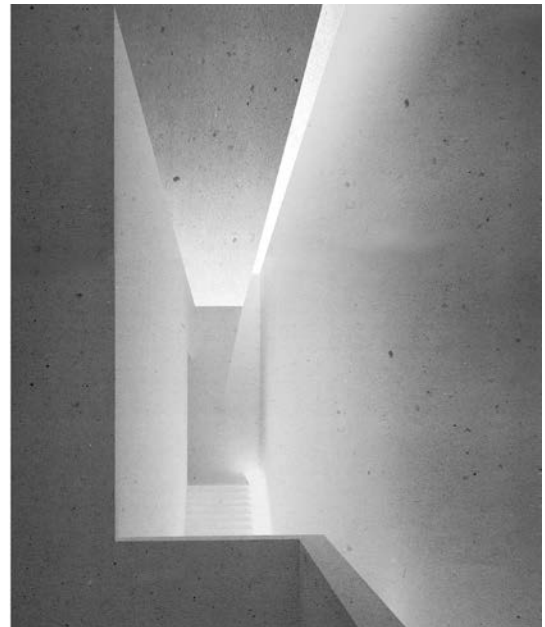


**Figure 4.** The main level plan: 1) the workshop-houses for sculptors; 2) the common underground space; 3) the auditorium; 4) the courtyard connecting the underground spaces; 5) the open-air theater, oriented according to the direction of the underground passage connecting with the adjacent quarry; 6) the ramps that lead to the terraced levels of the school-exhibition center; 7) the ramp-belvedere reaching the Sanctuary of Santa Maria della Palomba.





**Figure 5.** The cultural center with the terracings.



**Figure 6.** Left: the house-laboratory for a sculptor, reinterpreting the lamione type; right: one of the stairs that connect the underground levels of the cultural complex.

## Sustainable land reading

Jlenia Ruggiero

'Sapienza' University of Rome - PDTA (Department of Planning, Design and Technology of Architecture), Via Flaminia 70, 00196, Rome, Italy

E-mail: jlenia.ruggiero@uniroma1.it

Keywords: urban landscape; natural landscape; boundary; sustainable development; urban regeneration

Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *Talking about the shape of the contemporary city compared to the concept of the rapid and constant changes that delineate the historical period is increasingly complex. It is difficult to define which of these parts of the city are part of the urban landscape and which of the natural landscape.*

*Certainly, planning defines the urban landscape as the set of voids and full, projects and not, with more or less natural elements.*

*More obvious is the definition of the natural landscape, which in the same Italian landscape plans is outlined through the analysis and the physical-environmental and historical-cultural reading of the territory.*

*The history of Italian planning with respect to the concept of landscape and protection of the same has followed progressive but late stages starting from a purely aesthetic concept of the same until arriving at a concept of sustainability. Recently, articles 9 and 41 have been amended to introduce protection for the environment, biodiversity and ecosystems into the Italian Constitution, also in the interests of future generations.*

*There are many sustainability policies implemented to safeguard the environment and resources just think of the UN action plan with the 2030 Agenda.*

*The question of defining a boundary that outlines the interaction and/or exchange between the urban landscape and the natural landscape therefore remains the key to reading the change of the urban form in the vision of sustainable development.*

*The research therefore proposes a theoretical first and a later experimental part with examples of virtuous landscapes that define the boundary between urban and natural landscape, analysing the relationship of sustainable development with the contemporary urban context, with particular attention for the smaller historical villages.*



**Urban Landscape and Natural Landscape. From plan testing to landscape action, good practices towards sustainability.**

Landscape, as we know, is the subject of study by a plurality of disciplines, in addition to law, and lends itself to taking on different meanings depending on the thematic field of reference: it can be defined as a set of physical, ecological and geographical entities integrating natural and human processes and their patterns; from this it follows that it should not be considered as a simple summation of natural and artificial objects but should be read in a systematic vision, i.e., it should be understood first and foremost as a series of systems of elements and relationships (spatial, functional, ecological-environmental, visual, symbolic, etc.), which have followed one another in the past and which have been the subject of a series of studies in the past.), which have followed one another and intertwined over the centuries on the same territory.

Jurisprudence has also pointed out that, speculatively, environmental and ecological protection requirements must also be included and taken into account in urban planning.

In this context, it is up to the exponential body to mediate between the aforementioned values and the other interests involved, such as those of production or anthropic activities more generally, which, however, cannot be considered equal in absolute terms<sup>1</sup>.

2020 celebrated the twentieth anniversary of the European Landscape Convention (CEP, 2000), which, since 2012, has constituted the reference paradigm of the cultural and publicistic activity of the Community INU (National Institute for Urban Planning) "landscape and biodiversity", in relation to the necessary alliance between landscape and nature conservation policies<sup>2</sup>, in an increasingly complex framework that in recent years has been characterised by the crisis of global and local economies, the worsening of environmental problems and climate change, as well as the health crisis<sup>3</sup>. All this in order to grasp the territorial transformations in relation to the ongoing innovations in landscape planning and to verify the operativeness at the local scale in the plans and in the planning action (INU Territory Report 2010, 2016, 2019), always with reference to the European and international context.

In the CEP context, the landscape issue seems to have replaced the discourse on the city in recent years, investing the relations between society and territory and highlighting the main contradictions linked to the unsustainability of current economic and social development models as well as some critical issues and related challenges, from which the role of the landscape as a structural dimension of urban planning is highlighted. Landscape planning pursuant to the Cultural Heritage and Landscape Code responds to the demand for landscape through interpretative and action paradigms, which pay attention, albeit with appropriate conditioning and adaptation in the different regional contexts to: the entire territory (from emergencies to the margins, to degraded and vulnerable areas) and to the landscape quality of sector policies through a more concrete planning awareness<sup>4</sup>.

The complex meaning of landscape is linked to the aspirations and perceptions of populations, which is essential for the empowerment of communities in the definition and implementation of landscape policies, as well as in the care of their own territory<sup>5</sup>.

The approved landscape plans (Sardinia, Apulia, Tuscany, Piedmont, Friuli-Venezia Giulia, after

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<sup>1</sup>Cons. Stato, Sec. VI, sentence 28/06/2021, no. 4887.

<sup>2</sup>Gambino R., Peano A., (eds.) *Nature policies and landscape policies: towards an alliance*, Milan, Springer.

<sup>3</sup>Amorosino, S. (2012). *Commento agli artt. 135, 143,144 e 145*, in M. A. SANDULLI, *Codice dei beni culturali e del paesaggio*, Giuffrè, Milan.

<sup>4</sup>Gambino R. (2015), 'Introduction: Reasoning on Parks and Landscapes', in Gambino R., Peano A. (Eds.), *Nature Policies and Landscape Policies. Towards an Alliance*, Springer, Dordrecht, pp. 1-21

<sup>5</sup>Cartei, G. F. (2007). *European Landscape Convention and Territorial Governance*. Il Mulino, Bologna .

the current MIC won the appeal to the Constitutional Court for the Latium plan), grasp, in different ways, starting from the holistic process of interpretation/signification, how closely the landscape is related to the planning dimension<sup>6</sup>.

The third generation (post-2008 phase) of regional landscape plans, approved after a long gestation, also due to the necessary confrontation between the Ministry and the regions for co-planning on landscape assets, is characterised by the creation of a common culture, which recognises the regional landscape plan as an essential tool for generating quality and wellbeing, through a close relationship with territorial government, especially at the local scale. As a matter of fact, the relationship between regional landscape planning and urban planning tools is essential, a delicate issue that must not be fulfilled in a bureaucratic way (adjustment or conformity of urban planning tools to the plan) and that must be considered in its different complexity, in compliance with the different regional urban planning laws and with reference to the national simplification regulations, to the measures for the country restart.

The landscape outcomes of the NRP remain uncertain. Therefore, there appears to be a picture of real complexity, in which landscape should increasingly be considered as a supporting factor in the selection of major policies for the country's future and as an outcome of their design integration at all scales.

In this direction, an in-depth research of tools and implementation mechanisms is necessary to strengthen the planning dimension of the plan and to build the empowerment of the populations in the implementation process of the landscape action (Apulia and Tuscany, Calabria, Piedmont).

Plan experimentation is essential to move from 'landscape on paper' to the concrete realisation of landscape action, integrating the planning of territories, accompanying them through processes of shared choices supported by regional policies (in Puglia and Piedmont)<sup>7</sup>.

The various regional routes to landscape action call into question various instruments (from strategic or integrated projects, figurative standards, to guiding instruments and guidelines), but do not fully resolve the questions of the effectiveness of the local plan on the landscape.

In this framework, the Guidelines for the quality of architecture promoted by MIBACC-CNAPPC (LG, 2020) should be noted. This is a strategic theme, in relation to the new European Bauhaus (2021) and the Green Deal, which seeks to decline "quality", an elusive but dynamic concept that should be the focus of territorial government tools, at all levels, and which requires urban planning to take responsibility for the design of space, paying attention to the physical dimension, to the materiality of the city, to architecture.

It relates to growing inequalities, hopes, expectations of life, health, fundamental rights (to the environment, landscape, housing, identity, security and sociality in the democratic public space).

The Guidelines are an interdisciplinary document, the result of collaboration between ministries, local and regional administrations, supported by the academic, professional and key stakeholders.

Architecture is a universal right and its quality derives from Italy's identity and cultural history and should be analysed with reference to heritage, landscape, new technological frontiers, and sustainability, reconnecting the themes of research, training, cultural promotion, and

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<sup>6</sup>Voghera A., La Riccia L. (2019), *La pianificazione paesaggistica regionale*. Properzi P., Ombuen S., *Rapporto Dal Territorio 2019*, Rome, INU Edizioni, pp. 496-503.

<sup>7</sup>Ferrara G., Campioni G. (2012). *Il paesaggio nella pianificazione territoriale. Ricerche, esperienze e linee guida per il controllo delle trasformazioni*, Dario Flaccovio Editore, Palermo .

procedures for entrusting design and construction activities<sup>8</sup>.

Quality is declined in relation to the context, interpreted as landscape, giving centrality to open space, especially public space, which structures the city, to link design actions to each other and to the context, requiring multiple relations at different scales, touching urban, rural, natural territory to acquire new values and new polarities<sup>9</sup>.

The objective is to orientate the design of territory and landscape, central and transversal to the document's 'major groups of ordering principles' (identity and history; research, training, education; heritage; landscape; planning and urban space; sustainability; processes and procedures; legal framework).

Downstream of this process, INU is thought of as supporting the Guidelines, well able to select good practices, contributing with training, awareness-raising and/or pilot project initiatives, within the framework of landscape planning<sup>10</sup>.

### **Landscape units and landscape indicators, towards a sustainable reading of the territory**

Among the knowledge and competences entrusted to the ecological-territorial area are those relating to the construction of civil, industrial or rural settlements and infrastructures, to the restoration and reclamation of damaged or degraded land, and to anti-pollution works. The variety of these interventions makes it indispensable to have a modern and advanced knowledge of the aspects characterising the various geological environments destined to host the structure, of the natural factors that regulate the equilibrium and evolution of these environments, and of the consequences of the breaking of these equilibriums.

A practical-methodological approach is required for the study and implementation of specific intervention projects, starting from a rigorous description of the various Italian geological and soil environments. Hence the need for an experimental methodology that, starting from the environmental components of rock and soil, allows for an assessment of the territory's resources aimed at determining its suitability for the various types of use, also taking into account the main parameters directly or indirectly influenced by the nature and distribution of geological formations and soils:

parameters such as the erodibility of rocks and soils, propensity to hydrogeological instability, groundwater circulation, landforms, slope, soil fertility, vulnerability to water and soil pollution<sup>11</sup>. The starting point is to identify, in geologically homogeneous areas, the key to understanding the territory. In fact, by identifying fundamental geo-morphological units of the Italian territory (which in environmental sciences are called 'landscape units'), it is possible to highlight the parameters that define its potential and limitations of use, which are often correlated with each other in a cause-effect relationship: erodibility, relief shapes, permeability, surface and underground hydrology, geotechnical characteristics, geomechanical stability, climate, soil, vegetation, geomorphic processes.

All of this within the framework of a close correlation between the natural parameters of the territory, i.e. rock-soil-water-climate-vegetation, from which to start to understand the evolutionary or degenerative processes of the environment, in order to be able to set up

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<sup>8</sup>Breganze de Capnist, M. (2022). Introduzione al Seminario su "La pianificazione paesaggistica: esperienze regionali a confronto", Università di Padova, 29 aprile 2022.

<sup>9</sup>Gabellini P., (2018), Mutazioni dell'urbanistica. Principi, tecniche, competenze, Carocci, Roma.

<sup>10</sup>Ferrara G., Campioni G. (2012). Il paesaggio nella pianificazione territoriale. Ricerche, esperienze e linee guida per il controllo delle trasformazioni, Dario Flaccovio Editore, Palermo.

<sup>11</sup>Istat (2018), Rapporto annuale 2018. La situazione del paese, Istat, Roma..

preventive actions or, if necessary, rational remediation interventions<sup>12</sup>.

The landscape is not only the synthesis of the elements, natural and human, that make up a territory, but is the snapshot of a dynamic whole in which these elements relate to one another according to a pattern resulting from the history of the place. The landscape encapsulates both the natural history of the territory and the events and culture of the people who populate it.

Understanding the forms of the landscape, the distribution of its components and the relationship that exists between them is tantamount to giving meaning to natural forms and seeing how human action has modified the natural environment and thus, in essence, leads to understanding why the territory has the appearance that we observe today. Beyond the aesthetic factor, therefore, the landscape has its own precise meaning, the understanding of which is essential to correctly evaluate any intervention on the territory, whether conservative or developmental<sup>13</sup>. Understanding the landscape means correctly interpreting the shapes that characterise the Italian territory, where factors that determine its shaping operate, in particular the geological substratum, the flow of surface and underground water, morphology, vegetation, climate, soils and human activities, the interaction of which contributes to generating a strong variability in the dynamics of landscape shapes.

The greatest difficulty in the path towards identifying landscape units lies in the elusive characteristic whereby the groupings adopted for practical expediency sometimes appear defective or artificial, as they lead to separating aspects that are related in certain respects or, conversely, to aggregating apparently different realities<sup>14</sup>.

Therefore, through the intersection of a complex series of factors (geological constitution, geomorphological elements, altitude, microclimate and other physical-geographical features, vegetation material expressions of human presence and others) the Landscape Plan can identify landscape units to represent territorial areas with specific, distinctive and homogeneous characteristics of formation and evolution.

They make it possible to identify the originality of the local landscape, to specify its characterising elements, so as to allow, in the long term, to improve the management of sectoral spatial planning.

Framing in landscape units allows:

- to form a spatial matrix to be used as a reference to the elements identified through the censuses (mature assets, buildings, various artefacts, vegetation presences, etc.), for the formulation of a context value judgement;
- to organically link together the various objects of the Plan (systems, zones, elements, categories, classes and types) and the regulatory provisions referring to them;
- to consequently describe the structural and structuring aspect of the landscape of specific, significant portions of the territory;
- to plan and manage different objects together, orienting actions towards a common objective - conservation or transformation - while respecting the landscape-environmental invariants, the overall balances and the dynamics specific to each component<sup>15</sup>.

The problem of knowledge (even before control) of the environment is recognised today as a

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<sup>12</sup>Giorgio A. (2017). *Ambiente versus paesaggio*, Aracne Editrice, Roma..

<sup>13</sup>Istat (2018), *Rapporto annuale 2018. La situazione del paese*, Istat, Roma.

<sup>14</sup>Magnaghi A., a cura di (2016), *La pianificazione paesaggistica in Italia: stato dell'arte e innovazioni*, CC BY 4.0, Firenze University Press..

<sup>15</sup>Nogué J. (2017), *Paesaggio, territorio, società civile. Il senso del luogo nel contemporaneo*, Libria Editore, Melfi.

fundamental and pressing need, to be addressed at different educational and training levels and with different objectives.

Underlying this should be a generalised understanding of the environmental issue, such that individual and social behaviour is changed in a positive direction.

The overall understanding of the environment, as an interweaving of natural ecosystems, human society and technology, is extremely complex, because it is a dynamic system where changes in one parameter retroactively affect the others according to the ecological law whereby everything is connected to everything else.

The environment requires a multidisciplinary approach, it is not a homogeneous concept and its receptive capacities to respond to technology are variable in space and time<sup>16</sup>.

This means that design and planning are conditioned by the environmental context in which they take place and, conversely, that certain environmental conditions suggest the use of specific technologies.

It should be borne in mind that the natural environment is not only a constraint but also a resource for technology: up to now, it has been considered much more as a resource than as a constraint, ignoring or underestimating the fact that resources are not unlimited and partly non-renewable, and that even those that are, have cyclical renewal times that cannot be forced beyond certain limits<sup>17</sup>.

The assessment of the constraints that the natural environment places on technologies is therefore inseparable from the assessment of resource availability: this cannot be separated from the consideration of both the vulnerabilities and the potential of Italy's geological and pedological environment.

Landscape units are the elementary units of reference in territorial investigations. Indeed, there are various sciences, such as geomorphology, pedology, agronomy, that make use of natural 'landscape units' as elementary homogeneous areas of the specific environment to be studied. From this concept clearly follows that the landscape unit is also a planning unit.

The terms urban landscape, agrarian landscape, industrial landscape, etc. indicate a landscape dominated by a particular component, such as urban, agrarian or industrial. The term geological landscape indicates a landscape in which the geological component is predominant over the others<sup>18</sup>.

In general, landscapes, at least those of developed countries, are made up of various components, both natural and man-made, that have 'settled' there over a more or less long period of time.

On the other hand, one tends to speak of geological landscapes when the classification of a given landscape or set of landscapes refers, in a preordained and prominent manner, to elements, features and aspects of a geological nature.

Today, the landscape has acquired applicative importance as new instruments relating to spatial planning, such as landscape plans and environmental impact assessment and strategic environmental assessment procedures, place it among the privileged reference elements for the control and verification of territorial transformations.

In order to be able to analyse a landscape, one cannot limit oneself to its purely visual, aesthetic, perceptive aspects (the landscape as an 'object of contemplation'), but must also try to understand its structure and functionality, how it, as a dynamic reality, relates to geological,

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<sup>16</sup>Magnaghi A., a cura di (2016), *La pianificazione paesaggistica in Italia: stato dell'arte e innovazioni*, CC BY 4.0, Firenze University Press.

<sup>17</sup>Giorgio A. (2017). *Ambiente versus paesaggio*, Aracne Editrice, Roma.

<sup>18</sup>Nogué J. (2017), *Paesaggio, territorio, società civile. Il senso del luogo nel contemporaneo*, Libria Editore, Melfi..



vegetation, fauna, climatic, as well as anthropic processes<sup>19</sup>.

Moreover, in order to carry out landscape restoration work (e.g. through the methods of environmental geology and naturalistic engineering), it is essential to know the functional, as well as the structural, aspect of the landscape.

Therefore, the main objectives of landscape studies include the aesthetic-perceptual one, the understanding of ecological balances (understood as natural dynamisms and as human-induced transformations), and finally that of the potential of fruition, the latter in line with the new needs and changed problems of a society moving towards a phase of post-industrial development.

Landscape refers to two groups of interests and thus disciplines<sup>20</sup>.

The first group includes the predominantly structural-natural aspects of the landscape: various sciences, such as geomorphology, pedology, phytosociology, agronomy and geography, start from the landscape understood in this sense and use the natural landscape units as homogeneous and elementary units of the territory to be investigated. For example, in agronomy, the landscape units used to map the various "land-use capacities" are areas within which it has been verified (through sampling), or it is assumed with a satisfactory degree of reliability (through extrapolation), that the individual landscape factors exert their own peculiar influence that is repeated in the same or similar forms on all the map units classified in the same way (Emilia-Romagna Region, 1981)<sup>21</sup>.

When carrying out the soil survey, homogeneous areas are identified for one or more parameters (lithology, vegetation, morphology, etc.). Within these areas, first the degree of soil uniformity is ascertained, then the set of soils recognised as uniform is characterised. Each homogeneous area is nothing more than a natural landscape unit; as a whole, it involves the presence of soils that are sufficiently similar to be cultivated in a comparable manner and with similar yields.

From the above, it is clear that this is not a landscape identified on the basis of aesthetic values, which tend to be subjective, but rather a landscape understood, at least theoretically, as an objective reality independent of the individual observer and the individual act of observation, to be analysed and classified using clearly identifiable methods.

To the second group belong mainly the aesthetic, cultural and historical aspects of the landscape: the disciplines concerned here can be landscape design<sup>1</sup> and landscape architecture<sup>22</sup>.

Again, these disciplines develop their analysis by homogenous territorial areas under the aesthetic-perceptual or historical aspect, always referred to as landscape units. The two aspects, the naturalistic-geographical and the aesthetic, controlled by the two groups of disciplines, often do not coincide and the methods for studying them do not correspond. In fact, the aggregation of certain formal characters to constitute a given landscape, if it can provide good results, for example, for pedology, can be defective or artificial for the aesthetic and historical aspect.

The landscape does not originate and evolve from a single natural or anthropic process, but is the result of the long interaction of various processes that influence each other. Therefore, in order to overcome the dualism between the objective approach and aesthetic perception, a

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<sup>19</sup>Giorgio A. (2017). *Ambiente versus paesaggio*, Aracne Editrice, Roma.

<sup>20</sup>Sabbion P. (2016), *Paesaggio come esperienza. Evoluzione di un'idea tra storia, natura ed ecologia*, Franco Angeli Editore.

<sup>21</sup>Cfr. Ricci L. (2005), *Diffusione insediativa, Territorio, Paesaggio. Un progetto per il governo delle trasformazioni territoriali contemporanee*, Carocci Editore, Roma..

<sup>22</sup>Turri E. (2002), *La conoscenza del territorio. Metodologia per un'analisi storico-geografica*, Marsilio Editori, Venezia.

joint effort between scholars of the two groups of disciplines is appropriate to address the problem of landscape analysis, classification and assessment in a unified manner, if reliable information is to be provided in the drafting of landscape plans, environmental impact studies and territorial surveys in general<sup>23</sup>.

In this regard, the experiences of landscape plans, such as that of the Liguria Region and the Emilia-Romagna Region, integrate natural and man-made aspects to arrive at the definition of landscape units, which are valid for all aspects taken into consideration.

For example, the Landscape Plan of the Emilia-Romagna Region identifies a certain number of landscape units, each of which represents an 'integrated set of natural and man-made variables that constitute territorial areas with specific, distinctive and homogeneous characteristics of formation and evolution'<sup>24</sup>.

In particular, in the Emilia-Romagna experience the landscape unit is identified through a descriptive method, based mainly on the interpretation of zenith photos; it is therefore defined as a "globally homogeneous spatial sphere due to its own and intrinsic pattern characteristics"<sup>25</sup> and the reading of the territory by landscape unit bases its assumptions on some general principles, such as systems analysis, model theory and, above all, the ecosystem vision of the territory. More than ten years after the approval of the general landscape planning tool, the Emilia-Romagna Region, in collaboration with ENEA, has drawn up a research project, called the "Atlas Project", with the "objective of verifying the validity of Landscape Units as a reference for managing land transformations, which allows to anticipate the assessment of the sustainability of planning choices, overcoming the current practice of a posteriori administrative verification, which the experience of recent years has shown to be insufficiently effective. This initiative, which is highly innovative in its approach to environmental and territorial issues, represents the development of a landscape reading model, accompanied by an information system capable of offering the planner an additional tool for evaluating choices in terms of the effects they may have on the landscape" (ENEA, Emilia-Romagna Region, 2001)<sup>26</sup>.

In the early months of 2011, a survey was carried out on the web portals of Italian regions and provinces to identify and catalogue the landscape indicators used in planning: the aim of the survey was not so much to analyse individual landscape indicators as to group them within predetermined categories, drawing conclusions of a content and statistical nature. The purpose of the research is eminently scientific/cultural; therefore the administrative validity of the regional and provincial Plans was not considered, but only whether or not the documentation relating to the Plans themselves contained landscape-type indicators<sup>27</sup>.

The CEP - European Landscape Convention (2000) constitutes the reference, both for the definition of Landscape and for the objectives that the Convention itself sets; indicators can be identified under several headings, which include:

- description, analysis and evaluation of landscape components;
- protection objectives;

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<sup>23</sup>Giorgio A. (2017). *Ambiente versus paesaggio*, Aracne Editrice, Roma.

<sup>24</sup>Giorgio A. (2017). *Ambiente versus paesaggio*, Aracne Editrice, Roma.

<sup>25</sup>Pattern: a term used in aerophoto interpretation, indicating a geometric configuration that repeats itself with greater or lesser frequency in a given area, characterising it; it is defined by the way in which physical, biological or anthropic 'signs' are arranged and thickened individually or in association with each other. An example are drainage patterns or drainage patterns, illustrated in the appendix, "Parameter 3 - Surface hydrology and hydrography".

<sup>26</sup>Sabbion P. (2016), *Paesaggio come esperienza. Evoluzione di un'idea tra storia, natura ed ecologia*, Franco Angeli Editore..

<sup>27</sup>Ferrara G., Campioni G. (2012). *Il paesaggio nella pianificazione territoriale. Ricerche, esperienze e linee guida per il controllo delle trasformazioni*, Dario Flaccovio Editore, Palermo.

- project and planning actions;
- management aspects.

All framed within the overall C.E.P. objective of landscape quality in relation to sustainable development.

As a corollary to the CEP, it is important to reaffirm the importance of a terminological and content distinction whereby landscape is not a single component of the environment, but rather a systemic perspective, i.e. one in which the entire system of objects and relations as perceived by the populations involved is reflected. Moreover, it does not coincide with other systemic perspectives such as that of the 'ecosystem' or even that of the 'territory'<sup>28</sup>.

Finally, with regard to the definition of "indicator" and "index", it is believed that these concepts are sufficiently acquired (albeit in a rather variegated manner) by the general public, and can be extrapolated from the SEA Environmental Reports relating to existing Landscape Plans or Territorial Plans, both Regional and Provincial, or, in the absence of R.A., from Regional or Provincial Landscape Plans that contain indicators, or again, in the absence of Landscape Plans, from Regional or Provincial Territorial Plans that contain landscape indicators<sup>29</sup>.

With reference to the indicators found so far, it should also be noted that:

- if the indicators have been specifically identified by the Plans (as in the "Landscape Indicators" category), they are recorded without further consideration of whether or not they are relevant to the landscape (e.g. indicator "Presence of areas of high biodiversity for the mammal class" in the Piedmont Region);
- If, on the other hand, the landscape indicators were presented in associated form with other indicators (e.g. the category "Ecosystem-landscape capital" in the Emilia-Romagna Region), those indicators that were in some way related to the landscape were taken into consideration, while those that were considered very unrelated or not at all were discarded;
- indicators that the Plans have not explicitly referred to the landscape are not taken into account: e.g. an indicator in the "Ecosystems" category may be relevant to the landscape, but has not been taken into account if the Plan itself has not identified it as specific to the landscape<sup>30</sup>.

Finally, regional and provincial town planning instruments that do not contain any indicators explicitly referring to the landscape or whose documentation available on the web is insufficient or absent were identified by difference.

We started from the 'classic' tripartition into natural, anthropic and symbolic categories, with the first two categories identifying individual physical components of the landscape that are predominantly natural and predominantly anthropic: although the landscape is a system and not merely the sum of individual elements, the two categories are in fact the ones mainly used in the various landscape analyses and related indicators<sup>31</sup>.

In particular, 'climate' has been included in the 'natural' category as it sometimes contributes to landscape characterisation (fog, air transparency); in the 'anthropic' category, reference is made to 'settlements' in the typological sense (concentrated, scattered, along roads), to prevalent areal 'architectural types' (ancient centres, industrial buildings, commercial areas), to 'exceptional artefacts' in that they connote a context even if present individually (a church

<sup>28</sup>Valega, A. (2008), *Indicatori per il paesaggio*, Franco Angeli, Milano

<sup>29</sup>Magnaghi A., a cura di (2016), *La pianificazione paesaggistica in Italia: stato dell'arte e innovazioni*, CC BY 4.0, Firenze University Press.

<sup>30</sup>Valega, A. (2008), *Indicatori per il paesaggio*, Franco Angeli, Milano.

<sup>31</sup>Mautone, M. Ronza, M. (2016). *Patrimonio culturale e paesaggio: Un approccio di filiera per la progettualità territoriale*. Gangemi Editore, Roma.

on top of a hill a relic of industrial archaeology, a monumental tree) and finally also to “minor artefacts” if their diffusion contributes to the characterisation of a landscape (dry stone walls, hydraulic drainage works, mill system); to the third “systemic” category belong both physical and intangible indicators, united by the overcoming of a vision of the landscape by single components in order to arrive at a “holistic” conception of the landscape: aspects of visual enjoyment and those referable to plans and projects have also been associated with it, since it is believed that both relate to the landscape as a “whole”; the fourth category deals above all with the “immaterial” aspects of the landscape and the added value (or disvalue) that they determine on the “real” landscape, i.e. the social and cultural aspects including legal protection and also management choices; finally, the fifth category deals with “evaluation”, recording judgements of degradation or landscape value, which we decided to deal with separately because the considerations expressed there are “transversal” with respect to the other categories, inasmuch as an overall systemic assessment is mixed with characters of “collective subjectivity” that can be related to historical moments (what today may appear to be degradation may not have once been considered such) or of social condition, noting a certain concordance of judgement with regard to the “detractor” elements of the landscape (disused areas, ecomonsters, pylons)<sup>32</sup>.

Ultimately, five general and 15 specific categories were identified to which the indicators could be related.

The sources from which the landscape indicators were sourced are: SEA Reporting applied to the Landscape Plans or Territorial Plans of the following 7 regions: Abruzzo, Emilia-Romagna, Lombardy, Piedmont, Apulia, Umbria, Veneto; - the Landscape Plans of 2 other regions, Marche and Tuscany. For the other 11 regions, the Regional Plans do not present any indicators, even though their appropriateness and the methodology for identifying them are sometimes mentioned, leaving the definition to the Provinces<sup>33</sup>.

### **The Labro case study. New approaches, towards 5.0 planning**

The municipal territory of Labro is developed on the base of a hill system north of the Piana Reatina at an altitude of approximately 400-600 m above sea level between the Velino and Avanzana valleys, territorially included in the Monti Reatini district in the direction of Leonessa. Particularly interesting is its materiality that characterises it from the point of view of the local materials used to erect it, namely limestone rocks, which is why it is also called ‘stone village’<sup>34</sup>. The old town and historic centre essentially overlap, its urban-architectural development following the natural development of the slope itself.

Like most minor historic centres, it has perimeter walls, once necessary for defensive purposes, but which open out to cultivated landscapes gained from the Apennine forest, the result of centuries of intertwined civil and religious strife.

The intertwining of various vicissitudes in its urban and cultural history, especially related to depopulation during the Second World War<sup>35</sup>, makes Labro today a particularly interesting territory for its landscape surroundings that are decisive in defining its environmental quality. These perpetual transformations in the succession of time have certainly given scholars, who have been studying the territory for more than fifty years, the opportunity to understand the

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<sup>32</sup>Bonetti, T. (2011). Diritto del governo del territorio in trasformazione. Editoriale Scientifica, Napoli. 2011.

<sup>33</sup>Ferretti, A. (2019). Manuale di diritto dei beni culturali e del paesaggio. Edizioni Giuridiche Simone, Napoli.

<sup>34</sup>Camilletti, P. (2020). Labro 1970-2020: cinquanta anni di riqualificazione architettonica e paesaggistica. In VII Convegno Diffuso Internazionale, San Venanzo - Terni, 17-21 settembre 2019.

various stratifications of the territory.

A reading of the territory of Labro shows how there has been for centuries a perpetual relationship between the urban landscape and the natural landscape represented by the city/countryside concept.

The 1970s marked the rebirth of the hamlet of Labro initially with the implementation of the Ministerial Decree of constraint under Law 1497/1939 for overall assets where the historical, aesthetic, testimonial, and landscape values<sup>36</sup> were recognised and applied through the constraint for the protection of any transformations of the territory proposed in terms of design or planning. This was also followed by artistic-cultural relations that favoured socio-cultural-economic growth.

The 1990s, on the other hand, marked a continuous workshop of recovery of the city by restoring and renovating buildings to ensure a higher quality for the inhabitants of the historic centre and also focusing on a tourist vision of the village itself.

However, it is interesting to note the introduction of the G5 zone as an Agro-urban Park, which developed between the walls and the Cancellio locality with the aim of protecting the historical-landscape identity.

A concept of integrating what marked a historical boundary between 'the inside' and 'the outside' of the historic village was implemented.

The idea and to also develop a tourist activity that could boost the village's economy came with the establishment of the Albergo Diffuso, as a concept of sustainable tourism<sup>37</sup> and thus bringing as a chain response the valorisation of local products produced in those same valuable places.

The contemporary design phase sought to create a link between what was considered a boundary "in a negative sense" between the medieval centre and the agrarian landscape, instead relating it as a sustainable boundary through a system of relations, hence the push towards the landscape value of the place also through the recovery of the pathways that allowed at the same time a restoration of the cultivated areas by including soft mobility as a key point.

Labro has undergone long transformations throughout its history and the recovery process that has lasted almost fifty years makes us understand how the exasperated need for protection should not stop landscape actions that could allow this sustainable border to be a link capable of expanding the concept of transformability of the place, aware of the idea that it is not possible to stop the dynamism and anthropic-natural evolution of the territory but it is possible to guide it. The PNRR itself envisages a renewal of the conception of marginal areas, promoting smartworking and technological development of these areas, allowing a new human-nature interaction that is, however, based on a sustainable concept of coexistence between the urban landscape and the natural landscape, which can also be curative for those who live in it, guaranteeing quality from a psycho-physical point of view, wellbeing.

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<sup>35</sup>Demographic data from ISTAT censuses referring to the entire municipality of Labro show a decline from about 800 inhabitants in 1936 to 344 in 2011 (- 57%), with a minimum peak in 1991 (293 inhabitants); these figures, however, are greatly reduced if only the historic centre is considered.

<sup>36</sup>D.M. del 27/8/1970 "Labro: centro abitato e zone circostanti", pubblicato in G.U. del 9/9/1970 n. 228.

<sup>37</sup>The Albergo Diffuso model responds to the expectations of 'third-generation' tourism, which is more attentive to the experience of travel as a discovery of places - cf. Dall'Ara, G. (2015), *Manuale dell'Albergo Diffuso. L'idea, la gestione, il marketing dell'ospitalità diffusa*. Milan, Franco Angeli.

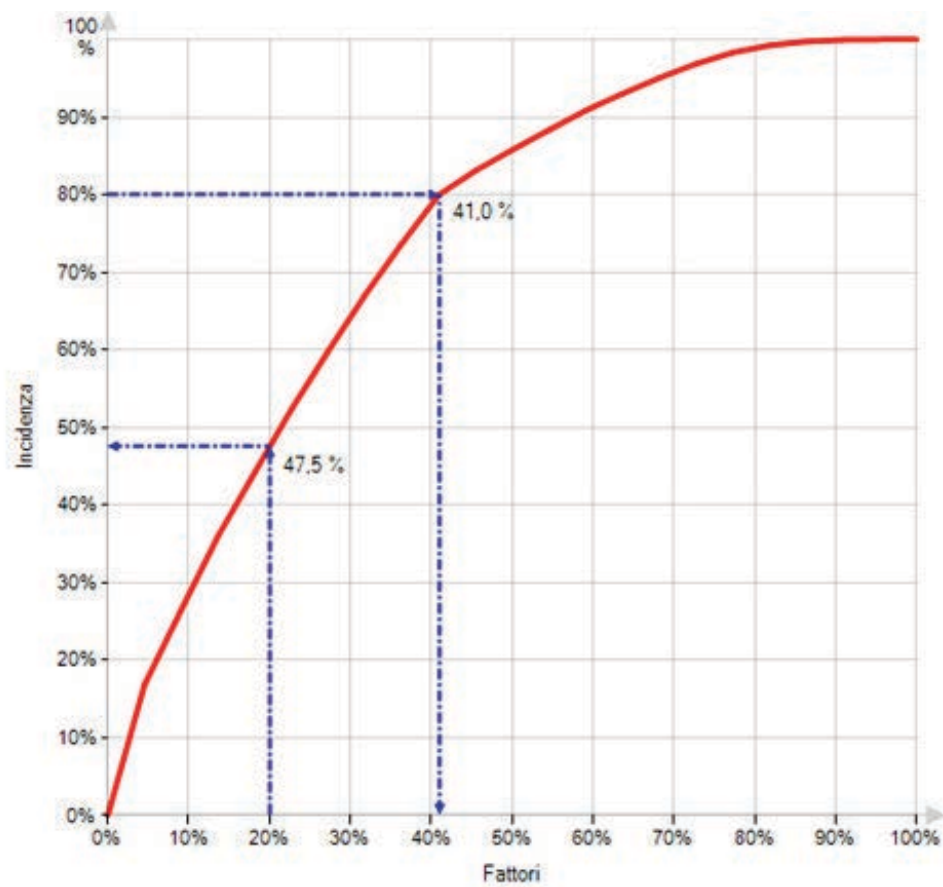


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## Illustrations and tables

P	Regioni	Dimensione (N° di abitanti)	demografica (%)	cum (%)
1°	Lombardia	9.981.554	16,8	16,8
2°	Lazio	5.730.399	9,7	26,5
3°	Campania	5.624.260	9,5	36,0
4°	Veneto	4.869.830	8,2	44,2
5°	Sicilia	4.833.705	8,2	52,4
6°	Emilia-Romagna	4.441.353	7,5	59,9
7°	Piemonte	4.274.945	7,2	67,1
8°	Puglia	3.933.777	6,6	73,7
9°	Toscana	3.692.865	6,2	79,9
10°	Calabria	1.860.601	3,1	83,1
11°	Sardegna	1.590.044	2,7	85,8
12°	Liguria	1.518.495	2,6	88,3
13°	Marche	1.495.820	2,5	90,9
14°	Abruzzo	1.281.012	2,2	93,0
15°	Friuli-Venezia Giulia	1.201.510	2,0	95,0
16°	Trentino-Alto Adige/Südtirol	1.077.078	1,8	96,9
17°	Umbria	865.452	1,5	98,3
18°	Basilicata	545.130	0,9	99,2
19°	Molise	294.294	0,5	99,7
20°	Valle d'Aosta/Vallée d'Aoste	124.089	0,2	99,9
21°	Repubblica di San Marino	33.627	0,1	100,0
22°	Città del Vaticano	618	0,0	100,0
Totale		59.270.458	100,0	-





**Table and Figure 1.** CLASSIFICA E MAPPA TEMATICA DELLA "DIMENSIONE DEMOGRAFICA" NELLE REGIONI <https://ugeo.urbistat.com/adminstat/it/it/classifiche/popolazione/regioni/italia/380/1>

## The ecological transition: shaping a design culture between technical strategies and morphological studies

Kevin Santus

Dipartimento di Architettura e Studi Urbani. Politecnico di Milano. Milano. Via Edoardo Bonardi, 3 20133, 20133

E-mail: kevin.santus@polimi.it

Keywords: Morphological studies, Nature-based solutions, Urban regeneration, Climate Change  
Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *Climate emergency is pushing for a reconsideration of design practice, where the enhancement of resilience and sustainability is necessary to reduce carbon emissions due to the building process and make the space able to resist climate hazards. Nevertheless, nowadays, this objective is often achieved through a technical approach. Indeed, current urban agendas and practitioners are implementing Nature-based solutions that act as drivers for adaptation of built environment and mitigation of climate change, considering them as technical strategies for rethinking the built environment at various scales.*

*The research takes part in this ongoing exploration, investigating how the morpho-typological dimension of the project is changing, focusing on the spatial impacts related to the implementation of these strategies, thus exploring the relationship between climate-related technics and spatial modification. Specifically, the contribution investigates how the ecological transition is transforming the morphological condition of the urban project, so having a glimpse of the spatial re-configuration that we could gaze in the future resilient city. In this scenario, morphological studies could investigate the renewed importance of the horizontal layer of the city, considering the ground level of fabrics, in a new balance between naturality and minerality. Investigating the role of the form in this new design condition means to consider it as a result and driver of the entangled relationship with the environment, in its limits, hazards, and possibilities.*

## Introduction

What is the urban conflict today between architectural objects and fabrics?<sup>1</sup> Which is the friction and tension between technics and project? How can we define the contemporary project of overwriting and stratification of the city? Which is the contemporary relation between project and environment? These questions could inform the current research dealing with the shifting condition of our practice (Berlingieri, Cavallo, Corradi, de Boer, 2022), and at the same time highlight the main topics of the ecological transition that we are facing. Working on the project of space, imagining the continuous and operative action of the project on the city, means to reflect on these questions as milestones of the current reflection on the project. Here, urban studies, framed as morpho-typological inquiry, should configure a pathway able to settle a dialogue with the contemporary environment and culture. Morphological studies, in this way, should address not only a possible solution, rather should reflect on the possibilities that architectural and urban design could have in shaping the ecological transition reflecting on the spatial features of it. Looking at the design panorama nowadays, it seems to discover a lack of prefiguration of the future, where the design results are closer to a technical application rather than a cultural (Frampton, 2011) reflection on the physical construction of space.

Therefore, if it is true that the city of the future must be imagined (Berkers, de Boer, Buitelaar, Cavallo, 2019), it is necessary to understand the characteristics of the contemporary city, and the implication that ecological solutions could have on the urban space. Because of these reasons, considering the fragilities related to the climate crisis (Wilby, 2021), and the necessity to work with concept such as sustainability, resilience, adaptation, and mitigation, the work of the architect should investigate how physical elements of the city and the urgency for a rebalance between naturality and minerality can produce new urban configurations. These forms of space, specifically, should be able not to reproduce a nostalgic idea of the city, rather to respond to nowadays problems. Because of this reason, a crucial question we should pose ourselves regards how to build and regenerate meaningful urban fragments in our contemporaneity, considering solutions, technical and spatial configuration able to construct a new praxis, validated by the quantitative efficacy and qualitative impact.

Morpho-typological studies could have an important role in critically reflect on the urban transition, overcoming the technocratic perspective that seems to cover most of the current work, in a new design interpretation, highlighting possible figures of the space.

## Methodology

Starting from the general panorama expressed in the introduction the contribution aims to show a critical reflection on how technical solutions and morphological studies could reveal a potential pathway to study the current ecological transition, overcoming the sectorial research of technical climate solutions and cultural transformation of the project. Indeed, understanding how the ecological transition is transforming the morphological themes of the project means having a glimpse of the qualitative results that we could gaze in the future resilient city. Therefore, the study started to investigate the role of the form in this new design condition, considering it as a possible result and driver of the entangled relationship with the environment, in its limits, hazards, and possibilities (Santus, Corradi, Lavagna, Valente, 2022).

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<sup>1</sup>This contribution originates from the PhD research "Groundworks and Roofworks. Spatial modification relating climate crisis and design form", with Supervisors: Ilaria Valente (DASTU) and Monica Lavagna (DABC). The research is currently being carried out within the PhD course in Architectural, Urban and Interior Design, with coordinator Alessandro Rocca, at Politecnico di Milano.



Assuming this condition, the essay asserts the need for a reflection on the transformation of the physical space that these features have for the regeneration of urban and peri-urban areas. Here, the contribution focuses on the role of nature-based solutions, as tools for a possible dialectic between design and technology in the face of ecological transition (Kabisch et al., 2018). In fact, although generally assumed as technical solutions, the intervention aims to reflect with respect to a possible influence that these solutions can have on morpho-typological issues concerning the horizontal layer of the project, leading to a re-imagination of the urban and architectural space, acting on the construction of form, in an adaptive perspective and rebalancing between naturality and minerality.

To have a direct reflection of the design impacts, the contribution displays the projet for the urban regeneration of Bottiere Chenaie by Atelier du Paysage Bruel Delmar. Settled in the French context, the project highlights how technical solutions, such as the implementation of green and blue infrastructures, have been transposed with a design perspective, shaping the ecological transition in a form of new image of the city. Moreover, the project, programmed for a progressive construction began in the 2003 and that will end in the 2025, aimed at creating a new eco-district able to respond to the increasing climate fragilities, achieving a new image of the built environment. The project is studied in its physical features, understanding the role of the ground in shaping new morphological configuration for the city, in a new relation between built environment and naturality.

The study reveals the relevance of the morphological studies as critical analysis that uncovers the relationship between things, objects, and their composition in fabrics, where the technical solutions merge in the design choices to shape a new image of the urban space.

### **Climate change as key-driver of transformation or How design and morphology can intertwine the transformation**

Looking at the international and European Agenda, we could state the climate change and its consequences as the main character that is forcing a general reconfiguration of the human action on the environment. From the SDGs to the European Taxonomy, we could state that climate change is a key-driver of the transformation of our contemporaneity, not only referring to the built environment but more generally regarding our societies (Hawken, 2017).

Nevertheless, considering the territory as an artifact (Gregotti, 1966), makes clear the role of the architect in modifying the environment and the physical space, where architecture could be framed as anthropic action of modification deeply entangled with the environmental condition (, which nowadays are also the climate fragilities.

Subsequently, we could reframe the idea of the climate change as key-driver of contemporary transformation and question the discipline about the possible role of design and morphology in intertwining the ongoing change. Thus, concept such as resilience or sustainability could acquire a spatial depth, relating the cultural meaning, technical solutions, and the spatial form. As suggested by Vittorio Gregotti in his book *Architettura, Tecnica, Finalità* «La razionalità tecnologica in architettura deve non solo rispondere a esigenze economico-produttive, ma anche aprire possibilità morfologiche che devono essere considerate come offerte oltre che come condizioni delle finalità del procedimento progettuale.» (Gregotti, 2002: 19). With this in mind, we could reconsider the role of current approaches such as nature-based solutions or circularity, framing them not only as technics, but rather as potential device that could impact the morphological configuration of the urban space. Indeed, the same solutions could be outlined looking at them with a double lens. The first, and more common, looks the quantitative efficacy, so quantifying the carbon sequestration or the adaptation that such approaches

generate. Nevertheless, the same approaches could also reveal a spatial understanding of the different design condition. For example, the application of nature-based solutions implies a specific thought about the measures, the time frames, and the spaces, where naturality is implemented. How elements such as ecological corridors, green roofs, or new urban spaces such as storm squares or rain gardens, are reshaping the grounds, modifying the urban sections, and implying a morphological modification of fabrics. Similarly, circularity, bond to the concept of reuse-recycle-reduce (McArthur Foundation, 2013), in its faceted scales, could open a discussion about the typological permanence in the urban texture, or suggest specific typological condition due to the specific material reused.

All this allows to have an architectural cultural understanding of the changings going on, but also to consider the ecological transition, and resilience, as a spatial open question and not only as a technical one. Hence, the same resilience could be considered as a physical configuration of space, a device thought in a time perspective. Interestingly, Kabisch addressed resilience as something that «should not only be considered to be beneficial for current and immediate pressures from climate change but also be able to withstand potential future changes [...], both environmental and socio-political changes. Long-term resilience thinking [...] is of particular importance because challenges from climate change will further impact on urban society during the upcoming decades and require long-term adaptation thinking.» (Kabisch et al., 2018: 325). In a certain sense, the author pointed out a vision of resilience similar to a physical object, implicitly opening to a series of possibility for the project. If contemporary technics are not only a finality of the ecological transition, but a driver for the transformation facing the climate crisis, then a morphological and typological understanding of the practice is necessary, to enable the observation of space to enrich the architectural culture.

Therefore, becomes essential to understand which are the spatial meanings of contemporary technics, where they are operating a shifting condition, and where we could focus the attention for the current ecological transition from a design perspective (Turan, 2019).

### **The horizontal level as contemporary field of experimentation: the case study of Bottier Chenaie**

Themes such as the Nature-based solutions are increasingly present in international agendas as technical approaches to implement in projects of urban and architectural transformation, to mitigate and adapt the built environment and relating the climate crisis. This dynamic is orienting the design practice (Eekelen, Bouw, Shapiro-Kline, 2021) impacting the results of many interventions.

Often applied as technical solutions, nature-based solutions could also be seen as a possibility for the urban and architectural project, to rethink the condition of the practice and the texture of built fabrics.

Focusing the usage of nature-based solutions, to rethink an abandoned and polluted area, an interesting experimentation could be found in the periphery of Nantes. The neighborhood of Bottiere Chenaie (Figure 1) saw an important transformation of a former wasteland into a new eco-district. The new settlement worked with a settling principle able to read and interpret the surrounding fabrics. The masterplan was curated by J.P. Pranas-Descours, who thought the general strategy where buildings were massed to create a different density in the areas, so to relate the various part of the city around while leaving an open linear park at the core of the intervention. The different areas operate like tiles of urban fabrics, where the naturality becomes the main element characterizing the public space. Here, to rethink a balance between naturality and minerality, the office Atelier du Paysage Bruel Delmar focused on the landscape project and decided to insert a series of nature-based solutions, that works at the various scale

and could operate a process of urban adaptation.

The disposition of raingardens to collect the rain during storms, canals to implement blue infrastructures in the district and a proper ecological corridor that cut the site, becomes distinctive elements of the new neighborhood. These are treated not only as punctual solutions but helps to define the overall morphology of the intervention, shaping the rhythm for the built space (as it is for the canals), but also generating a pause in the built sequence thanks to the ecological corridor (Figure 2). The groundworks of Bottiere Chenaie clarify the morphological presence of the neighborhood, keeping together different measures and densities of the plot, where modest buildings (one to three stories high) set close with people and vegetation, generating a vibrant space that wedge in the city. The project shows how the ecological transition, that is translated with a various application of nature-based solutions, have a direct impact on the morphological construction of the site.

The settling principle used the technics as element of the design process, making them integral part of the site conception. Moreover, the design action in Bottiere Chenaie could reveal how the work of grounds acquires a crucial relevance. In fact, the horizontal level would reveal a privileged plan of action for the regeneration of urban fabrics in response to climatic fragilities, thus defining a renewed morphological and typological value of soils and crowns. The horizontal level of the city could be studied and identified as the place most open to give shape for a proper response to the climate crisis, where to operate a renewed work of modification towards a resilient construction of the city. For this reason, horizontality could be defined as an 'operational climate layer' of the city and architecture, where to act to address the threats and risks of the climate fragilities.

This statement establishes a relevance for soils and roofs, where the conception of soils, artificial grounds, natural or public ones, etc., becomes a possible focus for the contemporary practice. Here, morphological studies could identify the new element of the project, their measure, and their impacts on the urban shape. Therefore, defining the place of the project with reference to the themes of sustainability, resilience or adaptation means to outline which could be the contribution of the architectural discipline in embody the climate issues in the design form and process. To do so, it is then important to detach from the demiurgic role of architecture, but rather seeking, through observation, the practical field of action of the project.

This is visible in experiences such as the one of Bottiere Chenaie, where the ground becomes a field of experimentation, and could help also in rising some questions about the current ecological transition. For example, looking at the project, a first question should regard the density of the ecological transformation, questioning the measures of the project. Having green corridors, raingardens at the sides of the small streets among the dwellings, implementing the blue infrastructures, means to leave the space for the urban nature.

At the same time, the project shows how it is not sufficient just to have space, but also how to work with nature and ground in a close relation between buildings and open space, where the morphological work could help in transforming neglected fragments of the city, to give new resilient neighborhoods to the urban fabric.

## Conclusion

The ecological transition is an ongoing process, which in the last decades has taken a prominent role and became a necessary theme when dealing with the modification of the environment (Gethering, Puckett, 2019). Nevertheless, the necessity to curb the emissions and to have impactful interventions produced a field of research majorly oriented toward the technological fields, leaving behind the cultural and design understanding of the shifting condition of the

project.

As it was in the Sixties, the architectural panorama could find in the morphological studies a first step toward a deeper understanding of the ongoing processes of transformation, starting from the observation of the current design culture, to produce new core stones for our discipline, close to the contemporary necessities but at the same time rooted in a valuable design culture. Because of this reason it is necessary to regain the ability to observe things, to look at the current architectural production with a critical eye, and to define the form and quality of the spaces we inhabit.

The usefulness of morphological studies is framed in its capacity to trace a relation between the design practice, the context, and the tools that are shaping the space (Ravagnati, 2012), so outlining the role of the architect itself as a figure able to relate the project with the environment and the built space. With this idea, architects could intervene in the places where the issue of climate change beats the most, not in the role of one who adds objects while forgetting the rest but understanding the features of the place and recomposing those issues and fragments with the ability of enriching the space of new values.

The design panorama needs impactful solutions, overcoming empty rhetoric of sustainability, but at the same time should be able to use technical approaches, such as nature-based solutions, to achieve architectural and morphological results that build a new stratification of our cities.

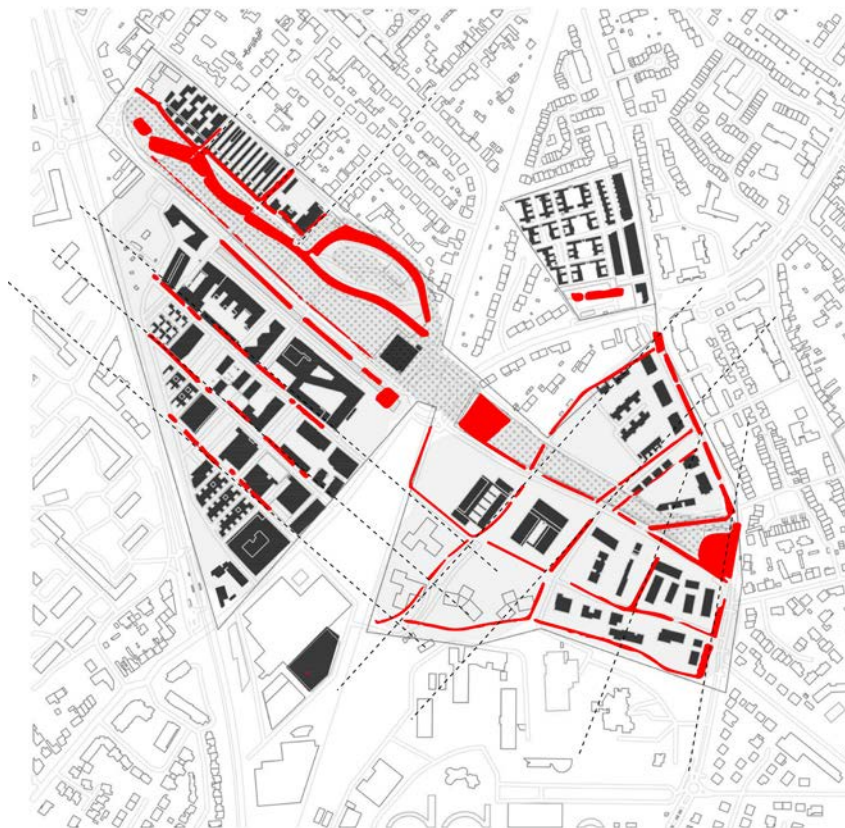
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**Figure 1.** Bottiere Chenaie, in Nantes. Identification of the designed district.



**Figure 2.** The neighborhood presents a different built density, where the natural elements flow as element that unify the different parts. Within this system, blue infrastructure defines the rhythm of the building and the urban grid. Drawing by the author.





# Prolegomena to a theoretical course in urban morphology based upon the relationships between the shape of the city and the shape of the map

Marco Trisciuglio

Politecnico di Torino (Dipartimento di Architettura e Design), Viale Mattioli 39, 10129, Torino, Italy

E-mail: marco.trisciuglio@polito.it

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**Abstract.** *The aim of the paper is describing the contents (and the critical approach) of a theoretical course held in Spring Term 2022 between Politecnico di Torino (PhD Program in Architecture. History and Project) and Southeast University Nanjing (Master Program in Architecture). The course introduced the main open questions of urban morphology through 10 cities, 10 maps and the approaches of 10 scholars/designers/cartographers.*

*The archaeological map of Pompei by William Bernard Clarke (1831/1840), in the comparison with the new topography of Rome by Giovanni Battista Nolli (1748), show the methodologic instruments of maps for studies on urban form. The map of Venice by Saverio Muratori (1959), the map of Como by Gianfranco Caniggia (1963) and the map of Torino by Augusto Cavallari Murat (1968), in their differences and at the same time in their deep relationship with the idea of urban dynamics in time, can be considered the main epistemological basis for Italian studies on urban morphology (whose excellent outcome can be represented by the plan of Palermo's historical center by Pier Luigi Cervellati in 1992). The Plan Voisin by Le Corbusier (1925) and the representation of Boston by Kevin Lynch (1960) represent two modern ways to look at the form of the cities, while the London portrayed by Space Syntax (2012) and the studies by Fumihiko Maki towards the possible morphologic map of Tokyo (1980-2018) introduce relevant topics (digital representation, the nature of Asian cities) in the contemporary debate about urban morphology.*

*The paper, written in the framework of the debate about the teaching urban morphology, will face the topic of collecting conceptual and functional tools able to help in describing the transitional changes in urban form.*

## Introduction

In the framework of the activities of the Joint Research Unit "Transitional Morphologies", established in 2018 between Southeast University in Nanjing and Politecnico di Torino, the course MORPHOLOGIES. The Form of Cities has been held for the first time in Spring Term 2022 by whom is writing this paper, together as PhD level course (in Italy) and as Master elective course (in China), in the context of educational programs in Architectural and Urban Design.

Each of the ten lectures was divided into three parts:

- a) in the first part, a city (Pompeii, Rome, Venice, Como, Torino, Palermo, Parigi, Boston, Londra, Tokyo) was described in its main morphologic features;
- b) in the second part a map of the city was introduced (together with the studies and the role of the scholar who traced it), trying to observe its capability to show the main characters of the settlement, but overall trying to describe the methodology that support the making of that specific map (and also its reproducibility for another similar case);
- c) in the third part attention was paid, to a specific topic related to the methodology adopted to trace the map.

This last point shows a sequence of questions, that all together are able to create the epistemological back-bone of the course:

1. What is an archaeological map?
2. Which can be the interplay among ground, figure and type in tracing a map?
3. May an "operating" urban history open to "transitional" projects?
4. May urban morphology become a Darwinian science based on evolution and analogies?
5. How can ground floor maps be transferred in conjectural diagrams?
6. Which can be the role of urban morphology in urban regeneration activities?
7. May new urban models be the starting point for new urban forms?
8. How is it possible to move from the connection Tectonics/Typology/Topography to the connection Uses/Perception/Behaves?
9. What can link, in the logic of urban form, physical walls and neural networks?
10. Are the Western maps able to describe Asian cities?

This paper will not answer specifically to those ten questions, because it has been written in the framework of the pedagogy of urban morphology, rather than in the epistemology of the same subject.

What will be described here is the long story underlying the development of the course, which for many of the students was the discovery of fascinating documents (such as urban cartographies in modern and contemporary history) and of the existence of a specific form of cities, while for others it was a useful reorganization of one's own skills and knowledge.

The conclusions will try to build a critical methodological and historical connection between the ten cities/maps that does not coincide with the diachronic sequence adopted during the ten lessons.

## Ten lectures, ten cities, ten maps

The first map was the map of Pompeii, traced by William Barnard Clarke between 1831 and 1840, published under the superintendence of the Society for the Diffusion of Useful. It is an engraved hand colored map. It shows the ancient city of Pompeii, that was covered by ashes during the eruption of the Vesuvius in 79 A.D. and slowly rediscovered only from late 18th century. The map by Clarke shows a limited excavation of the city, from where Pompeii is coming out from the ground as a complex system of walls and streets. An important key, useful to understand the entire map, appears on the left half of the board: it is the type of the "domus"

(the Roman house) that allows archaeologists in reading what remains of the city. Watching this map, we can say that, since an archaeological map shows the ground floor of a city (all the other parts of buildings are destroyed), every map of the ground floors of a city is based on typologies and can be named as "typological map". A map of the ground floors of a city is an "archaeological map" of something that was not yet destroyed and it is a map that can tell a lot about the configuration of internal and external spaces of the city itself, connecting the space of the rooms and the space of the streets.

The second map was traced by Giovanni Battista Nolli as the giant New Topography of Rome (between 1736-1748) in 12 engraved boards (with the help of the three young drawers Carlo Nolli, Giovanni Battista Piranesi and Giuseppe Vasi). It is not an archaeological map, like the one of Pompei (engraved one century later): it is the first real map of a city. The blocks are drawn as shapes painted in black, while the main buildings (palaces, churches, temples) are represented through their ground floor (their typological basis). Thus, the map by Nolli describes the city through grounds (streets and urban spaces left, in white) and figures (what is built, in black), but overall typologies (of the main buildings).

The map of Venice traced by Saverio Muratori in 1959 is the third map considered within the course. It is not really a map, but a book, printed in 1959 and related to an impressive work of survey of the urban form of Venice. Another book, written by Paolo Maretto, Muratori's pupil, will later (1963) describe the specific typology of the Venetian house as the "cell" of the Venice urban "tissue".

The book by Muratori shows two maps (1/10000 and 1/4000) and above all some "critical surveys" on specific areas. The great novelty is that each of those zones are pictured in different phases of development (example: 11th, 14th, 16th, 18th century). That means that the book is the first work demonstrating the dynamics of urban form: urban form is never the same forever, but something always changing and a designer (as Muratori was) must understand those dynamics in order to preview the new orders for the future. The title of the Muratori's book ("for an operative -working- urban history of Venice") means that the aim of the book is not only describing, but creating the background for renovation/regeneration projects.

In Saverio Muratori there is the first "transitional" consideration of urban form. In his lectures, Muratori followed a sharper and sharper methods, whose are witnesses some great boards (the famous "Tabelloni"): topography, typology, tectonics are together the keywords useful to study urban morphology.

The fourth map is the one of Como, drawn and published by Gianfranco Caniggia. Also in this case, the map has been conceived as part of a book: Reading a city: Como (1963). The map is a deeply detailed map of the city of Como in a specific historical moment: the beginning of 19th century. Even if Caniggia was pupil of Muratori, even if he considered the book on Como in continuity with the two works by Muratori about Venice and Rome, even if Muratori and Caniggia are always quoted together as the two main Masters of the Italian Urban Morphology's Studies, the map of Como is totally different from the one of Venice. Caniggia doesn't really work on surveys (more on documents and old maps) checking analogies, Caniggia traces not a map of Como in 1963, but a historical map (beginning 19th century), Caniggia is not interested in generically describing the continuous transitional change of urban forms (as Muratori is), but in describing the Roman rules of Como, looking for traces of the Roman city that can have influenced the shape of the city of today, Caniggia at the end enters in detail, trying to explain the role of a wall, of a street, of an ancient public building, in determining the shape of urban objects of nowadays. Caniggia was for a scientific approach to urban form and it is evident that he was not only interested in archaeology, but also in biological evolution (Charles Darwin)

and in the role of analogy in improving comparisons and taxonomy.

The fifth map is the map of Torino, drawn and published by Augusto Cavallari Murat and his team at Politecnico di Torino in 1969. The map is not really a map, but a “box”, that contains three books and one of those books contains three maps of the historical center of Torino in three different periods. The title of the entire work (translated here in English) is: Urban Form and Architecture in Baroque Torino. From the classical premises to the neo-classical conclusions. The map nr. 2 (1750-1800) can be considered the real Torino map by Cavallari Murat, while map nr. 1 is a more conjectural map of previous years and map nr. 3 is a later integration of map nr. 2. The most important novelty is the graphic solution: Cavallari Murat invented a new one to describe morphology based on in order to: describing elevation's elements (what the ground floors plan cannot do), describing something that is not sure, but just hypothetical and conjectural.

Even if he was professor of Architectural Design at Politecnico di Torino, he didn't give an “operative” role to his maps. He was more concerned on creating a National rule (UNI 7310/74 standard: conventions and symbols for the survey of historical urban fabrics) in a moment in which the design question of urban regeneration in Italian and European historical center was very urgent. Furthermore, adopting the idea of conjectural survey, he is continuously questioning documents and maps about the previous periods. The result is a series of map, maybe not so well defined like the ground floors map by Muratori and Caniggia but useful to make overlappings and understanding the transition of urban forms.

Cavallari Murat also describes urban morphology through diagrams, linked to the functional distribution in urban survey. It was for a long time something considered as totally abstract. Nowadays we know that it could be the basis for a logic and digital description of urban morphology (even investigating the question of topology and of machine learning as Space Syntax theories are doing nowadays).

The typological map of Palermo (sixth map of the series) was “designed” by Pier Luigi Cervellati as one of the attached boards in the new General Plan for Palermo (1989). It has been published (like it were a project!) in the Italian Architectural Journal “Domus” in May 1990. So, it was not made for analysis (neither an “operative” analysis), but for suggesting rules to design the regeneration of a historical center (40 years after the book by Muratori about Venice).

In fact, the result of the urban history of Palermo, at the end of 20th century, is a city with a rich but often forgotten historical center, totally in decay and with a great need to be restored and re-qualified. Cervellati is not Muratori or Caniggia or Cavallari Murat: he is not an urban analyst. He is an architect in charge to drive the regeneration processes in historical centers. He worked here together with other two urban planners: Leonardo Benevolo and Italo Insolera.

The PPE was approved in 1989 (already ten years before, in 1979, Giancarlo De Carlo and Giuseppe Samonà worked at a Program Plan for the historical center, an interesting idea to develop the internal paths, elaborated on a typological map). However, the typological map-based plan for the historical center shows some limits: the urban form is “frozen” in a map valid forever, like it were sculptured in marble. As a consequence, the plan is really conservative and suggests to make every time a deep survey, understanding clearly typologies and only after that organizing a restoration project. Pier Luigi Cervellati was much more operative in his city, Bologna, in 1969, when he was the Administrator of Urbanism activities and he studied a lot the question of historical centers and their renovation. But in Bologna he gave typological rule and never draw a typological map.

The seventh map (Plan Voisin for Paris) describes a demonstrative urban project and a provocative manifesto for the idea of “modern city” (in 1925) by Le Corbusier. The Plan Voisin



is well described in the first volume (1910-1929) of the Le Corbusier's Complete Work (a very precious series of 7+1 volumes). Mr. Voisin was and industrial businessman in the field of cars, the sponsor of the art and design journal *l'Esprit Nouveau*, founded by Le Corbusier with his friend, the painter Ozenfant. In 1925 they built in Paris an *Esprit Nouveau Pavillon* (a simple and modern villa, demonstrative of the modern ideas in architecture, design and art) and they exhibited a new urban plan for Paris as a tribute to the sponsor, Mr. Voisin.

The vol.1 of the Complete Work described this project in around 10 pages with some drawings and some pictures and also an essay, published in French, German and English, with the title "The Street": it is evident that the street is the main feature of the historical center and that it will be the main focus of the critics by Le Corbusier, who dreams a city governed by the mechanical transports and by wider and wider green areas.

The same vol.1 shows other interesting pictures, linked in some ways with the Plan Voisin: the *Esprit Nouveau Pavillon*, the plan for the city for three thousands inhabitants (an abstract city for no places, but it could be Paris), the sketches for the book *Vers une Architecture* (1925), with also, again, some references to Paris.

Le Corbusier uses some pages of the book *Concerning Town Planning* to say something about the history of Paris, its transitional way to continuously renovating (always its sketches are watching historical monuments and places of the city). He also uses some pages of another book, *Precisions on the Present State of Architecture and City Planning*, to express his idea about the modern city and the problems that it must face, giving some solutions, such as "destroying the corridor-street", where again Paris is the example.

In the Archive of Le Corbusier there are two maps of the Plan Voisin that can show his idea (and consideration) of the urban morphology of Paris. At the end, maybe the best representation of the Plan Voisin is the one with the overlapping of the cross shaped skyscrapers on the plan of the historical center: it is a way to suggest a new urban form, totally modern, for one if the most important European capitals of ever.

The map of Boston is the eighth map. It appears in the book *The Image of the City* (1960) by Kevin Lynch and represents a paradigm shift in the description of urban form: in a city it is possible (and necessary) not only mapping physical objects and spaces in their consistence, but also their perception by human beings (citizens and also visitors) in order to take care of their feelings in making urban projects. The morphology of Boston, read in a traditional way, shows a Main Street coming from the continent and reaching the center (where are churches and important public buildings), other streets connecting that core with the wharfs of the port, some park and an important role played by some hills.

In detail, the figure 3 of the book (and many other similar maps) gives an idea of the revolution operated by Lynch. In the late 1950s, back from a period of study in Italy, Kevin Lynch had started studying his town (Boston) with the help of his students and adopting an innovative method: taking and watching photographs, doing interviews with people walking in the city, mapping the perception of urban space (negative and positive) by hand made maps and some written reports: all these materials is now on-line, consultable on the MIT Lynch Archives.

To do this, Lynch lists five families of elements: paths, edges, districts, nodes, landmarks.

Effectively, the paradigm shift given by Kevin Lynch proposes the change of the sequence tectonics/typology/topography with a new sequence, made by the caring of uses/perception/behaves. These new concepts can be used to analyze urban forms and also to drive urban design processes. Kevin Lynch wrote his book in the same years when Muratori published his book on Venice. Maybe they show two different side of the same coin and an effort in keeping them together (instead of thinking to a hard opposition) can be fruitful.

Six theoretical “fruits” coming from the idea of the city by Lynch can be listed here:

1. the “townscape” described by walking in a city and sketching on sequences of photographs (Gordon Cullen);
2. the reflections on the social uses of urban spaces (Jane Jacobs);
3. the design practice driven by the idea of uses and behaves (Team Ten);
4. the design practice with bottom-up participation (Giancarlo De Carlo);
5. the potentiality of describing urban form through diagrams (Christopher Alexander);
6. the suggestions given to design by the deeper consideration of human behaves (Jan Gehl).

Thus, the urban design of the last 60 years owes to Kevin Lynch a lot, but the question still is: “does the map of Boston explain enough of the city of Boston?”

The ninth map (the one of London by Space Syntax) was used during the Opening Ceremony of 2012 Olympic Games in London as the floor for all the parts of the show at the Olympic Stadium, directed by the Danny Boyle. This “pop” use was a tribute to a way to describe the form of a city, which is considered innovative and the last outcome of urban studies devoted in mapping cities (for a research unit based in London, UK). The map of London was traced by Space Syntax upon an idea by Bill Hillier, Professor of Architecture and of Architectural and Urban Morphology in London (Bartlett School) and Founder and Director of the Space Syntax Laboratory at University College London. That complete London Map already appeared in 1996 in the book by Hillier, *Space is the Machine*, which theoretically completed the previous book, *The Social Logic of Space* (1984, with Julianne Hanson).

Hillier worked on the relationships between spaces and on the paths used by people to cross them.

In order to shortly describe the Space Syntax approach, it is possible to list some statements:

- a) cities are complexes of flows and networks;
- b) cities are the place where built environment and society meet each other;
- c) cities are made by spaces (buildings are there just to put space in order and organize hierarchies);
- d) “space syntax” is a series of theories and tool useful to describe the “syntactical” relationships (like in language) between spaces and buildings (as they were words);
- e) every open urban space can be described through a straight line (AXIS) and a point moving on it;
- f) a city described through the consideration of its open urban spaces can be described by an axial map;
- g) the axis of axial maps can be understood through “justified graphs”, topological elements able to describe the different uses of the same architectural typologies (see famous schematic drawings by Hillier);
- h) the axis allows to measure “integration” and “choices”: “integration” means the capability of a space to be strictly connected (or not) with another space, “choice” means the feature of a linear path to be more (or less) open to changes of direction;
- i) an axial map always shows a foreground network (main structures or infrastructures) and a background network (the dense and complex system of urban residential fabrics).

Finally, the map of London is an innovative map, made just by lines. There are more and more versions of the same map, also because in time Space Syntax developed more and more complex tools, useful to capture behaves of people and treatment of the urban spaces, at the same time for analyzing and designing parts of the cities (historical and contemporary ones). The road open by Kevin Lynch (an urban form is not made by tectonics, typology and topography, but by uses, perception, behaves) brought to an interesting result: it is possible to

describe some intangible features of cities in a logic way. A logic way is something that, in our digital era, can be told to a machine through topology, the specific geometry which investigates the logic of places. A logic way is something which can become part of mathematics. Nowadays a logic way is something that can be connected to the studies about "neural networks".

That means that, maybe one day, it will be possible to generate and organize urban space in an automatic way, using the same decision criteria adopted by human brain. The efforts by Michael Batty (from the same UCL) are towards this kind of goals.

In Asian Countries, for a lot of reasons, Space Syntax is getting nowadays a greater and greater interest. So, the last map is the map of Tokyo traced by Fumihiko Maki. Once again, the map is not a real map, but a book that has been written as a premise for a map (effectively never made). The book is by the famous architect Fumihiko Maki and his team, published in 1980 in Japanese. In 2018 was finally translated in English with the title *City with a hidden past*. It means that a city like Tokyo contains some important traces that we all, as urban designers, must know, even if they don't appear immediately, but only after a "critical interpretation of urban forms" (buildings and spaces).

The book tries to organize a systematic approach to the main morphological features of Tokyo facing in order: the overlapping of urban fabrics in past times, the relationship of the settlement with nature, the topography read in ancient maps, the several typologies of traditional residential buildings. There's not a map by Fumihiko Maki, but several drawings that can be useful to trace a map of Edo/Tokyo. So, the question is: is it possible to map a complex Asian city as Tokyo, adopting Western conceptual tools?

The answer is that not only this is possible, but adopting all what is possible to be learnt about the Western studies' tradition (in this course, for example) can be improved really a lot once it will be tested on an Asian city. The "Transitional Morphologies" Joint Research Unit has been established with this mission.

## Conclusion

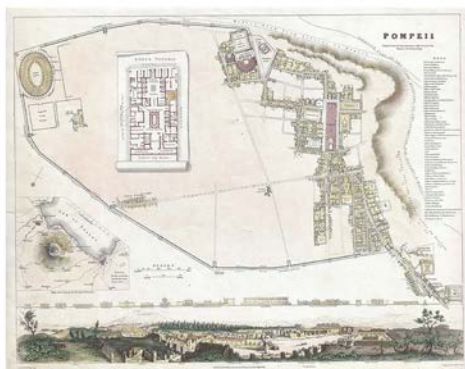
The sequence of the ten maps/lessons of the theoretical course in urban morphology based upon the relationships between the shape of the city and the shape of the map has been here described in a diachronic way. However, it is possible another kind of description, here simply traced in the conceptual map in figure 6. The core of the course is represented by the map of Venice by Saverio Muratori, whose direct precedent are the map of Rome by Nolli and the map of Pompeii (that both represent the archaeological background of Italian urban morphology). From the experience of Muratori, the map of Como by Gianfranco Caniggia (with its scientific approach to urban morphology) moves towards the "map/project" of Palermo by Pier Luigi Cervellati and also to the "project/map" by Le Corbusier (both design experiences based on different ideas of urban form). The map of Torino by Cavallari Murat, close in date and in hypothesis to the map by Muratori (even without a direct and openly declared link) is the first approach within the realm of graphs and diagram, where the map of Boston by Kevin Lynch and the map of London by Space Syntax can be placed. The map of Tokyo by Fumihiko Maki shows the possible role of all the described approach in reading the Asian city.

The conceptual map shows to be rich and fruitful for new and further experiences of studies and cities mapping.

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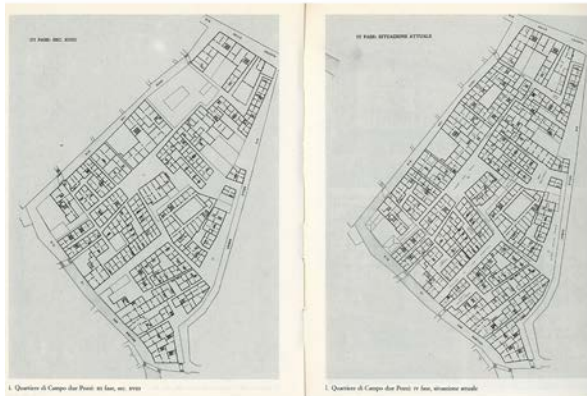
## Illustrations and tables



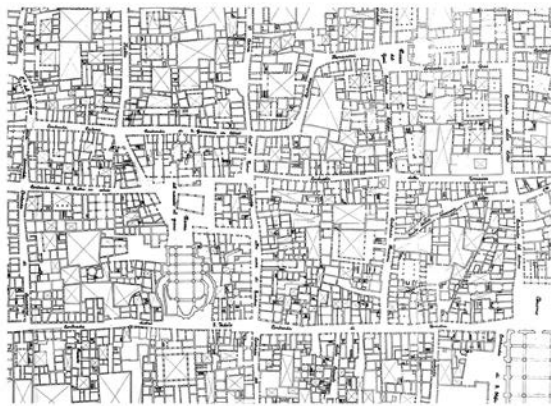
**Figure 1.** (Above: William Barnard Clarke (1806-1865), Pompeii. Published under the Superintendence of the Society for the Diffusion of Useful Knowledge. Engraved hand coloured map with a panorama (1831/1840); Below: Giovanni Battista Nolli (1701-1756), *New Topography of Rome* (1736-1748), 176x208 cm, in 12 engraved boards (with Carlo Nolli, Giovanni Battista Piranesi and Giuseppe Vasi) [detail])







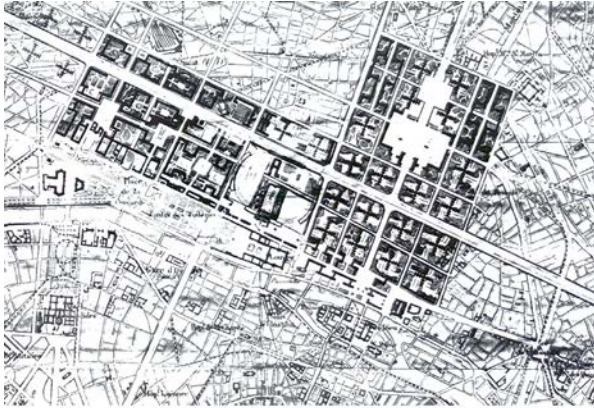
**Figure 2.** (Above: Saverio Muratori, Study for an Operational Urban History of Venice, [Studi per una Operante Storia Urbana di Venezia], Istituto Poligrafico dello Stato, Roma 1959 [the case study of Campo do' Pozzi]; Below: Gianfranco Caniggia, Plan of the City of Como, referred to the beginning of 19th century, [BOARD nr 22, from Reading of a City: Como, Centro Studi di Storia Urbanistica, Roma 1963 (1984)])



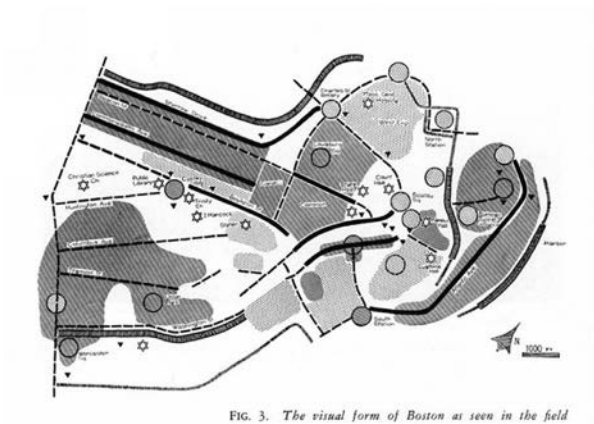
**Figure 3.** (Above: Augusto Cavallari Murat (1911-1989), Urban Form and Architecture in the Baroque time Torino (from the classical premises to the neoclassical conclusions), UTET and Technical Architecture Institute at Politecnico di Torino, Torino 1968, Map 2, Vol. 2 [Detail]; Below: Pier Luigi Cervellati (1936), PPE (Detailed Master Plan). Ground Floor, and Open Spaces, Board 10/13 of the Palermo General Master Plan (1989))



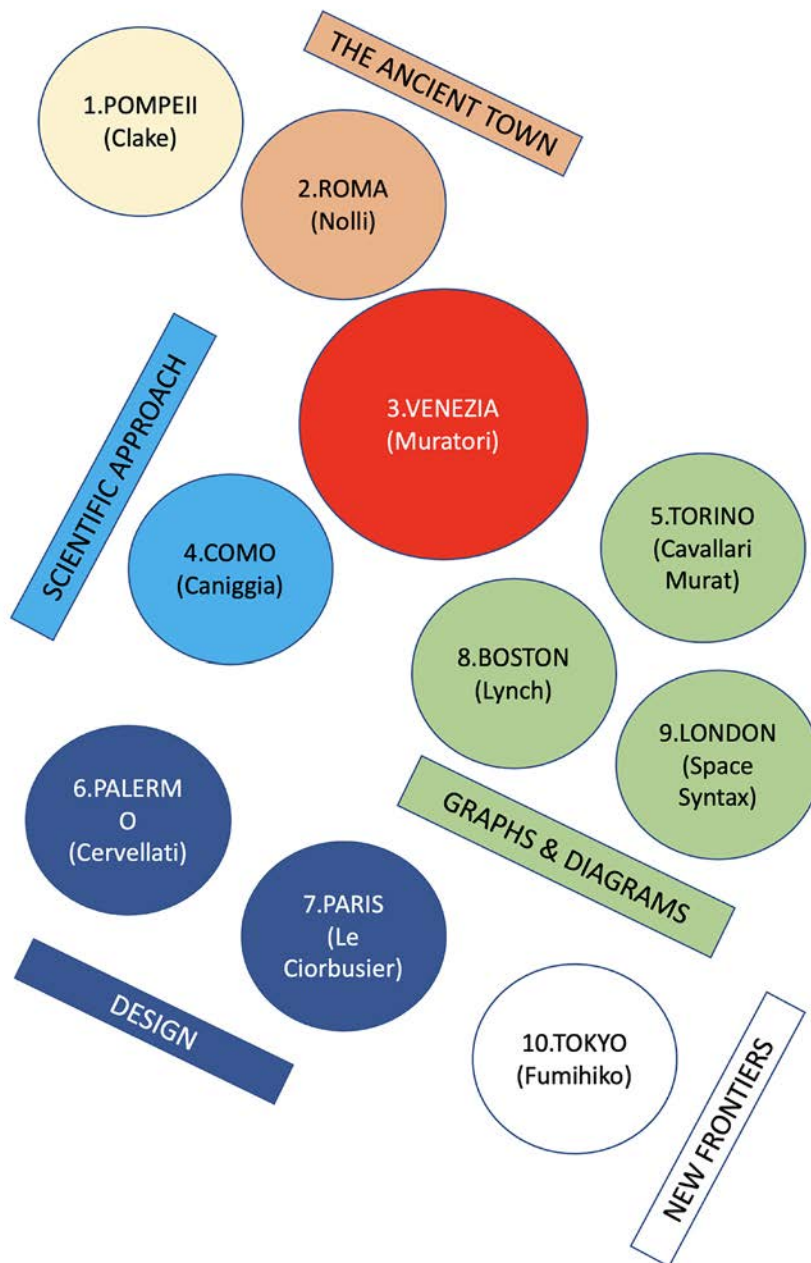




**Figure 4.** (Above: Le Corbusier (1887-1965), «Plan Voisin» of Paris (1925), exhibited at Esprit Nouveau Pavillon and at the International Exhibition of Decorative Arts; Below: Kevin Lynch (1918-1994), Fig. 3 The visual form of Boston as seen in the field, in *The Image of the City*, MIT Press, Cambridge (Massachussettes), 1960)



**Figure 5.** (Above: London's street network as an iconic part of the Opening Ceremony for the 2012 London Olympic Games, by Space Syntax Ltd (from Bill Hillier, *Space is the Machine. A Configurational Theory of Architecture*, 1996); Below: Fumihiko Maki and others, *Mie-Gakure Suru Toshi* [The city of the unseen], Tokyo 1980 (English-language edition: *City with a Hidden Past*, Tokyo 2018), Page 44, Distribution of street patterns in Edo [DETAIL])



**Figure 6.** (The conceptual map of the theoretical course in urban morphology based upon the relationships between the shape of the cities and the shape of the maps)



## Morphology, Morphogenesis, Metamorphosis. The need of a lexicon

Marco Trisciuglio<sup>1</sup>, Federico Vercellone<sup>2</sup>

<sup>1</sup>Politecnico di Torino (Dipartimento di Architettura e Design), Viale Mattioli 39, 10129, Torino, Italy

<sup>2</sup>Università di Torino (Dipartimento di Filosofia e Scienze dell'Educazione), Via S. Ottavio, 20, 10124 Torino, Italy

E-mail: <sup>1</sup>marco.trisciuglio@polito.it, <sup>2</sup>federico.vercellone@unito.it

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Conference theme: *Design a Sustainable Urban Form*

**Abstract.** *30 years are the temporal distance between the Peter J. Larkham and Andrew N. Jones' work A Glossary of Urban Form (1991) and the new Glossary of Morphology (2020) by Federico Vercellone and Salvatore Tedesco (editors). Even if the two works are different in setting, in consistency and above all in the field of knowledge to which each refers (urban morphology on the one hand and aesthetic philosophy on the other), the two glossaries show many similarities in their attempt to construct a taxonomy of concepts relating to form (including the city).*

*The purpose of the paper is the comparison between two disciplines especially on three concepts: "morphology", "morphogenesis" and "metamorphosis". The consideration of morphology from the point of view of the evolution / corruption of the form and above all of its original constitution (archetypal and / or also as an anthropological datum) is of particular interest here.*

*The proposed contribution, as preliminary reflections on an interdisciplinary study to be carried out, will take the form of a dialogue around the same object from two different points of view.*

## Introduction

This paper arises from a specific and little question, linked to a specific and little experience we did in China: how to translate in English, for a lecture, the title of the 1959 book by Saverio Muratori, *Studi per una operante storia urbana di Venezia*, never translated in English until now. We know how much the adjective «operante» used in that title was important in the Italian debates on urban morphology and on historical urban centers, but the English translation of the term is not so shared by everyone.

The Wiley-Blackwell Encyclopedia of Urban and Regional Studies, edited by Anthony M. Orum (2019) translates it as «operational». Many other Authors preferred «operational», while Giancarlo Cataldi (in a speech hold in 2014, at ISUF Conference in Porto) used the adjective present participle «working». Some colleagues in China proposed to translate «operante» with 操作 (cāozuò) that is something like «to be operative», but coming back from the Chinese culture to the European one (and specifically to English language), something can be lost and something can be added that can be also misleading in some way.

It is clear that we need a new generation of lexicons dedicated to the subject of urban morphology.

The books we call lexicons can be of two main different genders: specialized vocabularies (able to explain the words of specialist languages and -according to their size- they can be a shorter work, called glossary, or a wider fruit of a greater challenge, called encyclopedia) or dictionaries (able to translate the same words from the language of one culture to the language of another culture). Since languages and cultures are not neutral and precise in their mechanisms of development, much often the semantic field of a word changes in the passage from one language to the other and so the more advanced specialist lexicons play the role both of the specialized vocabularies and the dictionaries.

## State of the Art

We must recognize that the 1568 pages of *L'Aventure des mots de la ville*. À travers le temps, les langues, les sociétés opened in 2010 a new season in studies about words related to urban form. Driven by a team including a sociologist (Christian Topalov, CNRS and EHESS, main editor of the research project), a geographer (Laurent Coudroy de Lille, Université de Paris-Est), an urban anthropologist (Jean-Charles Depaule, CNRS), and a historian (Brigitte Marin, Université de Provence), the work investigates on the words ordinary used nowadays to talk about cities in seven European languages (English, French, German, Italian, Portuguese, Russian, Spanish) and in Arabian (because of its interplay with the other European cultures). 160 authors have been involved in writing 260 essays/entries during the 15 years of the project (started in 1995). Ten years later, in 2020, another European network (coordinated by TU Delft within the COST – European Cooperation in Science and Technology, called “Writing Urban Places”) published the glossary *Vademecum. 77 Minor Terms for Writing Urban Places*, edited by Klaske Havik, Kris Pint, Svava Riesto and Henriette Steiner and above all devoted to the new terms of the current debate on urban spaces and places.

If the aim of the first book is organizing the words about the cities in a historical and genealogic perspective, the main goal of the second one is showing that new terms are entering, year by year, in the debate on the uses and thoughts upon the city as an anthropologic product.

What about the words related to urban morphology? They are not so evident in the two works of 2010 and 2020 above described, even if, obviously, the urban form seems to maintain its role of general background of societies behaves.

In order to find more specific term related to urban morphology, other works should be



consulted.

Already in 1988, when the Topalov's challenge towards a genealogic dictionary of urban terms just started, a *Dictionnaire de l'urbanisme et de l'aménagement* has been published by Pierre Merlin and Françoise Choay as the outcome of a national investigation «about urban morphologies» (conducted in France, Italy, UK and USA) by the *Laboratoire Theories des Mutations Urbaines en Pays Développés*.

Furthermore, the collection of papers by M.R.G. Conzen *Thinking about urban form. Papers on Urban Morphology, 1932-1998* (2004, edited by Michael P. Conzen) contains a chapter entitled «A Glossary of Technical Terms». It is derived from the second edition of the famous book on Alnwick by Conzen (*Alnwick, Northumberland: a study in town-plan analysis*, published by the Institute of British Geographers Pin 1960). In a well-known comment on it, Ivor Samuels wrote: "It is one of the attractions of the nexus of concepts, ideas and approaches that occupy the field of urban morphology that they are capable of being appropriated for use by different professions in different contexts who seek to use them for their own purposes. Choay and Merlin (1986) complain about this. Everyone seemed to be discussing something different and there was very little common ground or methodological base, quite apart from language problems. This, however, is one of the strengths of morphology. It is open to approach by various disciplines with their own methods and any attempts to restrict or strait-jacket the discourse could stifle it" (*The Built Form of Western Cities*, 1990, by T. S. Slater, pp. 433-434).

Between the evocation of richness of a specialistic language (the one "spoken" by urban morphologists) and the real and always lurking risk of a new Tower of Babel, another case can be here described: the translation in English (from the original Italian language) of two strictly linked books. The first one was written by Gianfranco Caniggia and Gian Luigi Maffei about the interpretation of basic buildings (originally published 1979) and the second one was written by Gian Luigi Maffei and Mattia Maffei about the interpretation of specialized buildings (originally published in 2011). The challenge faced by Nicola Marzot to transfer the works and ideas of the Caniggian School from the Italian field of debate to an international one required the compilation of two rich glossaries, probably also necessary for that sort of "newspeak" of Italian urban morphology that Gianfranco Caniggia had the merit (and perhaps also the fault) of establishing. The two glossaries by Marzot collect 86 terms, 62 for the first book and 24 for the second book, from "building plot" to "elementary cell", from "polarity" to "typological process", from "nodality" to "specialization".

### Comparing two lexicons on Morphology

However, faced with the semantic uncertainty of the terms of urban morphology, instead of increasingly closing the circle of those who speak (and understand) the same language, with the risk of no longer being understood outside that circle, it seems today necessary to further widen the meshes of the "morphological discourse" so as to break the strict disciplinary logic and open reflections on the shape of the city to new and different scientific contributions.

For this reason, we tried to compare two different lexicons, both admittedly presented as glossaries: the first is *A Glossary of Urban Form*, edited by Peter J. Larkham and Andrew Jones in 1991 and the second one is *Glossary of Morphology*, edited by Federico Vercellone and Salvatore Tedesco in 2020.

First of all, it must be said that a glossary is usually built on selected terms, it does not have the exhaustive nature of a dictionary. However, precisely through the choice of lemmas, specific critical attitudes and implicit field choices can be read.

The glossary by Larkham and Jones has been published as the issue nr. 26 of the "Historical

Geography Research Series" in June 1991, under the responsibility of the Urban Morphology Research Group within the School of Geography of The University of Birmingham (among whose members are also Jeremy Whitehand and the same T.S. Slater). The introduction to the glossary, signed by Larkham, is an excellent synthesis of the history of urban morphology in the British context over an entire century (and in the German context, too, at least in its origins). Although the field in which the glossary is drawn up is that of British-born geographers and planners, the glossary appears to acquire terms from a varied panorama of disciplines.

The actual glossary fills about seventy pages, in which it is recognized that each of the lemmas belongs to one of these subjects' fields: Agents of change, Architectural style, Architectural terms, Building types, Caniggian terminology, Conzenian terminology, Data sources, Fabric change, Interest in land, Methods of analysis, Planning terminology, Settlement type, Street type.

The glossary by Vercellone and Tedesco has been published by the international publishing company Springer. The main background of both the editors is the Aesthetic Philosophy in the Italian context of Italian academic humanistic studies, but the aim of the glossary is becoming a reference point for multidisciplinary studies about "morphology". Published in the Spring Series "Lecture Notes in Morphogenesis" (directed by a Mathematician, Alessandro Sarti, Directeur de Recherche CNRS at the EHESS in Paris) the work opens with a programmatic introduction, that starts with these words:

"Currently, there exists no discipline whose specific boundaries could be defined as morphology. Nevertheless, it is possible to trace out its history in ample terms and to define its scope the work opens with a programmatic introduction broadly by understanding it as the place where the semantics of forms are defined and where they are connected to a reference image. The central link in the field of morphology is form-image, and it refers to those dynamics of the form and to the dynamic systems that have taken hold in late modernity and that continue to grow today".

The Glossary of Morphology in the end is the result of a broad and articulated reconstruction of morphology as a study of form, to which different and even very distant knowledge is applied. The glossary itself (about 500 pages containing 123 lemmas) is composed of short essays focused on each lemma, with authors coming from different backgrounds.

The best way to compare the two works, that of Larkham and Jones and that of Vercellone and Tedesco, both in their general setting and in the different historical periods in which they were written and published, is to compare the reference to three words that on the one hand they appear to be emblematic of the specialized language of urban morphologists and on the other to be used sufficiently broadly to fall within the multidisciplinary context of the more recent work of the two. These are morphology, morphogenesis and metamorphosis, three lemmas that all contain the root of *μορφή* (*morphé*), *forma*: MORPHO-logy, MORPHO-genesis, meta-MORPHO-sis.

### **Morphology, Morphogenesis, Metamorphosis**

For Larkham and Jones, "MORPHO-logy" is intended as urban morphology and the definition is short and clear: "the study of form". They remember that for Oxford English Dictionary "morphology" is "the history of variation in form" (first used in 1885) and that the term has been used by Johann Wolfgang Goethe. Moving to the term "urban morphology", the editors try to mix the definition of British geographers ("the study of the physical fabric of urban form and the people and processes shaping it") together with the definition of urban designers ("methods of analysis finding out principles or rules of urban design"): saying that "morphology is the study of

the physical and spatial characteristics of the whole urban structure".

Within the glossary compiled by Vercellone and Tedesco, "Morphology" is of course the main term to be defined. Considering any keywords (Phenomenology and ontology, Forms, functions, attractors, "Crisis" of Morphology, Historical developments, Aesthetics, theory and history), the two editors wrote a long essay that retraces the ideal route of birth and development of the concept of morphology using philosophical and scientific references, showing the fruitful potentiality of the idea of "morphologie" as it was proposed by Goethe (quoted here in a more explicit way).

With respect to the term "meta-MORPHO-sis", for Larkham and Jones it is not faced in itself, but as the adjective "metamorphic", used to qualify the "plot pattern" in the Conzenian terminology. Thus, adopting the words (and also a specific picture) by M.R.G. Conzen (1969 and 1978), a "metamorphic plot pattern" shows "secondary changes caused by amalgamation, division and truncation of plots".

On the contrary, in the context of the collection of short essays that constitutes the glossary of Vercellone and Tedesco, Valeria Maggiore describes the meaning of metamorphosis in ancient mythology (between Homer, Ovid and Apuleius) as well as in biology (above all in zoology), highlighting the interplay between transformation (what changes) and permutation (what remains as the same).

And what about "MORPHO-genesis"? for Larkham and Jones, following the thought by Jeremy Whitehand in some written of early Eighties, "Morphogenesis" is "the creation of physical forms viewed as a developmental or evolutionary process".

"Morphogenesis" is absent as a specific term in the glossary by Vercellone and Tedesco, but the word is relevant in the name of the Springer series in which the book is published ("Lecture Notes in Morphogenesis"). The explanation of the contents of the series is clear as a glossary definition and passes through an essential question: "How can form emerge from the constant, chaotic flow? How can a sequence of purely informational elements -an a-signifying combination of chemical substances organized in the DNA molecule- evolve into the highly complex and structured forms of the living organism? A similar question can be asked when we deal with the morphogenesis of vision in neural systems and with the creation of evolving synthetic images, since digital technology makes possible the simulation of emergent processes both of living bodies and of visual forms".

## Conclusion

30 years are the temporal distance between the Peter J. Larkham and Andrew N. Jones' work *A Glossary of Urban Form* (1991) and the new *Glossary of Morphology* (2020) by Federico Vercellone and Salvatore Tedesco (editors). Even if the two works are different in setting, in consistency and above all in the field of knowledge to which each refers (urban morphology on the one hand and aesthetic philosophy on the other), the two glossaries show many similarities in their attempt to construct a taxonomy of concepts relating to form (including the city).

The older glossary investigates the field of urban morphology from within, trying to remain specific to the sciences (and languages) that strictly deal with the shape of the city. The more recent one completes (at least for the interpretation that urban morphologists can make of it) the reverse path, allowing other reasoning on the form to invade the field of urban morphology and ultimately freeing it from perhaps sclerotic terms of debate.

Now that the taxonomy of words on morphology seems to be able to be enriched from the point of view of the Anglo-Saxon matrix lexicon, a new and further phase of research is offered

to our initiative as scholars.

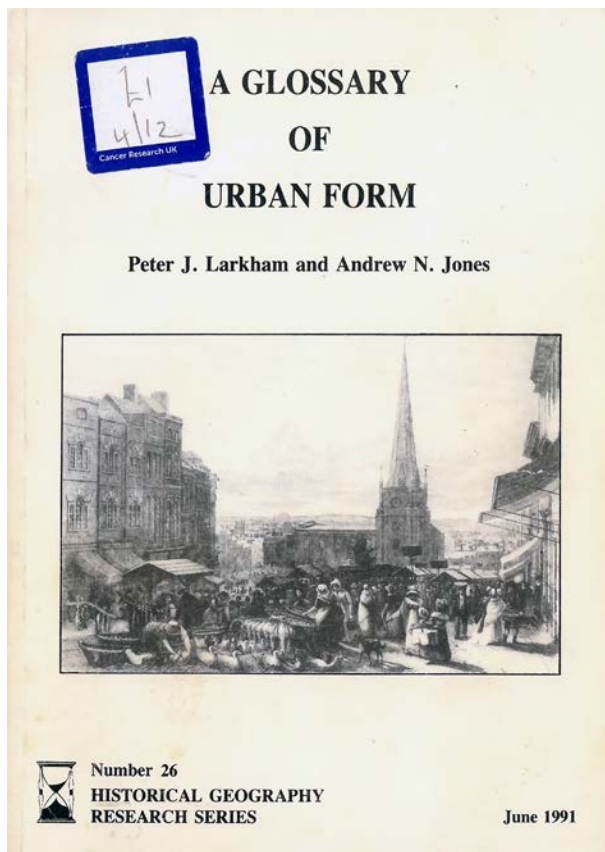
The intersection between settlement cultures and spoken languages could be the new horizon of research to come. For example, extreme Asia, so far from the Mediterranean and Anglo-Saxon cultures, can become an important field of experimentation. If we are able to “read”, in settlement cultures far from our own, the interrelationship between words and figures of the city, we will then be able, as in a mirror, to understand more and better our own settlement culture. That means that we must avoid to remain in the realm of words without any connection with the realm of objects: the real great challenge in our contemporary world (globalized by one hand and full of different and precious regional cultural identities by the other hand) is watching the apparently similar urban facts and considering the different ways to nominate them, in order to understand how the urban facts themselves are different in functions, uses and symbolic values for different cultures.

However, there is a second corollary of what has been said up to now. Just as there is a multidisciplinary character in the very nature and history of morphology studies (already evident in the glossary of Larkham and Jones), the discourse on urban morphology also deserves to look at the common place of comparison of the other disciplines. As this is explained by Alessandro Sarti himself, when he presents the Springer series on morphogenesis: we must provide ourselves of “suitable theoretical and practical tools for describing evolutionary phenomena at the level of Free boundary problems in Mathematics, Embryogenesis, Image Evolution in Visual Perception, Visual Models of Morphogenesis, Neuro-mathematics, Autonomy and Self-Organization, Morphogenetic Emergence and Individuation, Theoretical Biology, Cognitive Morpho-dynamics, Cities Evolution, Semiotics, Subjectivation processes, Social movements as well as new frontiers of Aesthetics”. Out of the specific boundaries of urban morphology, a new and trans-disciplinary interest towards the idea of form is needed, even considering how many subjects (in technics, arts, humanities, sciences) are using today the idea of Morphologie as it was used initially by Johann Wolfgang Goethe.

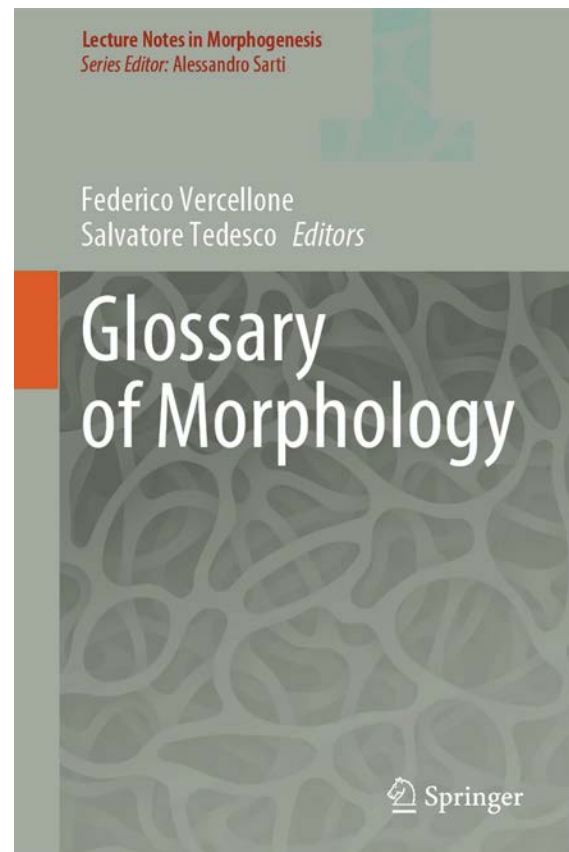
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## Illustrations and tables



**Figure 1.** (Cover of the book by Peter J. Larkham and Andrew N. Jones, *A Glossary of Urban Form*, "Historical Geography Research Series" Number 26, Cheltenham, 1991)



**Figure 2.** (Cover of the book by Federico Vercellone and Salvatore Tedesco, *Glossary of Morphology*, "Lecture Notes in Morphogenesis" series, Springer, Berlin, 2020)





## Useless towers. The triggers for urban growth

Marco Marino

Dipartimento di Culture del Progetto. Università Iuav di Venezia. Venezia. Santa Croce, 191. 35135

E-mail: mmarino@iuav.com

Keywords: *Urban Trigger, Urban growth, Medieval urban design*

Conference theme: *U+D Prize*

**Abstract.** *San Gimignano is the result of a single decision made by countless small and manageable ones that have followed one another over time, a sort of, using the words of Ernst Gombrich, "piecemeal planning", a gradual planning: an intervention-model based on micro-decisions forced by customs, rules and regulations, which together and in a short time are the trigger for the construction of the city. The towers of San Gimignano functioned as a catalyst for building development: every building subsequently built, was literally leaned against a tower. Each family with their own house had the tower as a reference which was both a symbol of social and ideal belonging, and a device for the spatial control of both the urban and landscape scenarios. The towers dictated the subsequent order of the city, and therefore all subsequent transformations were informed and organized by the position of the towers. San Gimignano shows us another way of designing, another way of thinking about urbanity and has, among other things, the advantage that has already been done, it is measurable, controllable and checked in all its parts and therefore I believe that the study of the shape of the city, of its urban pattern, of the comparison of scale, of the metric analysis of the urban shape that it has performed so well in the past, I think it is an avenue of future studies to follow, and the example of San Gimignano demonstrates this clearly.*

Starting from the twelfth century in San Gimignano begins what Leon Battista Alberti calls the "disease" of the construction of the towers, "I remember that no later than two hundred years ago, in the municipalities there was the disease of building towers even in the smallest cities: no father of a family could refrain from doing so" (Settia, 2007).

Since 1100 a series of citizens of San Gimignano are involved in struggles and "wars" (Fiumi, 1961) internal, between the Bishop of Volterra with his "fideles" (Fiumi, 1961) against other local families. The local families were wealthy and the income linked to the rent of land allowed to buy and erect towers that were necessary not so much to defend themselves from the attacks of other consortia but to demonstrate their power towards the city and the countryside. "Many local "tyrants" had covered the country" (Bloch, 1999) with their own towers. The towers of San Gimignano belonged to a middle class in the process of overpowering affirmation, parvenu who imitated the examples of the most powerful and important aristocratic families of the surrounding cities (Settia, 2017). The tower is an imported status symbol, from larger and more important realities such as Siena or Pisa, where the towers were built for a long time (Bonnucci, Castelli, 2005).

Building towers in the twelfth century is in effect a fashion because "military motives are in fact completely insufficient to explain their thickening in some precise points of the city area, in clear contrast to any offensive or defensive rationality" (Settia, 2017). The towers of San Gimignano are uninhabitable buildings, which can accommodate maybe two or three people at a time in a very constrained space of four square meters, where reaching the highest floors is a very difficult and feasible only through very steep stairs, and from which any kind of defense or offense seems to be impossible. "There are also towers so narrow and slender that they do not allow any habitable use; in these cases, therefore, their very shape emphasizes the purely symbolic and representative value and puts out of question any other practical use. Such situations, abnormal from the military point of view, are instead explained if we consider that the towers responded first of all to the need to «appear» as clearly as possible in the most frequented places of the city" (Settia, 2017).

The location of the towers in San Gimignano is not accidental, they are usually built along the Via Francigena, and this allowed to be seen by everyone, inhabitants, travelers or pilgrims (Figure 1.).

The tower is the most technologically advanced and expensive building in the city, it is the symbol of the most coveted social role of a new nobility. The tower is part of a chivalric outfit that determines the status of an individual, which is composed of movable and immovable property (Salvemini, 1896; Salvemini, 1899). The horse and the armor to go to war are goods that can not be transmitted from father to son, but the coat of arms, the tower and the surname are transmissible goods for generations, and it is not surprising to still see the coat of arms of the Mangeri family engraved on the stones of one of the twin-towers of San Gimignano.

The houses of the lords and their consorts and servants have no material and even less symbolic value throughout the 12th century, because the houses of San Gimignano at least until the statutory provisions of 1255 will be built almost exclusively in perishable materials.

The towers are an immutable mark, whose value far exceeds the material one, so much so that in the statutes of 1255 these buildings are considered an inalienable good for any family.

*"II, 27. For those who want to sell towers or dwellings.*

*And we also state that, if a person in the castle or curtis of San Gimignano wanted to sell any tower or dwelling in whole or in part or wanted to undo or take away in any other way, He must*

*first ask permission from his father to the fourth degree [...]” (Diacciati, Tanzini, 2016).*

Around the towers “whose stone walls, in the cities, cast a thick shadow on the humble wooden houses of the common people” (Bloch, 1999) we go to build the houses of an entire family clan, and of servitude, thus becoming the first catalysts of urban expansion (IMAGES X).

Towards the end of the twelfth century and the beginning of the thirteenth century the nobles of San Gimignano implemented an aggressive and expansionist policy aimed at including more and more territories under the administration of their Castle and weakening the power of the Bishop of Volterra, until the creation of a micro-coup d'état (Ciampoli, 1996) that will lead to the foundation of the Municipality in 1177 (Ciampoli, 1996). Already in 1129 there were signs of a growing desire for emancipation from the Bishop of Volterra with the establishment of the Consuls, who were the representatives of the prelate in San Gimignano (Davidshon, 1909). The Consuls were basically landowners and bourgeois who soon realized that they could unite efforts, wealth, property, and administrative capacity to form an institution independent of the single power of the count bishop, radically transforming the political and legal structure of their possessions.

The jurisdiction of San Gimignano assumes, for the first time, the geographical scale incorporating the countryside, leaving the reduced physical dimensions of the Castle. It is what Siegfried Passarge calls *Stadtlandschaft*, the landscape-city, that “as a political factor clearly emerges in Western and Central Europe. The gathering of people with common economic interests has led cities to become politically organized, to fight for independence and to a large extent to obtain it. The special policy of city-states in the state as a whole dominates much of medieval and modern history” (Passarge, 1922).

The new Municipality intends to assert its power, not only by forcibly taking entire territories around the Castle, but by forcing all the local nobles, with their wives, servants and servants to live in San Gimignano. The forced urbanization that occurs between the twelfth century and the thirteenth century leads to an exponential increase in population, up to about 3,000 inhabitants, phenomenon also encouraged by the exemption from all property taxes through the “*Instrumentum Francheze*” of 1214:

*“You have the obligation to respect and observe the deductible throughout the new and old castle of San Gimignano, except for that area that is located above the bell tower and from the tower of the Parish Church towards the hill of Montestaffoli because on the same hill is observed an ancient custom, and if someone wanted to build on its ground a house or even better a tower can do it freely.” (Ciampoli, 1996)*

At the same time in Pisa (Bonaini, 1854) was severely limited construction and the height of the towers to 21 meters, in San Gimignano instead is encouraged and promoted.

*“The same City promises to Sigerio and his mother to give him space in the New Castle of San Gimignano, in which they can have and maintain houses in which they can build their own homes, and in addition they will have three hundred Pisan liras [...] And they must promise, Sigerio and his mother, to spend at least one hundred lire at San Gimignano for the purchase of a real estate as a house or better still a tower provided that the construction takes place from next May 15 until the end of the year, when the consuls will ascertain the fact happened.” (Ciampoli, 1996)*

The act drawn up by the consuls of the City shows once again that the towers are not an instrument of defense, but are the true symbol of the city. The construction of the "beautiful towers" of San Gimignano is not accidental, but is part of the new project of the city promoted by the Sangimignanese ruling class. In the list (Pecori, 1853) of the first podestà of the Castle there are many tower builders such as Messer Alberto di Montagutolo from 1201 to 1202, the aforementioned Messer Gregorio dei Gregorio, the only Sangimignanese to have held for three times the role of podestà in 1209 in 1213 and 1219, holder of the gabella of step of the town of San Gimignano in 1228, who owned at least three towers and will host in his home all the podestà of San Gimignano (Rivers, 1961).

It is the inscription of the genetic code, the input for growth, the information that will give the Castle the shape of the turreted city. The consoles impose on the city a precise shape that will be best qualified in its profile, in its skyline. Favorable conditions were being created for the ideal of a city to come true, the prerequisites for the Castle of San Gimignano to be transformed into the city of the "hundred towers", a place with a strong formal identity capable of imposing itself on an entire territory.

The image of the Castle acquires a new significant value, is the expression of the Municipal affirmation on the surrounding territories. The self-representation of a city like San Gimignano has to do with its formal marks, the towers, which make it the place that makes possible the identification and individual and collective development. "And in fact these are marks, for whose most incisive and perfect presentation we have fought throughout history. Think of the towers, the walls, the squares, the theaters, but also the urban forms in their entirety, the profile of Rome, how Rome emerges from the summer vapors, the horizon line of New York at the entrance of the port" (Mitscherlich, 1968). The consequence is that "the configured city can become "homeland", the merely agglomerated one, no; since the concept of homeland requires the identification marks of a place" (Mitscherlich, 1968).

San Gimignano is located on a relief in the center of a plateau limited on three sides, North to East and West, by the river Elsa, and West by the mass of Poggio del Comune (IMAGES X). The towers in the city become architectural elements on a landscape and geographical scale, are the "elements of that "beautiful landscape" pictorial and poetic" as Emilio Sereni writes "of which the taste in Tuscany is reborn, while the new people of the Communes and the countryside return to imprint beautiful forms and congrue to their fields and their country houses" (Sereni 1979). The city must be seen from afar and must emerge from the landscape that is one with it, is the figuration of the Stadtlandschaft, and is what Folgore da San Gimignano calls the "town" in his sonnets of the months:

*"Di Giugno dovvi una montagnetta  
coperta di bellissimi arboscelli  
con trenta ville e dodici castelli,  
che sian intorno ad una cittadetta [...]" (Sereni, 1979)*

Like San Gimignano, all of Northern central Italy is completely redesigned by the constellation of the many medieval "Manhattan" such as Bologna, Brescia, Lucca, Parma and Piacenza, Arezzo, Milan, Pistoia, Turin, Tarquinia, Verona, Rome, Vetralla, Monza, Pavia, Florence, Gallese, Siena, Volterra, San Gimignano, Asti, Lodi, Vercelli, Modena, Genova, Bergamo, Castiglione d'Adda, Viterbo, Alba, Ivrea, Ascoli, Perugia, Prato, Ravenna, Rimini, Sarzana, Trento, Chieri, Albenga, Como, Savigliano, Vicenza, Padova, Treviso, Bassano del Grappa, Segni, and to these is added a series of smaller municipalities such as Oristano, Candia Canavese, Narni,



Todi, Civita Castellana, Sabbion, Conselve, S. Martino, Maserà, Brendola, Crotta, Tivoli, Caramagna, Pao, Segonzano, Ponte Organasco, Campagnano (Settia, 2007; Guidoni, De Mincis, 1996-2005).

The long list of cities, which also correspond to most micro and medium-sized capitals of Italian city-states, is a symptom of a common attitude, a typical *modus operandi* for the construction of the city. We must imagine that most of the Italian cities were built of wood and only the stone mass of the towers constituted a stable sign within the cities, and it is around them that a stable urban form was being consolidated. The towers are not exclusive to San Gimignano, on the contrary. In San Gimignano we can see a reduced and concentrated version - perhaps for this reason even more fascinating - of a phenomenon that has involved other cities in a massive way. In Florence and Siena, just to mention some models that the Sangimignanese certainly had in mind, the towers were a real system of social organization. The rich lords gathered in consortia occupied entire blocks fortifying them through the “castellari” (Causarano, 2017) in Siena and the “Society of the Towers” (Santini, 1887; Fanelli, 1973) in Florence, which will be the basis for the subsequent urban organization.

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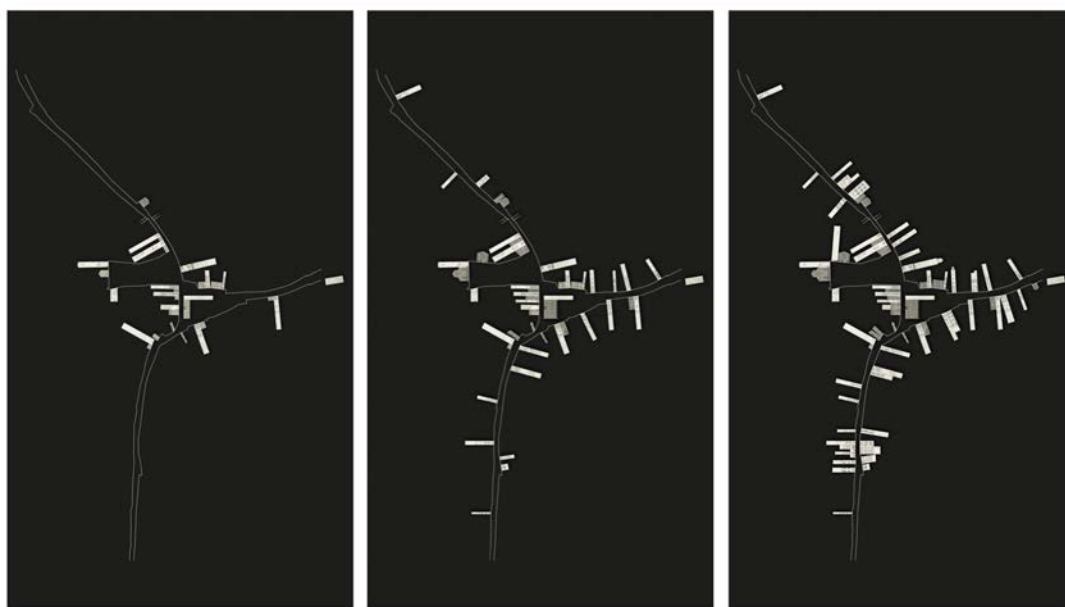


Figure 1. San Gimignano represented in schematic form in 1205, 1214 and 1255.

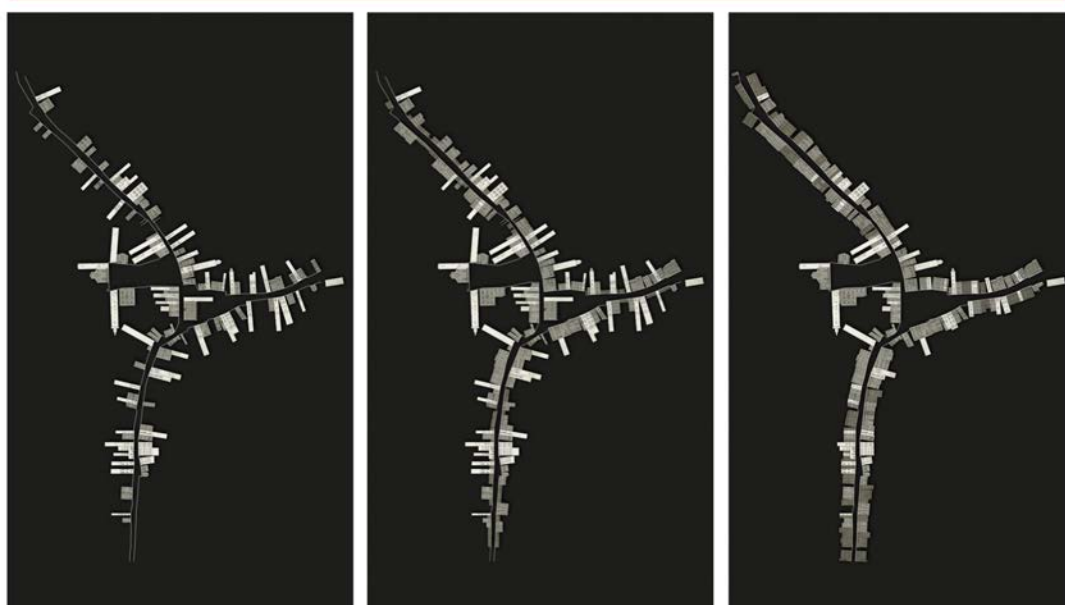


Figure 2. San Gimignano represented in schematic form in 1308, 1348 and 1603.

# Urban landscape and morphology as operable material for the architectural project: the work of Bruno Violi in Bogotá

Serena Orlandi

Dipartimento di Architettura. Università di Bologna. Viale Risorgimento, 2. 40136 Bologna.

E-mail: serena.orlandi4@unibo.it

Keywords: *urban morphology, landscape interpretation, architecture and morphology, Colombian modern architecture, Bruno Violi in Bogotá.*

Conference theme: *U+D Prize*

**Abstract.** *The relationship between architecture, topography, urban morphology and landscape is addressed and investigated through the critical analysis of four buildings designed by the Italian architect Bruno Violi (Milan, 1909 - Bogotá, 1971) in Bogotá between 1950 and 1962. The case studies have a different scale, functional program and location within the urban fabric of the Colombian capital: two private residences, the Shaio House (1950), located in a newly expanded residential area with a regular urban layout, and the Violi House on Carrera 2e (1953), sited on a sloping lot at the foot of the mountains, totally immersed in nature; the headquarters of the Volkswagen car company (1955), facing an important road axis; and the Quintana Building (1962), an office complex with a roof floor for residential use that dialogues with the consolidated fabric of the colonial historical city. Bruno Violi's work describes how the interpretation of geographic and urban characters of the site is acknowledged as an operational condition and an active design device, capable of strongly binding the architecture to the place, contributing to define its form, compositional choices and identity, as well as a tool for analysing the urban context. The contribution builds on the results of the PhD thesis in Architectural and Urban Composition entitled 'Modern Architecture in Colombia and European Contribution: opportunities for a cultural encounter. Critical analysis of the work of the Italian architect Bruno Violi in Bogotá' (2018).*

## **Introduction**

Topography, morphology of the urban fabric and landscape participate in defining the reference environment of the city and represent a supporting medium for design process, capable of guiding strategies of transformation, relationship and settlement in the specific area (Gregotti, 1982), as well as configuring itself as a device for observing the rules of the project itself.

These elements - even more so when particularly marked - can reveal and support the understanding of the identity of a territory, in terms of tradition, history and urban growth dynamics.

The present paper builds on the results implemented within the PhD thesis in Architectural and Urban Composition aimed at exploring the role of the European contribution in the process of development and affirmation of modern architecture in Colombia, in the period 1930 to 1960, focusing on the critical analysis of the figure of the Italian architect Bruno Violi.

The research investigates the essential characters of Violi's work considering his European background of reference and the cultural, morphological and geographical characteristics of the city of Bogotá, as well as the main aspects that characterized the debate of the time in the South American country. In addition to the technical vocation of architecture and the value entrusted to craftsmanship and construction, the relationship with the landscape and the urban fabric outlines a fundamental lens in defining the identitarian features of Colombian modern architecture.

Compositional principles of classical matrix between rule and variation, tectonics and the language of construction, reading and interpretation of the characters of the place, define the main research topics with respect to which, the all Violi's works have been analysed at general level, and have been deepened for a selection of four case-studies, different from each other for scale, functional program, location within the city, and realized between the 50s and 60s - a significant period corresponding to the so-called golden age of modern architecture in Colombia (Samper Martínez, 2000). The three broad and transversal themes overlap in determining the contribution of the Italian architect who, while always maintaining strong ties with his European origin, mainly operated in the Colombian context.

Geography, topography, urban morphology and landscape of Bogotá are critically understood and analysed as design conditions capable of linking the architecture to the place, contributing to define its compositional choices. Archive documents and historical pictures, jointly with the direct observation, supported the re-drawing process and the analytical elaborations developed in order to acknowledge the relationships between architecture and the urban context, both formal and visual.

## **Framing the overall research context**

In Colombia, the transatlantic transfer of knowledge followed trajectories of indirect and direct nature, involving among others, many architects, urban planners and engineers from Europe, who participated in the debate around emerging modern architecture through intellectual, professional and academic activity.

The experience developed by the Italian architect Bruno Violi, analysed as part of the avant-garde group who led the change of direction in architecture and urban planning, can be considered a significant storytelling example of a broader process of adaptation, exchange and contamination between cultures and knowledge, which played a key role for the development and affirmation of modern architecture in the country.

The research results show how Violi was able to combine, in a transversal way, the knowledge

base built in Europe with aspects of the Colombian geographical and cultural environment, more precisely of the city of Bogotá, where he spent almost half of his life.

First, to better understand the way through which the dialectic between different contributions developed, it is necessary to report some biographical information on the author.

Violi was born in Milan in 1909. He trained between the Academia of Brera, the Schools of Architecture of Rome and Milan, where he finally graduated in 1934. Between Italy and Europe, the young architect develops his first professional experiences, going to form his cultural framework of references, mainly described by the study of classical and renaissance architecture – as documented by the large number of drawings and survey exercises conserved in his archive; and the period spent in Paris working in the studio of Denis Honegger, former pupil of Auguste Perret. These experiences, addressed by the research as tools of analysis, turned out to be lessons learned translated by Violi into compositional rules and the ability to finely treat the building materials, in particular concrete. In particular, the classical reference was constantly fed by the knowledge provided by the architectural treatises of authors such as Palladio, Scamozzi, Alberti and Vitruvius, part of his personal library and which he daily analysed (Rother, 1986).

At the end of the Thirties Violi left Europe and moved to Colombia. In Bogotá he participated in the debate on the nascent modern architecture; he conceived and built a considerable amount of works, considered today part of the modern architectural heritage – first working for the Ministry of Public Works and later developing a professional career full of prestigious assignments; he carried out a constant commitment in the academic field, participating in the critical training of the future generations of Colombian architects.

What makes his contribution relevant and the study of his work interesting is the transversal form with which Violi took part in this process, merging the experience developed in Europe with the features of the Colombian environment, physical and cultural.

### **Reading the characters of the place**

Violi designed and built most of his works in Bogotá, a city with extremely peculiar geographical and physical features.

Spanish foundation centre of 1538, the Colombian capital extends on the Sabana plateau, located at the foot of the mountain range of the eastern Andes, at 2650 meters above sea level.

The mountains and the rivers that cross the vast plain have always been elements of comparison for the construction of the city.

The regular so-called damero geometrical layout, founded on the repetition of a regular pattern of blocks (manzanas or cuadras in Spanish), and organizing the system of road axis in Carreras (on the north-south direction) and Calles (with east-west orientation), had to confront with the territorial geographical and topographical conditions, in addition to the uncontrolled expansion of the modern city.

The joint system defined by the background screen of the mountains and the regular urban fabric, describes a scenario of great power perceptible in both directions, from the city looking at the mountains and vice versa. In particular, the mountains (los cerros in Spanish), considered a sacred place since the pre-Hispanic epoch, are an evident presence and a constant reference point that 'make unique Bogotá' (Alcaldía de Bogotá, 2017), so strong to convert into a cultural fact and an artefact north (considering that are placed to the east) with respect to which the cartographies are commonly oriented.

Even Le Corbusier, invited to develop a Pilot Plan for the city, on the occasion of his first visit in



June 1947, described this landscape as 'admirable' (Vargas Caicedo, 1987), capturing its peculiar features - the foundation centre, the regular texture of the urban fabric, the rivers, los cerros and the north-south axis that runs parallel to the mountains - in his first sketches. Elements so relevant that will be included in the planning strategies at the metropolitan scale.

Regarding the urban fabric, in the colonial epoch, it was established by buildings of maximum two floors on the model of the patio, closed on the public street and oriented towards the interior space of the courtyard.

The city, until the mid-nineteenth century, continued to develop within the boundaries of the consolidated centre, following a process of increasing densification, by division and subdivision of the existing blocks. The original system, developed on a quarter of manzana, began to change until assuming a conformation similar to the Gothic lot of European reference. The patio continued to be clearly legible, even if fragmented and placed in a variable position.

Starting from the early XX century, the development of mechanical transport systems (such as the tramway), brought the need to intervene on the section of the narrow Calles of the chaotic and congested colonial centre, through demolitions that allowed the widening of roads and the construction of new buildings, leading to the progressive change of the 'modern' city image and its public spaces.

At the same time, new residential districts began to develop in the outskirts of the city, which soon will lose its compact form to follow the direction of the north, south and west expansion axes. In this sense, the decade 1940-1950 marked an impressive acceleration of the process, in particular due to a massive and systematic migration from rural areas to the main centres of the country, causing a considerable increase in population (Arango 1989). The traditional and regular layout, although not always rigorously, continued to organize the built territory in close dialogue with the topography of the mountains, confirming the role of such elements as structural and distinctive features of the Bogotan landscape (see Figure 1 and Figure 2).

Bruno Violi spent almost half of his life in Colombia and the work he carried out in the country demonstrates how he has been able to understand - as happened to Le Corbusier - the value and significance of these characterizing elements, translating them into architecture.

The components involved are many and of different nature: the assumption of the typical features of the Bogotan environment as design conditions, the interpretation of the traditional model of the patio house or the needs related to the public space of a modern city in the making.

The re-drawing and the critical analysis of four buildings - built in Bogotá between the 1950s and the 1960s, with different scale, functional programme and location - supported the acknowledgment of the kind of relationship, both visual and formal, that Violi was able to draw up with the urban fabric and the cerros, directly and constantly involving the compositional process. These two elements, as already mentioned, not only define the structure and geography of the territory, but also represent for the city cultural assumptions.

Violi's work demonstrates an extreme attention to the different aspects involved: the conformation of the site, the topography of the terrain, the scale of the urban fabric, the public space, and the surrounding landscape, near and far.

#### **Four case studies**

The research analysed the four case studies with the aim of investigating this dialectic connection between architectural form and urban context, defined by the geographical elements and the urban fabric of regular matrix.

The case studies include two private residences, the Shaio House and the Violi House; the

Volkswagen car company seat; and the Quintana Building, hosting offices, commercial spaces and an apartment on the roof floor. The buildings are located in different areas of the city, dealing respectively with: the urban fabric of a new residential neighbourhood, the Shaio; a site in direct contact with the mountains, overlooking the Sabana plain and the city, the Violi House; an important road axis tracing the city expansion towards the west, the Volkswagen; the context of the historic city, the Quintana (see Figure 3 and Figure 4).

The Shaio House (1950) stands on the north-west corner of a large plot (about 390 square meters) located in the barrio la Cabrera, one of the urbanizations that at the end of the 1940 marked the limit of extension of the city to the north. A regular layout ordered in manzanas an area characterized by the presence of a few buildings - mostly single-family residences for the bourgeois class - surrounded by a dense vegetation of acacias and eucalyptus (Rother 1986). The building consists of a compact two levels block, with an almost square plan. The rooms, overlooking the garden in the southeast direction, are articulated around a large patio located in a decentralized position. Two secondary pavilions, on the west side, delimit a smaller courtyard. The plan describes the relationships that the building establishes with the limits of the lot, marked by the boundary wall, generating a succession of volumes and voids, according to a well-defined hierarchy. The interior spaces look outwards in various directions, creating a system of visual relationships that finds the main focus in the atrium, placed at the centre of the composition and framing the view towards the mountains, characteristic element of the Bogotan landscape. Element, this latter that in addition to defining the fixed scene of reference, seems to suggest a direct reference to the sinuous lines of the roof. The project seeks and sets up a close and deep connection with the surrounding environment, through the settlement on the site, the visual and formal relations: the landscape is part of the elements that guide the composition of the house.

The Violi House (1953-54), or House of Carrera 2e, was designed by the architect for his family. The building is located in the northern area of the city, at the foot of the mountains, on a steeply ground completely surrounded by nature, enveloping and wild.

According to these site conditions, the project choice was to get as far away as possible from the road, located at the bottom, and to arrange the entrance through a long open-air staircase, which follows the perimeter of the lot. The composition orders seven blocks of regular form, designed according specific modular rules, with vaulted roof and different orientation, articulated with respect to a main axis, placed on the north-south line and perpendicular to the level lines. The volumes, placed on four different quotes and raised with respect to the terrain, follow and adapt to the natural character of the site.

The functional program is marked by the form, orientation and size of the single blocks: an articulated volumetry that corresponds to a clear floor plan assuming the peculiarities of the site as main design conditions. The building fully integrates with the surrounding landscape, following, in shape and layout of the blocks, the lines of the level curves in plan and the profile of the mountains in elevation. The relationship established with the characters of the site, is not limited to a respectful insertion in the natural environment, but is expressed through the experience of the domestic life, interpreted through a promenade architectural exploring the conditions of the context of reference. The inhabitant is forced to 'feel' the mountain and find a contact with nature before entering the house. The distribution coincides with the longitudinal axis, which organizes the composition and connects the different rooms, finding a direct relationship with the landscape, near and far. The path, moving through the interior space guides the gaze towards two main miradores, placed in a studied position: the main one is placed in the middle of the facade of the block that houses the living room, and frames the

view of the Sabana of Bogotá. The understanding of the characteristics of the place, in terms of the conformation of the site and views towards the landscape, represents an unavoidable condition of the process of composition and construction of the final character of the house. The Volkswagen Building (1955), designed for sale, storage and repair of the well-known German company cars, overlooks the Avenida El Dorado or Calle 26, an important road axis - at the time under construction - that crosses the city in the east-west direction, connecting the centre with the airport. The building occupies a whole 'L' shaped lot of about 3,500 square meters, located at the end of a large block free on three sides. The main front stands on Avenida El Dorado, where the public and pedestrian entrance is located, while the driveway access to the workshop area is located on the back. The building is characterized by a geometric concrete structure that, in section, draws the volume of the two blocks with vaulted roof and flat terrace that houses respectively the sales area and the work area. The Volkswagen finds a direct relationship, of dual nature and hierarchy, with the Avenida El Dorado through the facade. The building stands as a large showcase, exhibiting a monumental dimension emphasized by the giant order of pillars. At the same time, the connection with the public space of the sidewalk, from which access to the sales area takes place, is reported 'on a human scale' through some cantilever elements and the design of the windows. Considering the visual relation, the better place from which to look at the city is located under the roof facing the main road, where the vertical lines of the pillars and the curvilinear lines of the vaults, frame the view of the Sabana. As already pointed out for the Shaio and the Violi Houses, the curves of the roof formally recall the profile of the mountains in the background.

The Quintana Building (1962) is located on a corner lot, between Carrera 7 and Calle 12, just one cuadra away from Plaza Bolívar, in the very historical centre of the city.

The Quintana is a compact volume of eight levels, slightly overhanging compared to a double-height base that includes a mezzanine floor. The main block is flanked by a lateral body, in which the distribution is organized, and concluded by an attic floor, intended for residence. The building dialogues on both sides with the architectures that describe the urban character of this area of the city, entrusted to the contrast between high modern buildings, headquarters of financial and commercial companies, and the fabric of colonial plant.

The Quintana, in particular through the base, creates a direct link with the street in accordance with the needs and use of the 'modern' city public space and the functional program with its open and double height commercial plant.

In addition to this, the way of treating the corner refers to the interpretation of an element typical of colonial architecture, that is to say, the wooden structure galleries, normally placed on the upper levels of the buildings, through which the relationship with the public space of the street was traditionally established.

The terrace, located on the roof level offer the view of the surrounding landscape: to the east in the direction of the mountains, to the south towards the Catedral Primada in Plaza Bolívar.

### **Acknowledging the formal and visual relationships**

The analysis highlights the ability of Bruno Violi to acknowledge, understand - and reinterpret - the potential of the site, transforming it into operative material for the project.

The graphic elaborations (see Figure 5) describe this connection as multiple and overlapped links, in particular, referred to how the buildings integrate and respond to the urban fabric, and capture the view towards the Sabana or the mountains.

In a similar way, methodologically speaking, the perspective drawings describe the formal and visual relationships between architecture, urban form and landscape. A reading key that can

be particularly appreciated for the two houses analysed: the volumes of the roof recall the profile or the curves of the mountain level lines; the main 'social' spaces (the hall and the living room) are converted into devices to bring the view of the surrounding landscape - near and far - within the experience and ritual of domestic life.

The critical understanding of the place also emerges from the re-interpretation of the central space. In addition to the four case studies, the analysis of a larger sample of Violi's works confirms and shows how the composition is often guided from the core, ordered by geometric rules and corresponding to the hall, the living room or a patio. Going beyond the references traceable through his classical academic education and the architectures by Perret and Honegger, the central space also refers to the so-known suburban Quintas houses of the Republican Epoch (1890-1930), which organized the different rooms around the entrance space overlooking the garden: a distribution scheme confirmed even in later periods (Arango, 1989).

Furthermore, the central space recalls the patio model, in terms of composition and relationship established with the lot, in particular for how the traditional model transformed over time, by progressive densification of the urban fabric, with the courtyard, always present but placed in a variable position. This model of urban growth can be observed both in the consolidated fabric of the historic city, both in the neighbourhoods of new expansion. The Violi's buildings interact with the limits of the lot that become part of the design elements (See Figure 6). In addition to this, the central space often corresponds to the better point from which to admire the landscape, or from which the visual relations between internal and external space are articulated.

Another analysed aspect, dealing with the relationship between architecture and elements of the context, is the compositional tripartite system. The basement, as well as recalling the classical architecture principles, is used to address specific design conditions, such as the connection with the public space and the pedestrian area, with respect to which stands as a direct extension. An attitude that emerges especially from the projects developed in the centre of Bogotá, on the Carrera Séptima - the historical axis that crosses the city from south to north starting from the square of foundation, Plaza Bolívar. In particular, the relation with the public space also arises from an unique document: a letter, written a few months after Violi's arrival in Colombia, in which he describes the project for the National Building of Pasto. The issues is addressed through the construction of a 'portico', defined by Violi 'as an urban innovation that will introduce an interesting variation to the trace of the traditional closed blocks and a new space in the urban centre, as an effective device of circulation'. Violi reports an interesting approach that proves the contextual understanding of tradition and the attention in answering to the changes of the modern city.

Finally, the urban dimension of Violi's architectures is described by his poetic charcoal perspectives representing the buildings in the urban landscape: drawings able to demonstrate his capacity to reinterpret the relationships with context of reference, that he probably learnt at a young age from the study of Italian historical cities.

## Conclusion

The relationship established with the elements of built and natural environment, for instance, topography, landscape, geometries of the fabric urban, and so forth, clarifies the Bruno Violi's ability to understand the characters of the place and to translate them into compositional and design condition.

In the Shaio House, it is the reinterpretation of urban morphology and the patio typology; in the

Violi House, are the mountains to dictate the design of the building; in the Volkswagen, it is the comparison with an important road axis; in Quintana it is the relationship with the public space. Aspects that, together with the view constantly turned towards los cerros and the Sabana, give meaning to the architectural project choices and deeply link the works to the tradition and geography of the Bogotan territory. The reading of the characteristics of the place also manifests in the references to traditional architecture, in the solutions adopted in responding to climatic conditions, in the constant dialogue with the limits of the lot, or the topography. To conclude, the research results confirm the relation with the context as a fundamental character of Violi's work, as well as for many of the buildings that contributed to the development of the 'Modern' Bogotá identity and image, defined by architectures built in concrete rising next to traditional colonial blocks, within the regular fabric of Spanish pattern and an extremely peculiar landscape, characterized by the constant presence of the mountains and the Sabana plain. Architectures that, 'without losing the characteristics that make a contemporary work distinguishable, are a direct translation of the physical, social and cultural environment of the country' (Samper, 1963).

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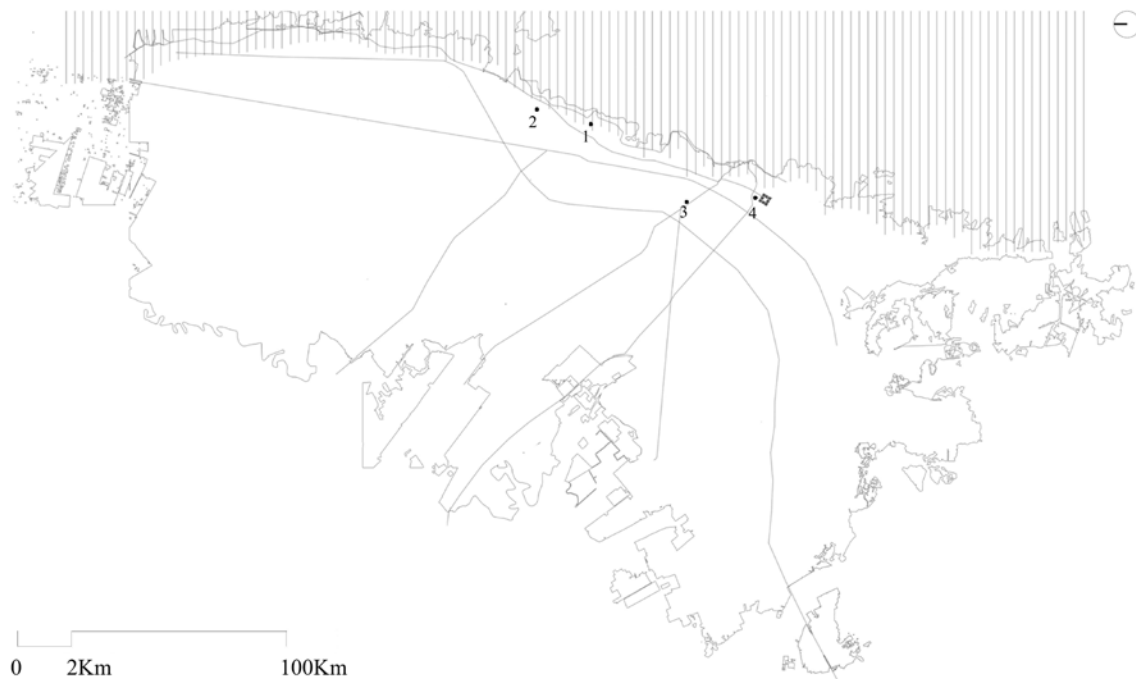
## Illustrations and tables



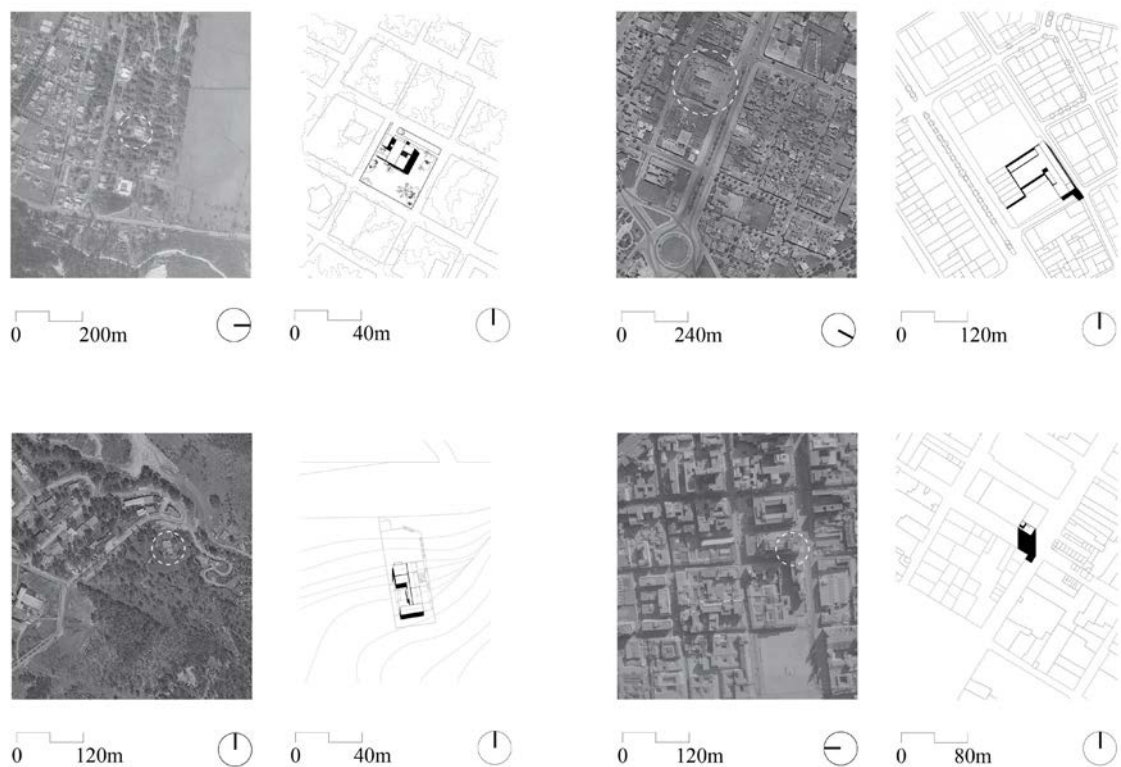
**Figure 1.** Bogotá, the urban context seen from the mountains, 2018



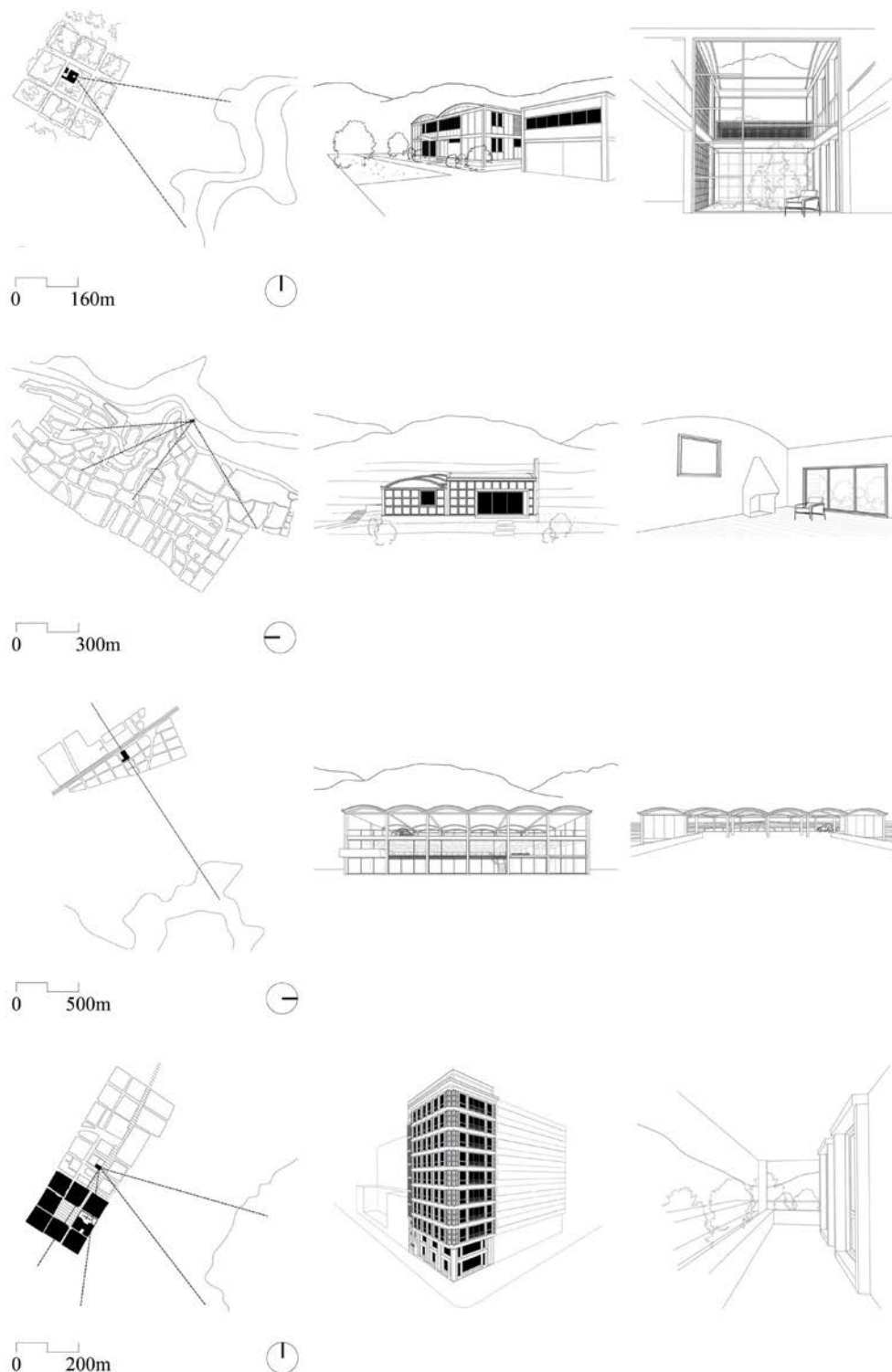
**Figure 2.** Bogotá, the Andes mountains, 2018



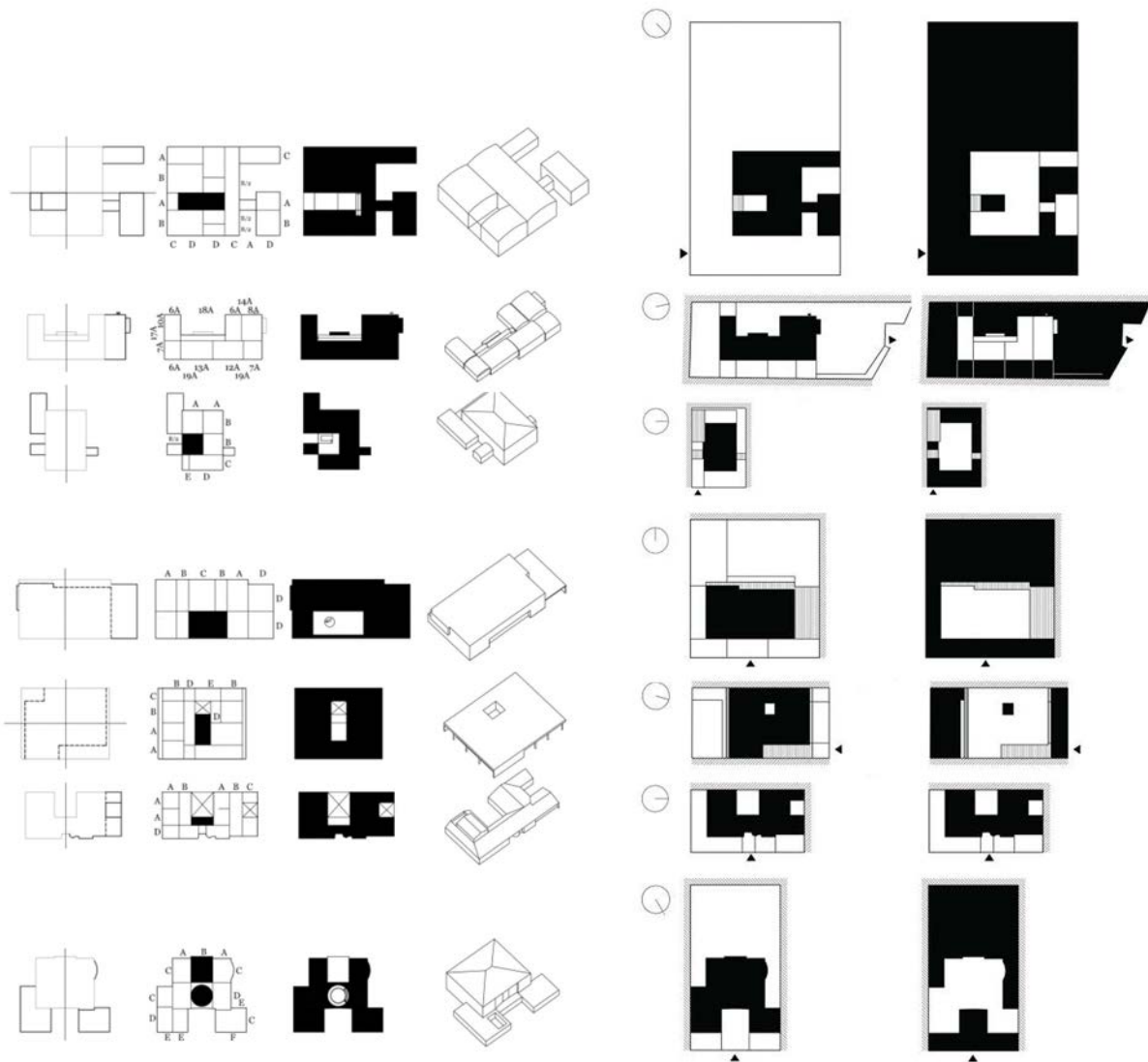
**Figure 3.** Plan of the city of Bogotá indicating the location of the four case studies analysed: 1. Shaio House, 1950; 2. Violi House, 1953; 3. Volkswagen Building, 1955; 4. Quintana Building, 1962



**Figure 4.** Aerial views of the urban context and Planivolumetric drawings. From top to bottom, from left to right view: Shaio House, 1950; Violi House, 1953; Volkswagen, 1956; Quintana, 1962



**Figure 5.** Diagrams and drawings highlighting the formal and visual relationships between architecture, urban context and landscape. From top to bottom: Shaio House, 1950; Violi House, 1953; Volkswagen, 1955; Quintana, 1962



**Figure 6.** Diagrams and drawings highlighting the central space and the classical geometrical rules governing the composition, the relationship between the lot limits and the volumes. From top to bottom: Shaio House, 1950; Violi House, 1953; Castro Mosquera House, 1948; Dobrinky House, 1956; Wasserman House, 1962; Perez House, 1963; Uribe House, 1963

## The city of the macroblock. A tool for the urban regeneration project of the medium-sized city.

Giuseppe Verterame

Dipartimento di Ingegneria e Architettura, Università di Parma, Via delle Scienze 181/A, 43124, Parma.

E-mail: giuseppe.verterame@unipr.it

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Conference theme: U+D Prize

**Abstract.** *The research deals with the problems of urban project of the historic suburb of the medium-sized city. It starts from an analysis of the urban condition of the contemporary city and reinterprets its elementary and complex figures – the suburbs, the district, the neighborhood, and the block – through a reflection on their urban meaning and role. Through a multi-scale approach to urban design and the taking a cue from the theory of the city by parts, the research develop the design methodology of macroblock, understood as a tool of the architectural and urban design applicable within the processes of urban regeneration. As a hybridization of the type-morphological constant of the block, it assumes its unitary and combinatory urban character: starting from its replicable singularity, it can constitute a new urban model that overcomes the monofunctionality typical of the suburbs and establishes the conditions of a minimum urbanity that, in reciprocity with the individual housing units, proposes spaces for socializing, rethinks mobility, sets a new local welfare organization. The urban model of macroblock builds a microstructure of the urban fabric that establishes high living conditions, even in situations of an emergency nature and a balanced model between living, work, services and leisure. The field of action, framed between the collective dimension and community construction, borrows the concept of the neighborhood unit, which in fact has in the historic European City a sort of archetype of an urban culture understood in its dialectical expression between singularity and collectivity, between the city and its parts.*



## Introduction

The scientific contribution submitted at the 6th ISUItaly International Conference «Morphology and Urban Design. New strategies for a changing society» organized in Bologna from 8th to 10th June 2022 resumes my PhD research, developed at Department of Engineering and Architecture of University of Parma (Architecture and City curriculum) under the supervision of prof. Carlo Quintelli, from November 2018 to January 2022.

The dissertation explores the topic of urban regeneration, a highly debated and relevant issue by practitioners and scholars from various disciplines, as well as by the political field. Despite much attention, urban regeneration is not yet a transformation process with tools and more suitable urban areas of intervention than others. Rather, it seems to be a universal remedy to the problems of the contemporary city, where the phenomenon is heterogeneous and needs to be analyzed in detail before deducing general rules of intervention.

For these reasons, the research first takes on the experimental field of the city and its innumerable phenomena, aiming to define a methodology of intervention through the tools of urban and architectural design.

The research assumes the experimental field of the city and try to define a methodology of intervention through the tools of urban and architectural design.

Subsequently, the research moves towards and identify the historical suburbs of the medium-sized city<sup>1</sup> as study object. It is chosen because represents an ideal experimental sample in terms of genetics, experiential characteristics linked to its overall form, clearly recognizable in the proportional relationships between volumes and voids, as in the representation of the architectural elements that have stratified the city. As a result, today we can recognize its fundamental historical role in the construction of the cultural and socio-economic space of the old continent.

Its typicality, condition and intermediate dimension make it suitable for replication in contexts of a different scale: from the readings of its typical body, it is possible to identify fixed and reiterable characters, which can manifest a unitary urban conception. And where do we feel the value of the city most strongly? Certainly, in the open space. The medium-sized city, in a sense, favors more than others, the semantic manifestation of open space as an element that stages an identity character in two directions: in the relationship between urban form and architecture and in the relationship between place and man.

Indeed, it is precisely the relationship between public and private spaces, within an urban structure, that makes it possible to appreciate the medium-sized city for its quality of living, estimated in the relationship between urban fabric and polarities, monumental structures, streets, squares, fields that can determine specific urban facts. This type of European city possesses the potential to design and redesign itself within its built space. And this quality, that

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<sup>1</sup>The research is part of the studies and design experiments carried out on the type of medium-sized city by a group of professors at the University of Parma (research leader prof. Carlo Quintelli) since its foundation. We refer to the studies and research on the Emilia-Romagna territorial system of cities connected by the Via Emilia and to Archéa – Architectural European Medium-sized City Arrangement (co-funded project by the Erasmus+ Programme of the European Union) project on the type of the average European city, in which the author of this contribution participated as a member of the University of Parma research group. For further information, see Quintelli, C. (ed.) (2000) CITTAEMILIA. Sperimentazioni architettoniche per un'idea di città (Abitare Segesta, Milano); Quintelli, C. (ed.) (2001) S.S.9 Via Emilia. Progetti architettonici e nuovi luoghi lungo la via Emilia tra città e città. città (Abitare Segesta, Milano); Amistadi, A., Balducci, V., Bradecki, T., Prandi, E. and Schröder, U. (ed.) (2022) Mapping urban spaces. Designing the European City (Routledge, New York); Quintelli, C. (2022) 'The long-term method of the urban project in Italy and in the Parma School', in Amistadi, A., Balducci, V., Bradecki, T., Prandi, E. and Schröder, U. (ed.) Mapping urban spaces. Designing the European City (Routledge, New York) 181-192.; Amistadi, A., Balducci, V., Bradecki, T., Prandi, E. and Schröder, U. (ed.) (2021) Archéa. Mapping the city. On urban spaces. An atlas of Bologna and Aachen (Aión, Firenze).

allows it to have an almost infinite perspective of growth and transformation, is allowed by a consolidated structure built by its historical stratification.

The old parts of this type of city sharply exemplify urban identity according to orders, dimensions, modules and relationships between architectural objects and open spaces. They exemplify and teach the ways in which the city has grown upon itself and how its slow, continuous modification has maintained the original reasons, evident in the architecture that builds the urban structure, a perennial fact that allows the city to specify and modify the reasons for its development.

Within the built body of the city, the inner suburbs represent a great challenge today, as an urban laboratory of the future. For the reasons given above, if the historic city represents the model, the first periphery is, on the other hand, the area on which current and future issues will be discussed.

Today, the inner suburbs manifest a phenomenology seriously in crisis, characterized by inhospitality, unable to promote coexistence and welcome human activities.

More generally, the city of the last century was built around an idea of efficiency based on specialization of activities and services has been that people and goods must continually move between one specialized area and another. What has resulted is a city of continuous mobility of things and people. The space is mainly used by car: the space for human purposes doesn't exist and so the segregation prevails, enough to take on an anti-urban attitude as they enclose everything without producing a real architecture of the public space.

Therefore, the contemporary city express a prevalent peripheral condition which means marginalization. The compact city model appears promising, to restore the balance of a new economy of urban space and outskirts of the city.

#### Methodological premises

The methodology adopted invokes, of course, the legacy of the masters who built the so-called Italian tradition of urban studies. It cannot be otherwise than to start from their pioneering lessons, originators of a pre-design research methodology.

In the footsteps of the masters, the approach to the study of the city is scientific: the object of the studies is being analyzed by applying the most important theories of Italian masters of different generations. It would be pleonastic here or to mention them all: at the end of this writing, their different contributions will seem obvious to the reader, depending on personal interpretation.

The nature of the research required the adoption of a precise and circumscribed experimental field on which to check the validity of the hypotheses through experimental analysis as Carlo Aymonino states at the beginning of the collective volume «La città di Padova. Saggio di analisi urbana»<sup>2</sup>.

In the case of the research described, the choice was made for the Pablo district, a suburb of the city of Parma built from the post-war period until the end of the 1980s.

The city of Parma was chosen for convenience of location and easy accessibility.

The historic periphery was chosen because it is a statistically prevalent urban sample in all European cities, which have been subjected to considerable post-war reconstruction. Within the ring of so-called historic suburbs, the choice fell on the Pablo district. This area of the city presents criticalities and potentials typical of the historic periphery and as a consolidated city, contains urban material to be revitalized, as it is already structured from an urban point of view.

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<sup>2</sup>See Aymonino, C.; Brusatin, M.; Fabbri, G.; Lena, M.; Lovero, P.; Lucianetti, S. and Rossi, A. (1970) *La città di Padova. Saggio di analisi urbana* (Officina, Roma).

The critical issues of the historic periphery are the lack of and insecurity in public space, poor quality of life, obsolete and inadequate construction in terms of energy sustainability, and rarely maintained material, building and construction quality. Nevertheless, these parts of the city possess well-measured urban balances, due to the presence and relevance of the quarter structure, the first built urban component that has given order to the addition of the housing fabric and determined, in this way, a relevant city-effect.

The methodological process is being supported by a previously conducted doctoral research on the compact city, begun in 2013 with the title «Progettare il costruito. Nuovi modelli a qualità compatta». This research, taking as a sample the medium-sized cities of the Emilia-Romagna, revealed a consistent availability of spatial resources within the urbanized area, to be reformed and redefined according to the parameters of morphological structuring and functional reconfiguration based on the principle of urban centrality<sup>3</sup>.

The research is later refined in Urban Regeneration Technique through the Structured Densification of the Centrality System (TDSC) and becomes appropriate in an urban regeneration strategy aimed at densifying the existing city<sup>4</sup>.

The two researches, the first on the urban centralities and the second on the housing fabric are complementary, as the space of urban centrality cannot be separated from that of the fabric and vice versa: the effects of both are a necessary condition for the development of urban phenomena. For this reason, the research of macroblock, here illustrated and explained, would not be fully accomplished without the previous scientific contribution.

The developed regeneration methodology uses analysis as an instrument of knowledge of the urban environment, since moving within it means doing so in a conscious manner.

The analyses performed identify and quantify the relevant quantities of partially or badly utilized spatial resources with a high transformation potential.

From the urban scale, characterized by the prevalent functional areas, infrastructures and urban centralities, the methodology focuses on the housing fabric of the historic periphery, the connective link between the centrality and the houses themselves.

The analysis of this fabric has found in the dimension of the block the suitable entity to experiment innovative transformation processes in line with the overall regeneration strategies at the suburb scale.

The block has a key role in the construction of the city since Miletus Hippodamia. Then, along the history, many European and South American cities, both new and old, identified in the block the suitable size for the development of the city. In fact, the scale of the block takes on a more effective dimension for the transformation of parts of the city. Although, in general, the district assumes the role of unitary area in which to intervene, an aspect that derives from the Modern Movement, where begun to be a unitary element of the expansion of the city: in fact, today it is the most common element that allow to identify an urban part within the complex. Nevertheless, the block has the most important role in the transformation of the city: it is a typological and morphological constant that allows the urban regeneration of the urban fabric nowadays, of the spaces, forms and functions of the medium-sized city.

It is a typical element due to its ability to be the constructive principle of the city and for this reason it is the ideal solution for scale and urban character through which to re-establish its

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<sup>3</sup>Nolli, A., Montini, N., Strina, P. (2013) 'Progettare il costruito. Nuovi modelli a qualità integrata per la città compatta', unpublished PhD thesis, University of Parma, Italy.

<sup>4</sup>See Prandi, E. (2022), Designing the European medium-sized-city. Urban Regeneration Technique through the Structured Densification of the Centrality System in Amistadi, A., Balducci, V., Bradecki, T., Prandi, E. and Schröder, U. (ed.) Mapping urban spaces. Designing the European City (Routledge, New York) 195-205.

meaning of city architecture.

The block as a type, but even more so, as a typical organism, becomes basic to describe a precise idea of the city, differentiated and differentiable according to the specific situations in which one operates, due to formal, building, spatial and functional peculiarities. The autonomy and the typicality of the block are fundamental characteristics for its hybridization and subsequent change, from block to macroblock.

Indeed, the macroblock as derived from the block has the same genetic characteristics and is therefore able to assert itself as a collective architectural element and express urban phenomena or to gather within itself inhabitants, sociability, lived life.

The transformation of the block into a macroblock restores the ideological value of its type and at the same time overcomes the type that has lost all concrete value in the context of the outskirts of the city. Another very important feature is the ability to reproduce itself and that of creating a systematic approach that connects the scale of the building and that of the neighborhood, putting into practice an effective example of an urban architectural prototype. In this way, the meaning of the block remains in its hybridization and survives in a new urban form that affirms its typicality as a debt towards character of the primitive type that gave them origin.

The methodological process: measurement, analysis and design tools

The methodological process, both analytical and synthetic, involves different scales and elements of the city: from the scale of the city to that of the block and vice versa, the urban centralities and the housing units.

Firstly the investigation of the structure of the district was developed, from which derives the design and systemization of the buildings to establish a relationship between them: the parks, the church, the schools to try to form a structure of the neighborhood that can host and coexist with macroblocks elements that rely on this framework.

The analyses carried out, from the urban scale to the scale of the neighborhood and the block, have provided in-depth knowledge of the critical issues and, consequently, the potential of the object of study.

The analyses made it possible to understand which analytical-compositional categories to introduce into the design process, to identify the operational conditions and methodological premises for the development and experimentation of the macroblock model.

The categories of analysis regarded the quantitative and qualitative consistency of the population, the functions and facilities present, the density, the overall morphology and character of the perimeter boundary, the building types, the building quality, and the relative susceptibility to varying degrees of retrofit up to demolition and reconstruction, the use and quality of open spaces, the conditions of mobility and access, the character of the internal landscape and other detailed aspects.

An analysis that statistically gives back to the neighborhood scale fundamental indications to be able to calibrate an urban regeneration methodology.

The following analyses were carried out, mainly at the district scale, although some were carried out at the city scale to verify some invariants in a larger range of analysis.

1. Morphological analysis of the urban fabric through the block type
2. Analyses of the nature of urban void
3. Analyses of the building types
4. Analyses of the roads
5. Analyses of the social housing buildings
6. Analyses of functions

The analyses, which are different, suggest a framework of possible actions that the urban design of the macroblock can perform to restore urban quality within the residential areas of the district. Among these, the morphological analysis of the urban fabric through the block type is indispensable for an effective strategy that adopts the block as spatial model of reference on which to operate targeted actions of architectural and urban composition. The analyses show the different ways of utilizing the space of the block in relation to the building types settled within it and suggests the possibilities of reconfiguring the available space through the possible synergies established between the different types of blocks included within the macroblock.

The district is later divided into macroblocks, identified according to the infrastructure grid and the corresponding to it hierarchy of road axes. The transition from block to macroblock implies the conversion of lower-ranking streets into public space and denied to motor vehicles. In this way, urban units are produced, that are superior to the block and delimited by the most important road axes that define its perimeter.

Later, a more in-depth study of the neighborhood's blocks is carried out, evaluated for specific categories based on the parameters of the ITACA protocol, a certification of the level of environmental sustainability of buildings of different uses and livability of the urban environment under assessment.

The overall analysis performed provides a rating based on site quality, building quality, environmental loads and indoor quality, assigning each of these categories a score from -1 to 5.

The investigation allowed to select three blocks, named A,B and C. The initial action in the design corresponds to the identification and subsequent welding of the individual blocks to compose the macroblock. This action makes it possible to identify and join the available urban material within the blocks that are merged to obtain a sufficient critical mass capable of sustaining the functioning of the macroblock, as an urban unit.

Once an experimental macroblock has been identified, four analyses are carried out on it: functional analysis, building quality analysis, morphological quality analysis, regeneration potential analysis. From the analytical framework, the design interpretation promotes several actions. The first involves the demolition of built elements, such as outbuildings and unauthorized boxes which are often located at land boundaries or in positions that impede the physical and perceptive continuity of open space.

Some buildings selected by the analytical framework may also be demolished. In such cases the reconstruction is clearly a more convenient solution.

The demolitions also allow to create the underground level, an opportunity to identify adequate place for cars and motor vehicles that will no longer be able to circulate within the macroblock. Later, the new buildings are built, with an overall redevelopment of the open spaces.

These latter actions allow to rethink an inner network of the collective space and to connect also externally, creating an urban network of macroblocks.

The last two actions concern a light or heavy maintenance, depending on the case, on existing buildings and a re-functionalization that allows to rethink the macroblock as an urban place more equipped with services, in accordance with the new contemporary social needs.

## **Conclusion**

The methodology described carry out the transformation of an urban unit that can contribute to the prevalent regeneration of the suburbs. In concrete terms, the experimental macroblock



is equipped with an underground car park, new residences, proximity social and health services, new spaces for commercial and tertiary activities (e.g. coworking), open spaces for leisure time such as open spaces for sociability and sports, capillary mobility system, new green spaces. The macroblock is an intermediate element between architecture and city, a unity of the urban fabric that affirms its own scale in the context in which it is inserted. The macroblock, precisely because it is a hybridization of the block, can be considered architecture and city at the same time, since it is able to express the ambivalence of the term city architecture.

In this way, its urban project becomes design of the part of the city since, as Gianugo Polesello affirms, «the problem of the urban design is referred to the thesis of the construction of the city by parts»<sup>5</sup>. The macroblock can therefore become an operational tool of urban regeneration that responds to the contemporary crisis of the city phenomenon: it becomes an aggregative principle of the urban organism that re-establishes a one-to-one relationship between singularity and plurality, respecting its own morphological peculiarities, spatial conditions and the typological qualities of the pre-existing environment. A new minimal unit of the city is formed, made up of blocks, endowed with that principle and value that gives them urban significance, as part of a community. In this way it identifies itself as a unity in continuity and with respect to the community principle of the city made up of heterogeneous aggregates and in dialectic with each other without which the urban phenomenon would not exist. Its dual nature as large architecture or small city represents his attempt to impose order within an urban system.

Furthermore, the macroblock takes on the meaning of a large civil architecture that finds in the small scale of the city the intention to look for the reasons to re-establish the image of a new model of city able to satisfy the needs of lifestyles, the contemporaneity of environmental sustainability, emergency situations caused by calamitous events.

As we have seen, its transmissibility allows us to imagine the result in a broader way, potentially applied to other neighborhoods susceptible of application, such as those of the historic periphery. Potentially, the result is that of a polycentric city, open and connected through the network of the collective spaces of the macroblock and through new services, potentially open to the whole city.

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#### Illustrations and tables



**Figure 1.** Suburb urban landscape in Parma: cars, housing segregation and leftover space



**Figure 2.** The image highlights three urban areas: historical centre, historical suburb and recent suburb. The Pablo district is part of the historical suburb.



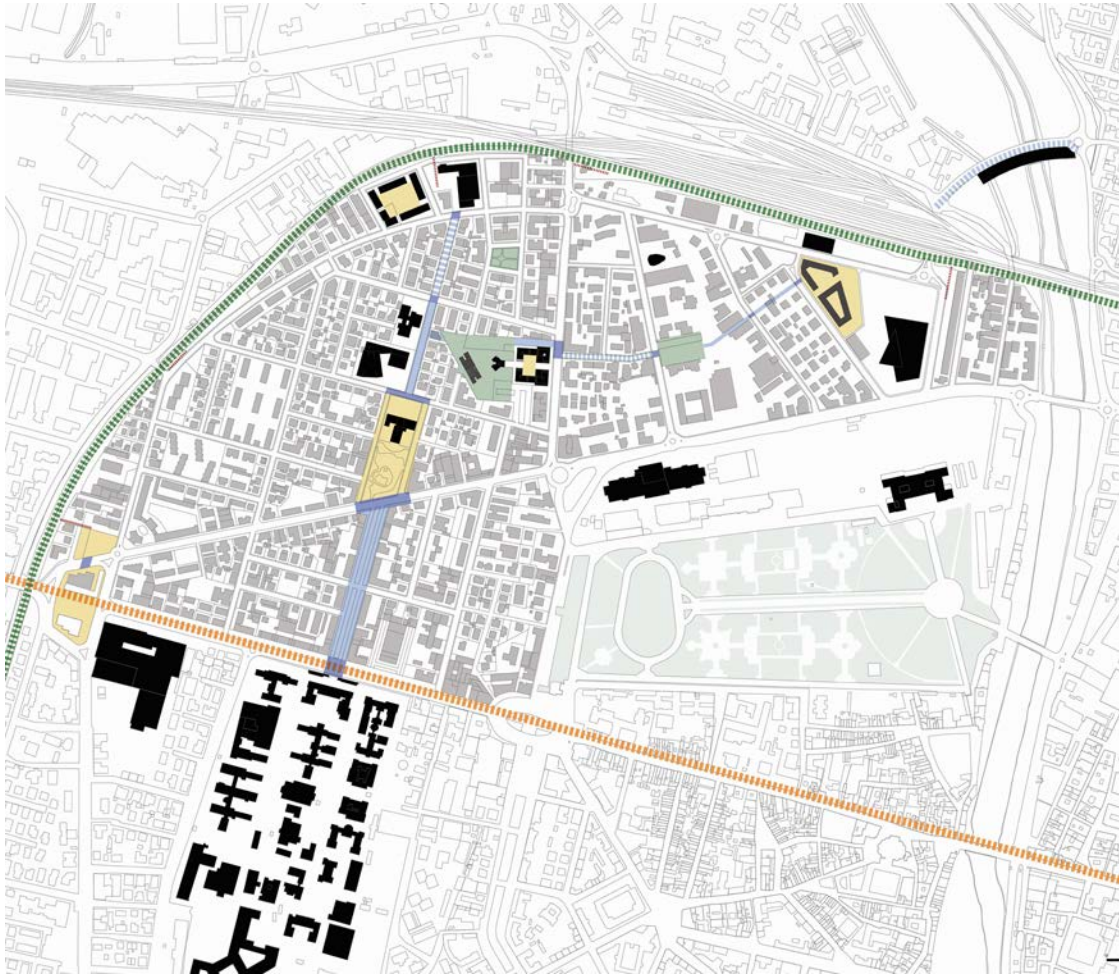


Figure 3. Urban strategy for the re-definition of the district structure through its urban centralities

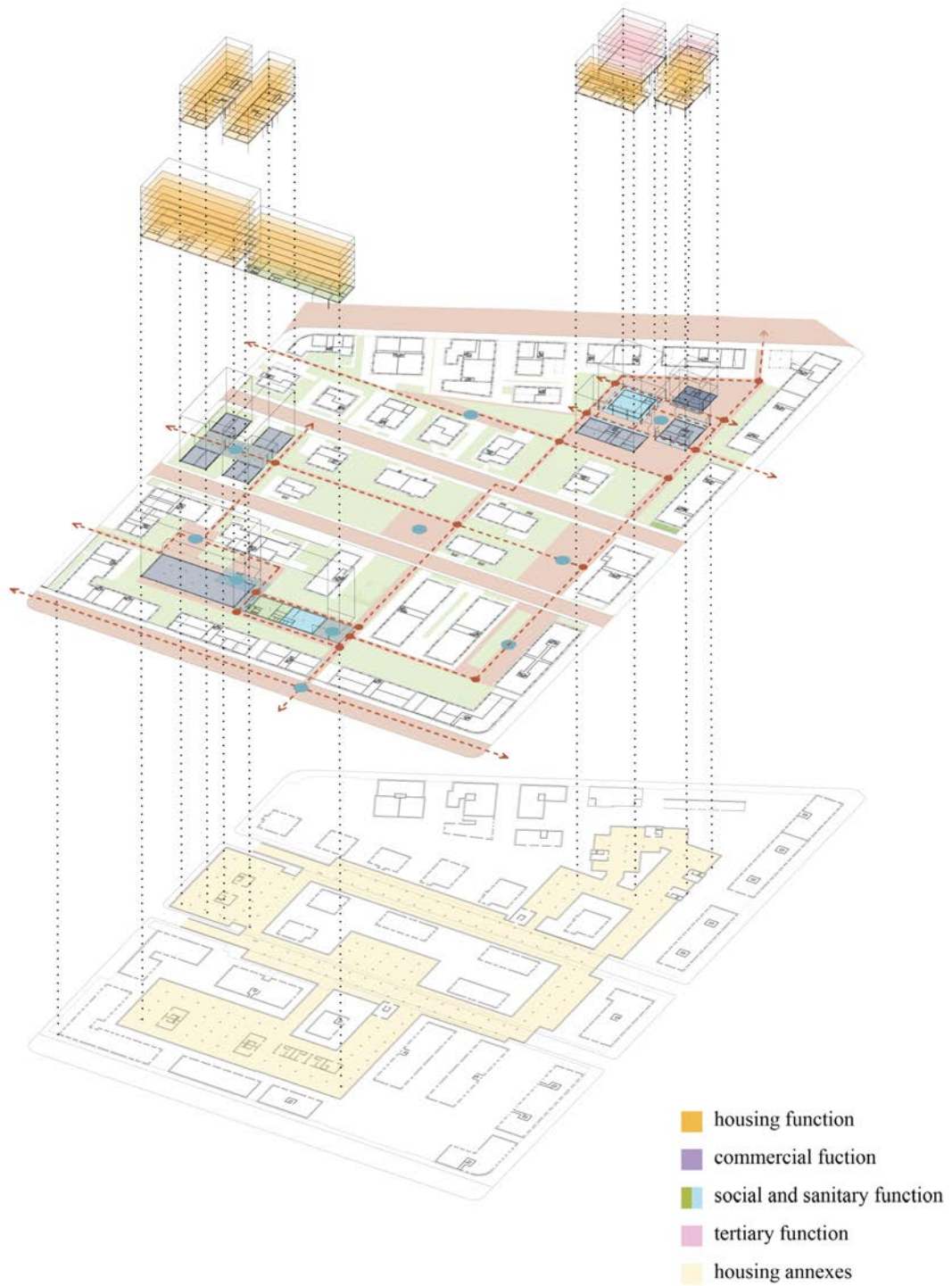


Figure 4. Morphological analysis of the urban fabric through the block type



Figure 5. Analytical framework for the macroblock design intervention





**Figure 6.** Exploded axonometric view of the designed macroblock



