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Science // and The City

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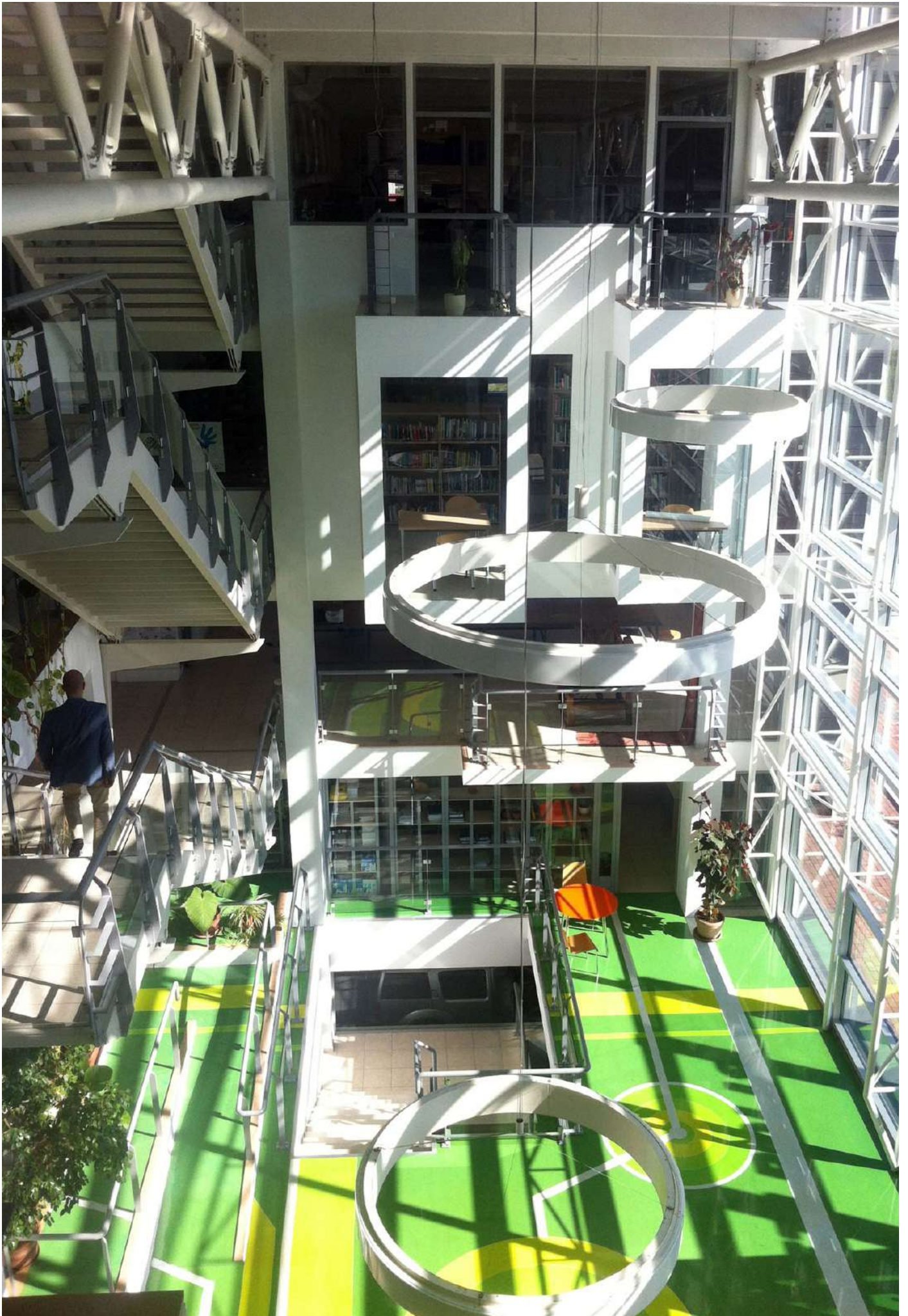
Science and the City

In the Era of Paradigm Shifts

TAW2020 International Scientific Conference

3rd October 2020 / POLIS University





Dear participant of Tirana Architecture Week,

Thank you for joining us in TAW 2020. I strongly believe that all together we are making an historic step directly or indirectly related to Tirana's and Albanian's architecture, city and landscape. In addition, this is also a contribution for the region and wider on. At present time Europe is struggling with the instability of one of the worst recessions of its own history. Europeans are tired of the lack of flexibility and rigidity of overregulated societies where nothing happens. But here in Balkans and specifically in Albania, despite similar symptoms, things are still evolving, not because of delayed projections but because people here are very active, entrepreneurial spirit survivals, and the creativity of society is in a never-ending process. In Tirana, Albania or anywhere – as they say – in Western Balkans, we are still doing fine, so we might have to learn but also to offer something to the rest of the continent, despite our endless effort to join EU. This is a land of creativity where all architects and city experts feel just great: amazed, shocked, revolted, confused, enthusiastic, inspired, etc. This is due to the fact that there are layers of a real self-generative city.

Let's not forget that Tirana is an example of creativity. So, let's use such energy in a positive way and let's open a debate that might be useful for everyone. TAW is an academic event which gives you the opportunity to come and share your professional passion or nightmare. Enjoy time with us. There is not a clear recipe but there is always a solution out there to be discovered with passion and commitment. Join POLIS University, Co-PLAN Institute and our network of creative partners. I believe we all have something in common that can help to educate the new generation of architects who can re-appropriate the city and its needs, including those of real dignitary architecture. This is the point where the architect rediscovers its own place, space and meaning within society.

Enjoy TAW 2020! Enjoy U_POLIS and Tirana!

Prof PhD Besnik Aliaj
Rector of POLIS University

Dear participant of Tirana Architecture Week,

In his famous book 'The Structure of Scientific Revolutions' (1962), the American physicist and philosopher Thomas Kuhn, coined the notion of 'paradigm shift', intended as a fundamental change in the basic concepts and experimental practices of a scientific discipline. In opposition to the activity of 'normal science', a 'shift' occurs when the current predominant paradigm, under which scientific activities are conducted becomes incompatible due to new phenomena, facilitating the research – and adoption – of a new theory or paradigm.

We can also assume that, such a critical change is often driven by a 'crisis', a transitional moment where the appearance of new technologies, environmental conditions (ex. climate change), or political situations (ex. migration phenomena), requires the a drastic rift from the past and opens the way to a reformulation of the notion of the so-called 'Modernity'. Indeed, according to the words of the French philosopher Jean Baudrillard: «Modernity ... is what transforms crisis into a value, a contradictory moral, says Baudrillard, for it gives rise to an aesthetics of rupture».

The history of Architecture and Design itself, can be also interpreted as a consequential stream of changes following the research of a new paradigm. The Industrial Revolution deeply influenced the work of professionals during the whole XX Century, leading to the appearance of an architecture that could be a response to the industry preferring a free and functional arrangement of bodies rather than typological preset; transparency rather than opaqueness, points structures rather than tectonic configurations.

In the last thirty years, with the development of computers and ICT technologies, another paradigm has raised and changed these disciplines from their inner structures. The IT Revolution has imposed itself as the central element for a new phase in all of architecture, and information has become the essential component of a new way of designing and a new urban environment. A whole generation of architects has been dealing with the purpose of transferring the dynamic interconnection at the heart of IT from the digital world to a new reality of reactive, sensitive, interactive architectures. The aim of Tirana Architecture Week 2020 is to draw current research and design practices, as well as theoretical speculations on the relationship between the paradigm shifts in science and urbanism; in other words about the science and the city. Such mandate will be addressed in multiple scales and contexts, and from different perspectives within different fields of interest, directly or indirectly related to design, architecture, urban studies, sociology, environmental research, engineering, education and pedagogy.

PhD Skënder Luarasi, PhD Valerio Perna

TDW2020 Curators / Scientific Coordinators and Editors of TDW2020 ISC



Skënder Luarasi is an architect and writer. His research investigates the relationship between architecture and geometry. His PhD dissertation, received at the Yale School of Architecture on 2018, focuses on how design processes end, and how the question of finitude intersects with style, geometry and parametricism in history.

Luarasi has presented his research in numerous ACSA conferences, and has published in *Haeceity*, *A+P Forum*, and other Journals. In collaboration with Adil Mansure is currently working on the book *Finding San Carlino: Collected Perspectives on Geometry and the Baroque*, to be published by Routledge in Fall 2019. Skender Luarasi also holds a Master of Architecture from Massachusetts Institute of Technology, and a Bachelor Degree in Architecture from Wentworth Institute of Technology. He is currently the Dean of the Faculty of Research and Development at Polis University in Tirana, Albania.

He has previously taught at the Yale School of Architecture, the Department of Interior Architecture at Rhode Island School of Design, Wentworth Institute of Technology, Boston Architectural College, the Architecture + Design Program at University of Massachusetts Amherst, the School of Architecture at Washington State University, and Massachusetts Institute of Technology. He has worked as a designer for dEcoi architects/MIT Digital Design Group, Kennedy & Violich Architects Ltd and Finegold + Alexander Associates Inc.



Valerio Perna (Rome, 1988) (Rome, 1988) is an architect and PhD in “Architecture - Theory and Design” at Sapienza - Università di Roma. During his studies, he was a Visiting Scholar at AUAS Amsterdam and lectured and taught at several universities in Iran, Sweden, Albania, and Kosovo. He is currently employed at Universiteti Polis, where he is Coordinator of the INNOVATION_Factory (IF), Head of the Research Center in Architecture, Engineering and Design, and Coordinator of the Professional Master in Digital Architecture. His research agenda explores the role of games and game-based processes in contemporary architectural practice to address the complexity and behavioral phenomena in the urban fabric. Valerio has published in several international journals and has been invited as a speaker in European and Asian countries. He is a member of the Editorial Boards of architectural magazines and series such as *archiDOCT*, *FORUM A+P*, *OMB series*, *Gli Strumenti series*, etc... In 2020 he published his first monograph *L'attività ludica come strategia progettuale. Regole e libertà per una grammatica del gioco in architettura* (Quodlibet).

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Jan Fransen

Ass Prof PhD - HIS – Erasmus University, Rotterdam

Alessandra Battisti

Ass Prof PhD - 'Sapienza', Università di Roma | Italy

International Speakers



POLIS University, 28th September 2020

Alessandro Melis, RIBA ARB AOU, is a professor of architecture innovation at the University of Portsmouth and the Director of the Cluster for Sustainable Cities in the UK. In 2019, he was appointed by the Italian Minister of Cultural Heritage (MIBAC) as the curator of the Italian Pavilion at the 17th International Biennale of Architecture in Venice 2020.

Previously, at the University of Auckland, he was the head of the technology area and director of postgraduate engagement at the School of Architecture and Planning. In the period 2010-2013 he has been the Director of Urban City Lab at the Institute of Architecture of the university of Applied Arts Vienna (Die Angewandte, Vienna) and visiting professor in Germany (Anhalt University, Dessau).

He holds a PhD in architecture design from the University of Florence. He has been an honorary fellow at the Edinburgh School of Architecture. He has also been invited as a keynote speaker at the China Academy of Art, the MoMA New York, the University of Cambridge, TED, the Italian Institute of Culture in London, and the UNESCO Headquarters in Paris.



POLIS University, 01st October 2020

Matias del Campo is a registered architect, designer and educator. Founded together with Sandra Manninger in Vienna 2003, SPAN is a globally acting practice best known for their application of contemporary technologies in architectural production. Their award-winning architectural designs are informed by advanced geometry, computational methodologies, and philosophical inquiry. This frame of considerations is described by SPAN as a design ecology. Most recently Matias del Campo was awarded the Accelerate@CERN fellowship, the AIA Studio Prize and was elected into the boards of directors of ACADIA. SPAN's work is in the permanent collection of the FRAC, the MAK in Vienna, the Benetton Collection, and the Albertina. He is Associate Professor at Taubman College for Architecture and Urban Planning, University of Michigan.

SPAN gained wide recognition for its winning competition entry for the Austrian Pavilion of the 2010 Shanghai World Expo, as well as the new Brancusi Museum in Paris, France.

The practice's work was featured at the 2012 Venice Architecture Biennale, at ArchiLab 2013 at the FRAC Centre, Orléans, France, the 2008 and 2010 Architecture Biennale in Beijing, and in the solo shows 'Formations' at the Museum of Applied Arts (MAK, 2011) in Vienna and 'Sublime Bodies' at the Arch Union Gallery in Shanghai (2018).



POLIS University, 02nd September 2020

Farshid Moussavi OBE RA is an internationally acclaimed architect and Professor in Practice of Architecture at Harvard University Graduate School of Design. Moussavi's approach is characterised by an openness to change and a commitment to the intellectual and cultural life of architecture. Alongside leading an award-winning architectural practice, Farshid Moussavi Architecture (FMA), she lectures regularly at arts institutions and schools of architecture worldwide and is a published author. Moussavi was appointed Officer of the Order of the British Empire (OBE) in the 2018 Queen's Birthday Honours for services to architecture. She was elected a Royal Academician in 2015 and Professor of Architecture at the RA Schools in 2017.

At FMA, Moussavi's completed projects include the acclaimed Museum of Contemporary Art in Cleveland, USA; La Folie Divine, a residential complex in Montpellier; a multi-tenure residential complex in the La Défense district of Paris, and flagship stores for Victoria Beckham in London and Hong Kong. Current projects include an Ismaili Center for the city of Houston in the United States, and, a new residential complex for the city of Montpellier.



Antonino Saggio (Italy) is an Architect and Full Professor of Architecture Theory and Design at 'Sapienza – Università di Roma.' He has been for several years coordinator of the Ph.D. School in 'Theory and Design' and director of the International book series 'The It Revolution In Architecture.' He has written several books among which one of the most important ones - 'Architecture and Modernity: from Bauhaus to the IT Revolution' - has also been edited in Albanian by POLIS University.

Three main guidelines distinguish his work: first, the confidence in the concrete possibility of teaching architectural design through making its methods evident and transmissible. This approach has been tested with many students and graduands, with the members of nITro (New Information Technology Research Office), and with many assistants and collaborators that are currently teaching in foreign institutions such as POLIS University.

The second fundamental aspect of Saggio's work is the continuous interrelation between the critical historian moment and the concrete design phase.

Particularly, this research path permeated his intense critical historian activity and led to the birth of books regarding Giuseppe Terragni (published by Laterza), Giuseppe Pagano (published by Dedalo), Louis Sauer (published by Officina Edizioni), Peter Eisenman and Frank O. Gehry (published by Testo&Immagine).

The third peculiarity of his work concern the belief of today's catalyzing role of IT in the definition of a proper 'IT Revolution in Architecture.'

This topic has been part of his early teaching years at Carnegie Mellon-Pittsburgh and has continued at ETH Zürich and is currently part of his commitment at the Faculty of Architecture at 'Sapienza – University of Rome.'

The book series 'The IT Revolution In Architecture,' founded by Saggio in 1998 and also edited in English by Birkhäuser, has been a focal point for the deepening of this topic and contributed to influence a whole generation of architects that are currently at the forefront of the international debate.

Furthermore, the presence of IT also characterized critical urban projects for the city of Rome (Urban voids, Urban Green Line, Tevere Cavo, UNLost Territories) that link together the different historical and landscape peculiarities of the city that urgently needs for the development of new infrastructures within the urban fabric that can treasure the impact of the new IT possibilities.

Notes

All papers presented at this conference have undergone a process of **double blind review** by the members of the international scientific committee. The quotation system adopted is the **Harvard Referecing System**.

As stated in the call for papers, **all copyright responsibility is fully and solely on the author(s) of the text**. The coordinators, organizers and scientific committee are not legally responsible for any claims for compensation if the author(s) have included figures, tables or text which have already been published.

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The city as a risk- dependent system. Towards resilient cities through risk assessment. The case of Albania.

Endri Duro

POLIS University, Faculty of Architecture and Design. Department of Architecture and Engineering.

abstract

The city has always been seen as one of the most intriguing objects of research and is studied from different perspectives related to the functionality, aesthetics and even from the social point of view related to the communities living in these cities. Sitte who sees the city as an aesthetic object, Rossi who sees it as a gigantic man-made object that ought to be studied as something constructed over time or Lynch who in his book explains that people's perception of the city is important are just some examples that show different ways of analyzing the city. In developing an area and building a city the aesthetic and functionality are two important elements, but above all the most important element is the safety and wellbeing of the inhabitants. The demands for living space are increasing day by day leading to the consumption of entire areas where firstly existing urban areas are being consumed behind the capacities and secondly the urbanization in risk- prone areas is taking place. This consumption is associated with an increasing risk and exposure towards natural hazards and while the requests are such that the development can't be stopped the risk imposed can be assessed and serve as a basis towards sustainability and resilience of cities. The aim of the research is to emphasize the need of studying the city as a risk- dependent system, with risk assessment methodologies as an important tool in mitigating and reducing the effects a hazardous event can have. The research will be focused in Albania as one of the most hazardous prone countries in Europe, giving an overview of the situation of the major cities and the way this new approach can change this situation.

keywords Albania, Hazard assessment, Resilience, Risk assessment, Sustainability

1. The city as a research object

From the very first traces of early cities built along rivers or on top of hills up to the modern ones we see nowadays, few things have changed regarding the function this "man- made object" has. While the city itself is very complex and is characterized by a great number of interchangeable factors, its function may be summarized using the Aristotle words: "A city should be built to give its inhabitants security and happiness" (as cited in Sitte, 2013: 1). This sentence gives in its essence all the principles of city building and may be considered as an introduction of the aforementioned issue regarding the efficient interchangeability of many factors in order to achieve both security and happiness. That is why for many authors the city is seen as an intriguing object of research studied from different perspectives related to the functionality, aesthetics and even from the social point of view related to the way the communities live and interact with each other in these cities. Some of these works are focused in a more practical and pragmatic approaches others in more theoretical ways. Camillo Sitte for instance, in his book "The art of building cities" says that in order to achieve the security and the happiness of the inhabitants the science of the technicians will not suffice and that there is need for the talent of the artist. Removing the modern system of blocks and regular aligned houses, saving as much as possible from ancient cities and to approach the ideal of ancient models are three principal requirements of practical city building (Sitte, 2013).

Understanding the city as architecture not only as a visible image, but as a construction of the city over time (Rossi, 2007) was the effort of the Italian Architect Aldo Rossi, who emphasizes that the city should be seen as a whole where each new or existing building should not disturb the organization of the city itself. Kevin Lynch on the other hand does not outline how an urban system works rather than how it is perceived and navigated by the people giving five elements that constitute what he calls mental maps: paths, districts, nodes, landmarks (Lynch, 2012). The aforementioned authors are only some mere examples which give the many point of views the city can be studied. Beside all the artistical, architectural and functional values a city must have, it is not less important the capability of this city to react, adopt and preserve itself towards a hazardous natural event. Nowadays the demands

for settlements, the need for new industrial and recreative areas mainly due to population growth lead to the consumption of existing areas behind the capacities and the exploitation of new ones and in both cases, there is eventually an increasing risk towards natural hazards. In order to mitigate the risk from inevitable natural events like earthquakes, tsunamis, flooding, slides etc. the city itself within all its complexity ought to be seen as a risk-dependent system where the risk is firstly assessed and later mitigated.



Fig.1 The impact of the earthquake of August 2016 in the center of Amatrice. (source: boredpanda.com, retrieved August 2020)

2. The city as a risk- dependent system

We talk about risk in our everyday life from buying a product, to crossing the road, using a car, flying on a plane etc. and in general the risk may be considered as the possibility of something not expected to happen and the consequences it may have. The concept of risk remains the same when dealing with natural hazardous events; it gives the likelihood of the events to happen and the aftermath of these events. A risk analysis may be divided into two parts: in the first one the risk is assessed based on detailed and relevant information and in the second one the risk may be reduced if it is within unacceptable limits.

Based on the factors that influence the risk there are four approaches to reduce it (Paul, 2002):

- Acceptance: where there is a low risk
- Reducing the severity of the hazard R
- Reducing the vulnerability degree
- Reducing the value of the assets (elements) at risk

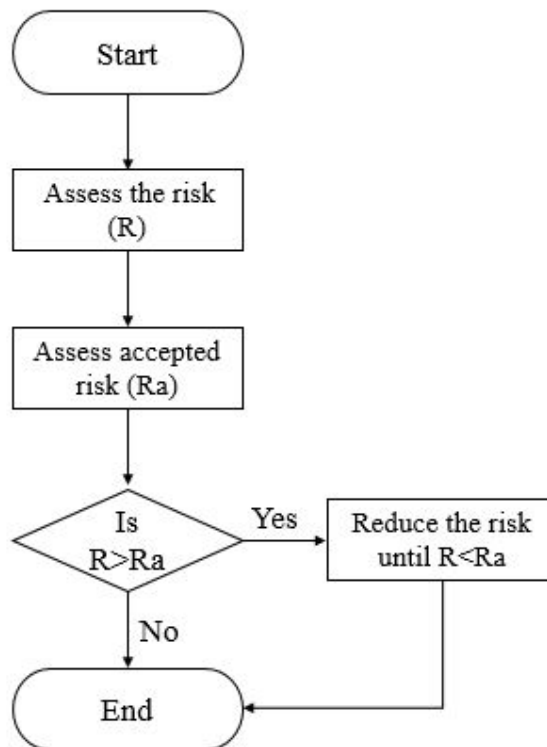


Fig.2 Simplified flowchart of risk assessment and risk reduction (source: the author)

In the context of the city and therefore of the urban planning due to the high request of usage, there is a need to extend and develop in areas prone to hazardous events and therefore analyzing and mapping the risk has the benefits of giving a good idea where to build and develop (Bernatik et al., 2013). Waterfront development increases the risk of flooding, when building in a slope area there is the risk of sliding or rock falling, building near areas that are above tectonic faults and that have weak soil conditions increase the risk of being affected by an earthquake. These setbacks can hinder development and in order to overcome them a proper risk analysis and mapping can be made. A relevant case is an urban planning initiative along the River Lagan in Belfast, which despite the challenges it presented due to soft soil deposits and its location near the river was still revitalized. Some of the development adjacent to the river included a number of residential areas and commercial offices (Millington, 1997 cited in Paul, 2002: 31) together with a new cross-harbor road and rail bridge to improve transport. The risk, in this case from high tides, was mitigated using a weir that served as tidal barrage.



Fig.3 Aerial view of the developed area along River Lagan (source: Google Maps, retrieved August 2020)

Cities consist in different urban components each one of them with different characteristics, but that have a dynamic interaction between them. Studying the city as a risk- dependent system means properly determining these components together with their sub- components and their influence in the total accumulated risk of the studied area. One way to divide this complex system is using four basic components: buildings, infrastructure, community and open space together with their subdivisions as proposed by (Koren et al. 2017) and based on the hazardous event for which the risk is to be evaluated several parameters for each of these components can be determined and further analyzed giving the final value of risk based on the methodology used (qualitative, semi-quantitative or quantitative).

By analyzing different ways these components interact with each other (different infrastructural configurations, different positioning of open spaces, building height- distance relationship etc.) using several scenarios the configuration that gives the optimal risk value, that will be lower or at least equal to the accepted risk, can be found. This acceptable value is determined based on several factors related mainly to data availability, economic and technical capacities and also to social components like level of education, wealth etc. This risk- dependent approach does not provide a system that will not be affected at all by a certain event or in other words a system with 0 risk, what it proposes is a way to create or even modify a system that will properly react to a certain event being able to maintain its functionality, preserve its most important elements, restore its full capacities faster and secure its inhabitants thus giving means to meet the high demands of usage.

3. Albanian cities and the need for a risk- based approach

After the fall of communism, with the beginning of the 90s Albania went through a process of radical changes in many aspects. These immediate and drastic changes had an effect in the way the cities were planned, built or further developed. The first part after the early 90s was characterized by a chaotic development, many high-rise buildings were constructed, public spaces were occupied and it was a phase where informal building ruled. In the second part beginning from 2000s up to nowadays, things have slightly changed in the context of laws which forbid these informal buildings, but on the other hand in many major cities there are a lot of interventions that have a negative impact in the city's identity and functionality. The reduction of public spaces to give space to many residential objects, the infrastructural systems which do not fulfill the requests, demographic movements causing an overpopulation of certain cities and abandonment of others are just some of the major issues.

As presented by INSTAT in January 2020, the capital of Albania Tirana occupies 31.8% of all population followed by Durrës and Fier with 10.2% each and the other percentage is divided between the other regions of Albania, showing clearly a demographic gap which for the overpopulated areas in terms of risk imposes an increasing effect due to an increasing of the elements at risk (buildings and inhabitants).

On the other hand, there are 184 requests and obtained building permits for the first three months of 2020 of which 67.3% are residential buildings, 21.1% are non-residential buildings and the remaining 11.6% are other engineering works (INSTAT, 2020). Taking in consideration the short time of evaluation these data show the high requests for living space due to population growth and demographic movement.



Fig.4 he capital of Albania Tirana (source: www.exit.al)

Albania is exposed towards a number of hazardous events, first of all it is a country with one of the highest seismicity levels in Europe with many medium scaled earthquakes, there are lots of flood- prone areas, sliding- prone areas and due to the weak soil deposits, there is in many cases the risk of several geotechnical hazardous events and the amplification of the damages an earthquake can have. The combination of all the aforementioned factors tend to increase the levels of risk in these cities. The latest case was the earthquake of Durrës of 26 November 2019 with a magnitude of $M_w=6.4$, which caused lots of damages for two main reasons; the first one due to the subsoil configuration which lead to an amplification of the effects of the event and secondly due to poor quality of buildings noticed by many inspections in the post- earthquake phase. The level of damages, considering the magnitude of the earthquake are not entirely justified and it implies that proper planning and consideration towards these kinds of events would have certainly reduced the impact.

Due to the actual situation in general the preparedness, response and recovery of most Albanian cities may be considered low and this would definitely lead to long and expensive recovery times. To avoid problems in this scale there is an extreme need, to follow a risk- based planning approach which would imply much more sustainable and resilient cities. To achieve this there is a need for collaboration between different fields of expertise including mostly urban planners and civil engineer through which using relevant information conceptual and later on applied frameworks can be introduced that would assess the levels of risk and based on this level proper measures can be taken. An important part of this task would be that of properly determining the urban elements to be taken in consideration as those which would have a greater impact in the assessed risk. Since in Albania there is no actual methodology international case studies and methodologies can be used and adapted. Together with the process of assessing the risk an important part is the determination of level of risk to be used as a threshold or allowable value.

4. Conclusions

The city may be considered as a complex and dynamic system in which many elements interact with each other and are in constant change with the aim of providing a secure place for its inhabitants. These systems are hazardous prone since they are in constant exposure towards several natural events and as such there is an essential need to study them as risk- dependent systems which constitute a whole that needs to be prepared, react and recover properly from these events. This can be achieved by dividing the city into several urban components and by properly determining the parameters for each component that would be expressed in terms of estimable risk. The total risk of the studied area would be the accumulated risk weighted taking into the account the effect of each urban component. The evaluation of the risk is of greater importance for the case of Albanian cities since the up to nowadays the development of these areas are rarely based on concrete and sustainable plans. There is also no supporting law or methodology that would assess

the risk towards a hazardous event based on the location that would definitely impact the way the cities in whole or even separate city components are conceptualized, planned and developed. This approach is also needed when considered that beside overpopulated areas, in Albania there are also lots of potentially exploitable areas, which will certainly be developed into a near future taking into account

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Classification of typical damages on prefabricated reinforced concrete buildings observations from the 26 November 2019 M 6.4 Albanian Earthquake

Merita Guri

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The seismic event of 26th November with Magnitude 6.4 had caused significant damages to many residential, social and industrial buildings in affected area. The earthquake had a tragic balance, 51 dead people, 3,000 people injured and about 14,000 property damages. The main objective of this paper is a study of performance of prefabricated reinforced concrete (RC) buildings with large-panel system (LPE). LPE system consists of various prefabricated elements such as wall panels, slab panels, staircase and landing. There are additional custom-designed prefabricated elements which are required to ensure stability, durability and structural integrity of the building. The main system for resisting seismic loads in these buildings consists of structural walls (vertical elements) and slabs/diaphragms (horizontal elements). The design was developed by the Institute of Construction and it was based on Albanian design code of 1963. These buildings are widely spread in our country and they have been in use for around 40 years. In A major demand for the large-scale housing construction started in Albania around 1972. At that time, a production plant with the capacity of 2000 apartments per year was built near the existing plant "Josif Pashko".

The purpose of this study is to recommended decision-making bodies the Methodology for Seismic Evaluation of prefabricated reinforced concrete (RC) buildings with large-panel system (LPE). Identify the damage patterns and issues related to LPE buildings reported after the earthquake of November 26, 2019. LPE buildings have been used for more than 40 years and have suffered severe damage due to various factors, such as deterioration, uncontrolled structural interventions, and earthquake shaking. Visual inspection of the entire structure in general and structural elements in particular was used to identify these issues. This paper discusses general considerations related to the damage patterns in prefabricated RC building systems exposed to earthquake shaking. The main attention is paid to the joints between the prefabricated panels and the construction materials. The original design drawings of these structures were obtained from the Central Technical Construction Archive (AQTN).

This study summarizes structural key and failure mechanisms for prefabricated RC buildings subjected to seismic loading. The study area is the administrative unit No. 6 "Kombinat Area", in which these types of construction are very widespread. Damages to these types of structures are categorized into two major groups: structural and non-structural. Technical recommendations and Methodology for Seismic Evaluation are provided in this study for decision-making bodies on the risk management that these structures may suffer from a similar significant earthquake.

keywords large-panel buildings, visual observations, structural and non-structural damages, panel joints , Methodology for Seismic Evaluation

1. Introduction

Prefabricated reinforced concrete (RC) buildings as in many other countries in Eastern Europe are very common in our country and have been in use for around 40 years. Around 1970s there has been a switch in the construction sector from traditional to more advanced and industrialized based on construction technologies of China. This paper discusses general considerations related to the fast survey damage patterns in LPBs exposed to earthquake shaking of November 26, 2019, in Administrative Unit No. 6 "Kombinat area" in Tirana city.

The main focus is the key structural parameters between the precast large-panel in several structural architypes. The original design drawings of these structures were obtained from the Central Technical Construction Archive (AQTN), which was extremely useful for the inspection process. This paper also summarizes the investigation of technology, used for the production and the site construction, building height aspect ratio in plan, as well as the degradation of material strength, damages due to deterioration, uncontrolled structural interventions, and earthquake shaking. Visual inspection of the entire structure in general and structural elements in particular was used to identify these issues, not including an analysis.

This study summarizes structural key and failure mechanisms for prefabricated RC buildings subjected to seismic loading. The study area is the administrative unit No. 6 "Kombinat Area", in which these types of construction are very widespread. Damages to these types of structures are categorized into two major groups: structural and non-structural. Technical recommendations and Methodology for Seismic Evaluation are provided in this study for decision-making bodies on the risk management that these structures may suffer from a similar significant earthquake.

2. Technology of Prefabricated Structural Concrete Building with Large-panel System (LPE)

2.1 Structural systems for prefabricated buildings

The basic prefabricated structural systems can be identified as:

- Large panel systems
- Frame systems
- Slab-column systems with shear walls
- Mixed (dual) systems

The designation “large panel system” is applied to multi-story structures composed of large concrete panels which are connected in the vertical and horizontal directions. The panels form the structural system. Prefabricated wall panels are usually one-store high, and in general there are both horizontal and vertical joints between the panels. The horizontal floor and roof panels usually consist either of one-way or two-way spanning prefabricated slab elements. When properly connected, the horizontal elements act as diaphragms, which transfer the earthquake loads to the walls, in addition to resisting the gravity loads. Each floor level comprises of a few boxes, which could act as moment resisting frames in one direction and as structural walls in the other direction. Three basic configurations are used for large panel buildings: Cross-Wall System; Long-Wall System; Two-Way System. The first system (Cross-Wall) was used in prefabricated residential buildings(LPE) in “Kombinat Area”.

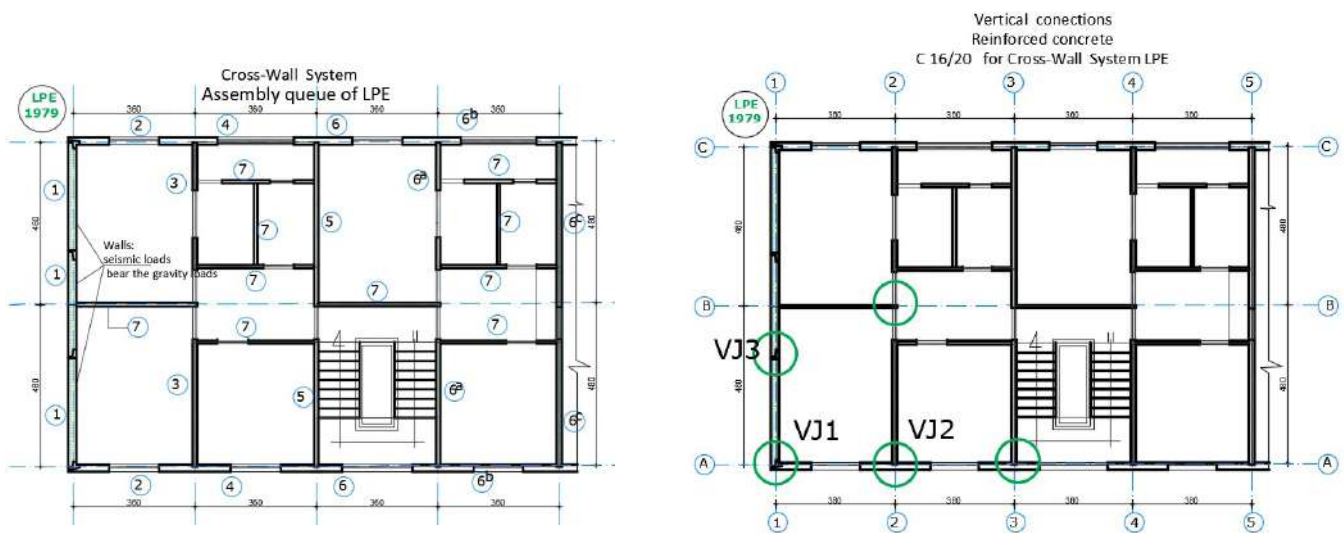


Fig. 1. Basic Structural Configurations of large panel buildings LPE in Albania: a) Cross-Wall System and b) Vertical connections (source: AQTN)

2.2 Materials of the Panels

Concrete compressive strength 200kg/cm², foundation compressive strength M-100 kg/cm² (with 25% stone), Steel yield strength 2100 kg/cm².

For the welding of the slabs and steel electrodes of type TL VIII S and kb IX/xs were used.

Light-concrete for the exterior panels for thermal insulation must have a thickness of 14cm with a compressive strength not less than M- 140kg/cm².

2.3 Connections

Depending on the direction of the joint, two main types of connections have been identified:

1. “Vertical joints”, which connect the vertical edges of adjoining wall panels and primarily resist vertical shear force due to seismic loading.
2. “Horizontal joints”, which connect the horizontal edges of adjoining wall and floor panels and primarily resist vertical axial forces due to gravity loads from the upper panels and floors, horizontal shear forces due to seismic loads, and bending moments in two directions due to seismic loading acting on the upper panels and gravity loading acting on the adjoining floor panels.

A wide range of details for joints are possible. In general, these joints are either “wet” or “dry”. Wet joints are constructed with cast in situ concrete in the joint regions between prefabricated panels. Dry joints are constructed by welding or bolting together steel plates or other steel inserts which have been cast into the ends of the prefabricated panels for this purpose.

3. Case Study

The study area is the administrative unit No. 6 “Kombinat Area”, where these types of constructions are very widespread. Traditional methods of building construction like: unreinforced masonry constructed before 1960, 1960-1990, and after 1990 characterize these areas. As a result, systems of buildings making use of the advantages of prefabrication were developed and extensive construction of prefabricated reinforced concrete buildings occurred.

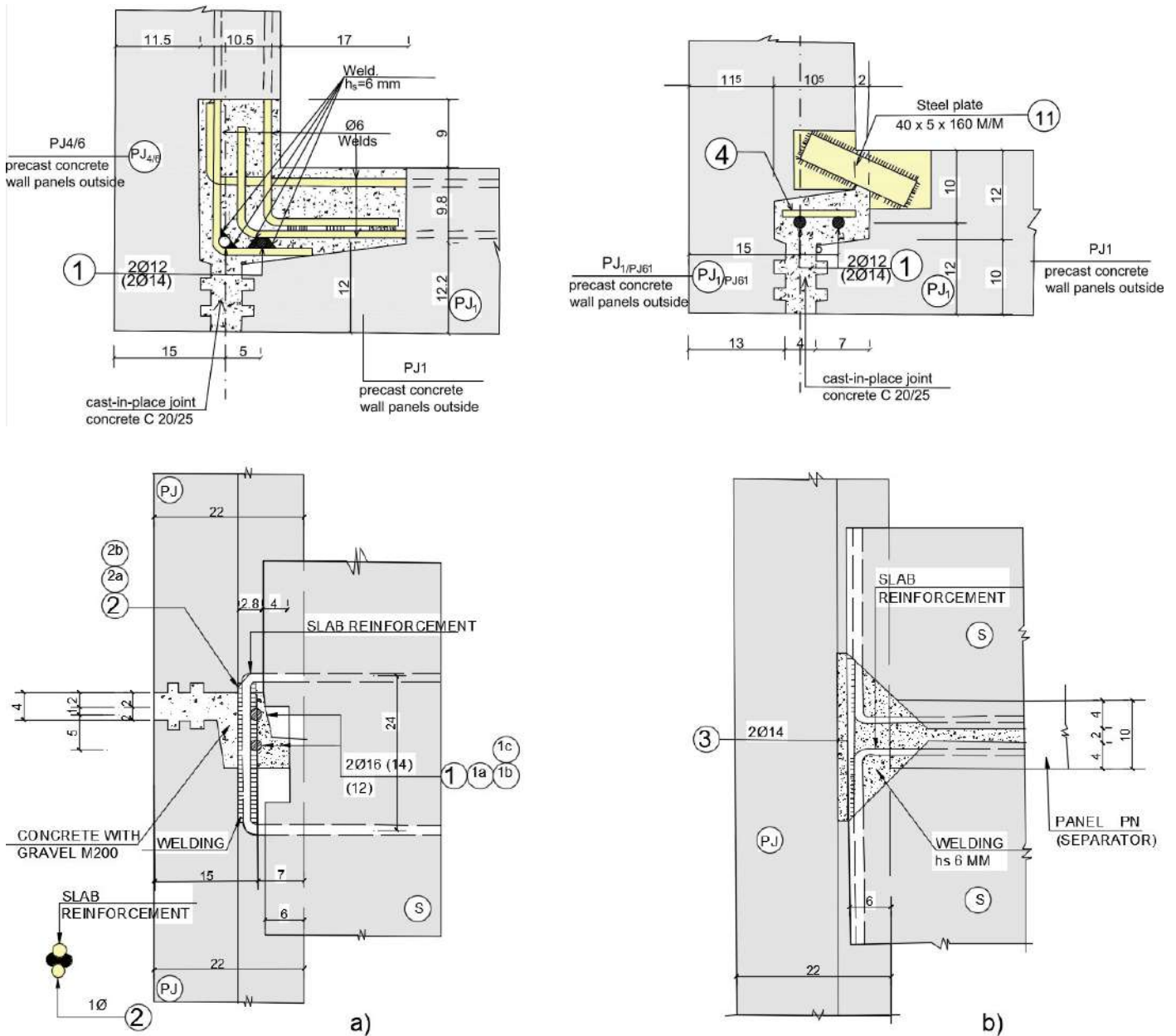


Fig. 2. Horizontal joints between structural elements (source: AQTN)

The massive building program applied in our country since the 1970s could not have been undertaken without the application of prefabricated concrete construction.

4. Damages from Durres Earthquake of 26 November 2019

Damages to these types of structures are categorized into two major groups: a) structural, when there are damages (cracking) in the walls and/or slab panels and/or their connections and b) non-structural for example cracks in plasters. Technical recommendations are provided in this study for decision-making bodies on the risk management that these structures may suffer from a similar significant earthquake.

The causes of damages can be classified as:

1. Degradation by ageing and atmospheric agents like the erosion, strain effects, material deterioration
2. Damage due to human activities, typical vertical and horizontal extension over existing floors
3. Damage from seismic activity (DS1 to DS5): DS1- non- structural damage (plaster cracks) - DS2- minor structural damage - DS3-DS4 damage to structural element - DS5- collapse

5. Failure Mechanisms of Structural Concrete Building With Large-Panel System (LPE)

Failure mechanisms of precast large-panel residential buildings (LPBs), subjected to seismic loading are shown in Fig. 5. Resisting seismic loads in these buildings is dependent of the damage state of (welded) connections between the structural walls (vertical elements) and slabs/diaphragms (horizontal elements) and determine whether a damage building should be repaired or demolished.

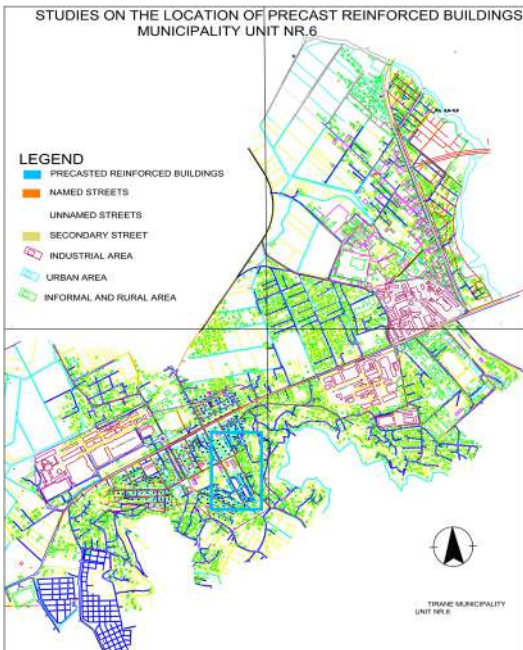


Fig. 3. Typical plan of large-panel buildings LPE in Administrative Unit No.6 "Kombinat area" (source: the authors)



Fig.4 Degradation by ageing and atmospheric agents (source: the authors)

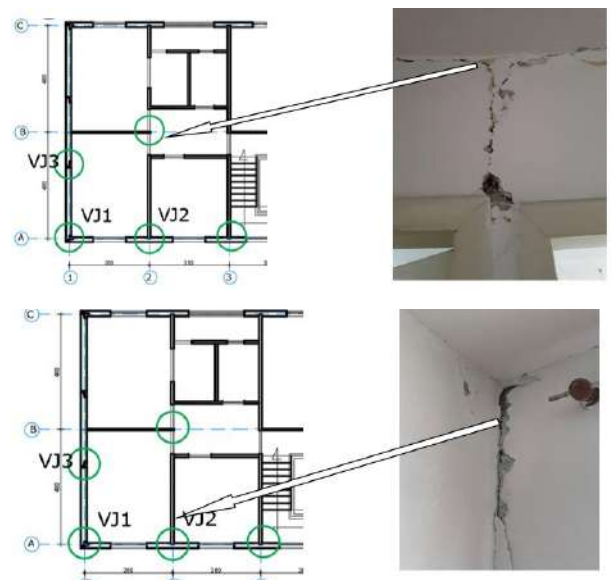


Fig. 5 Damage due to human activities (source: the authors) / Fig. 6 Structural damage DS2 in LPBs from Durrës earthquake 26 November (source: the authors)

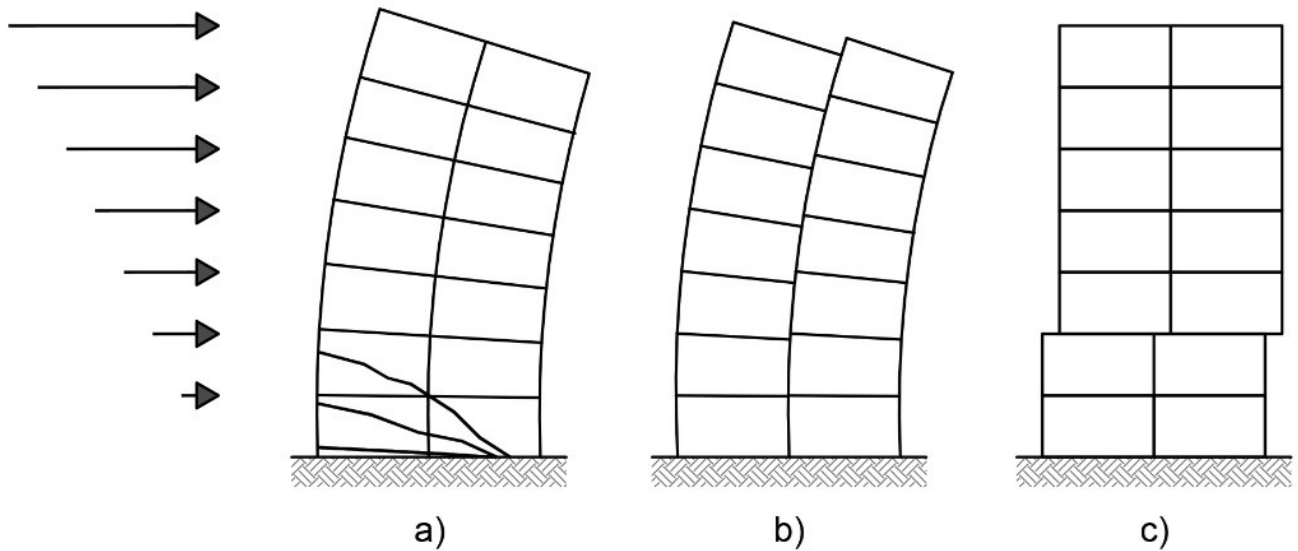


Fig.6 Failure mechanisms for prefabricated RC shear walls subjected to seismic loading: a) monolithic behavior; b) weak vertical joints cause vertical slip, and c) weak horizontal joints cause horizontal slip (based on UNIDO 1983).

6. Methodologies for Seismic Evaluation and Retrofitting of Prefabricated Buildings with Large Panel Systems (LPE)

The engineers design buildings to resist seismic forces and displacements, these procedures require a basic understanding of structural dynamics, ductility, and inelastic behavior of structural materials. The author proposed the three main steps needed for retrofitting: The first step is the Strategy which means legal requirements, selection of qualified of professionals, and settings Performance goals. The second step is the Concepts, which includes seismic assessments, demand, performance verifications and retrofit solution. The third step is the Detail, which includes, Reinforcement Determination, Techniques, Technology, Materials, Compilation of constructive documentation, Monitoring the quality of implementation.



Fig. 7 The general methodology for seismic evaluation and retrofit of prefabricated RC building systems LPE

7. Conclusions and Recommendations

Performance of LPBs in the November 26, 2019 earthquake has been good. These buildings did not experience significant structural damage. In some cases, damage was due to agent and environmental factors.

1. Albanian design and retrofit standards of LPBs need to be developed to include the design specifications and recommendations regarding a new damage classification system. Territorial authorities needed to identify potentially earthquake-prone buildings and seismic risk area.
2. Structural performance and strength of the structural and non-structural elements and their connections used in the prefabricated construction system are very important for global behavior, stability and structural integrity of these systems.
3. Seismic evaluation: considering a large stock of these buildings in Albania it is of critical importance to perform analytical studies to understand the mechanism of damage and collapse of these buildings, using the available information regarding the design and detailing of prefabricated structural elements and their connections.
4. Failure mechanism: based on the observed performance in the November 26, 2019 earthquake it can be concluded that structural damage was concentrated at the connections. Future studies should examine whether the next stages of damage are related to complete disintegration of connections, or damage is expected in wall panels.
5. Seismic retrofitting solutions: many of these buildings are almost 50 years old and in poor condition. It is a question whether significant investment in seismic retrofitting is justified.
6. Creating a methodology for the evaluation and reinforcement of all the damaged typology structures.

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The Ideological Function of (Post-)Modern Architecture in the Context of (Techno-)Science

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Our understanding of an architectural phenomenon is interrelated with political, economic, cultural, scientific or technological developments. As F. Jameson would put it, architecture, ideology, politics, economics, culture, technology, science, etc., are structurally connected instances (Jameson, 1991). In this context, we will focus on the relation of architecture – as ideology – and (techno-)science, in order to analyze and understand the ideological operation of architecture, through its formal, technical and aesthetic modalities. The paper is a theoretical elaboration of architecture's ideological and (techno-)scientific contexts, following the theories of Althusser, Marx and Tafuri. It presents an intersection of the history of architecture and history of science, interpreted through Tafuri's 'Ideology of the Plan' and the National Library of Kosovo, in Prishtina. The aim is to interpret how architectural space – i.e., its form, and its technical and aesthetic aspects – impacted by the developments in (techno-)science, (re)creates and determines the social, political and cultural events occurring there. We are to deal with the ideological character of architecture (architecture as a representation of reality) and the fact that the techno-aesthetic and techno-artistic modalities of architecture typically hide this character (Šuvakovic, 2014). By re-thinking the practice of 'hiding' (in principle, an ideological practice), we will understand architecture as a language between ideology, morphology, aesthetics and technology. Furthermore, this paper will interpret the practice of 'hiding' in the context of architecture's relation with (techno-)science; their political and economic association with capitalism, and cultural association with postmodernism. Differently put, how architecture – as ideology – positions itself in relation to (techno-)science? The present work will discuss the architectural and urban form as a product of the combination of architecture and (techno-)science, within a (post-)modern condition, by interpreting what this form represents. By arguing that architectural form – the building and the plan for the city – operates ideologically, this paper will question how architecture, by using its technical and aesthetic qualities, through the practice of 'hiding', returns to an essential character – that of enclosing.

keywords Architecture; Ideology; Techno-Science; Plan; Postmodernism;

1. Introduction

The political, social, economic and cultural context in which we live, is marked by an exteriorization (globalization) of knowledge, or, a radical exploitation of resources – technology and media above all (Jameson, 1991). This context has already been defined as postmodernism. As Fredric Jameson elaborated in his book *"Postmodernism or the Cultural Logic of Late Capitalism"*, postmodernism itself is a force-field of different instances, actions and events – politics, economy, society, culture, science, etc., – that if not always competitive with one another, are interrelated and impact each other (Jameson, 1991). In this context, the first premise of this paper is that architecture is structurally connected with these instances. Differently put, in order to understand an architectural phenomenon, one has to look at all configurations formed out of politico-economic and socio-cultural instances, and all the forces derived from them. The second premise on which this paper is constructed, is that ideology is a system of representations to describe reality (Althusser, 2014), and architecture – architectural form (i.e. the building and the city) – is a representation of a political, economic, social and cultural reality. Considering this, the research topic is related to the understanding of architecture as metaphor for (re)creation and (re)production, and as language between ideology, morphology, power, aesthetics and technics (Benevolo, 1963; Tafuri, 1976; Thoenes, 2011). Here, it will be discussed about architecture's practice of 'hiding' that representative character, through architecture's formal, functional, technical, artistic and aesthetic aspects.

Architecture in the interplay with ideology, power, agency and imagination, – or, differently put, with politico-economic, socio-cultural and scientific instances – has been treated in several discourses dealing with different times from antiquity to the present day (Benevolo 1963; Tafuri, 1973; Lane, 1986; Heynen and Loosen, 2019; Smart, 2020). Architectural works such as the Parthenon in Classical Athens and the plan with the building programme of Washington D.C., are examples treated in these discourses. Yet, the aim of this paper is to outline the ideological function of architecture within architecture's relation with science and technology, focusing on the (post-)modern period. The term "(post-)modern" is used to represent both modernism and postmodernism, their combination, or the shift from one to the other and the configurations created within that shift.

The present work belongs to the field of theory and critique of architecture. It is a theoretical elaboration of architecture's ideological and (techno-) scientific contexts. Following the theories of Althusser, Marx and Tafuri, the paper presents an intersection of the history of architecture and history of science. Through text and discourse analysis, we will probe into the fields of inquiry, in order to analyze the concept of techno-science as a cultural (re) production of postmodern society, its political and economic association with capitalism, and its relation with the ideological function of architecture. The objectives of this paper will be demonstrated through Tafuri's "*ideology of the plan*" as a conceptual basis, and the National Library in Prishtina as a case-study. The two examples are used to interpret 'architectural ideology' and architectural practice in terms of politics, economy, culture and (techno-) science.

2. Architecture in the interplay of ideology, science and technology

2.1 Ideological context of architecture

Starting with the premise that ideology is the system of representations to describe reality (Althusser, 20014), the present work indicates that architecture is an ideological practice which represents a political, economic, social and cultural reality. In his book "*On the Reproduction of Capitalism: Ideology and Ideological State Apparatuses*", Althusser discusses the meaning of ideology through two theses: 1) Ideology represents the subject's imaginary relationship to his/her real conditions of existence; 2) Ideology has a material existence (Althusser, 2014).

What should be considered at the first, is that ideology does not exist only at the level of distortion and/or misrepresentation of reality. Reality remains what it is. When it is said that ideology is the "*imaginary*" relationship of the individual with reality, we must understand that the individual has an illusory relation to the real conditions of his existence. These real conditions are constructed through architecture. In this context, there is a convergence between the first thesis and Manfredo Tafuri's "*ideology of the plan*". The plan – the architectural and urban plan, and the plan for the organization of the capital – is a representation of architects' imaginary relationship to their real conditions of existence, or, of state's vision (i.e. imaginary vision) for the city and society.

The second thesis relies on the materiality: the fact that ideology exists from the subject and for the subject. Thus, ideology does not exist in the spiritual world, it exists in institutions: the institutions Althusser is referring to appertain to what he terms as Ideological State Apparatus (Althusser, 2014). For instance, the Guggenheim Museum in Bilbao and the National Library in Prishtina, are Ideological State Apparati. What we should understand here, is that the two buildings (and the public architecture in general) were formally outside state control, but they did reflect the politico-economic programme and the vision of the state, including new technologies and new forms of (re)production that were used in (re)building programs. If we look at Frank Gehry's Guggenheim Museum in Bilbao, one cannot escape the doubt that the extravagant spaces create a new form of elitism, while simultaneously pretend to be open for the people (Hamza, 2020). By 'enclosing' a space, architecture determines the socio-cultural events occurring there. The Guggenheim Museum is a large-scale architectural project that intended to transform the post-industrial city of Bilbao: to 'recover' the economy and society. Thus, architecture uses its formal, techno-aesthetic and techno-artistic strategies, to participate in the organization of individual and collective human life.

The formal, techno-aesthetic and techno-artistic modalities of architecture, usually hide its ideological character. The practice of "hiding" is in principle an ideological practice that positions architecture – in particular modern and postmodern architecture – as a nonideological or post ideological state apparatus (Šuvaković, 2014:10). In this context, architecture operates ideologically. If Althusser discussed the "material existence" of ideology (Althusser, 2014) and Tafuri positioned architecture within the organization of building (re)production (Tafuri, 1973), then, architecture is a material practice which (re)produces the political, social and cultural within the process of constructing the visible (Šuvakovic, 2014), through aesthetics and technics.

2.2 Defining techno-science

At this point, the intention is to create an intersection of the history of (post-)modern architecture and (techno-)science: architecture, science and technology are to be considered as instances in the force-field that illustrates postmodernism (Jameson, 1991). As a postmodern field of research, techno-science refers to the shift, or, to the relation between the traditional philosophical distinction of science as a theoretical discipline and technology as a practical discipline. Said otherwise, techno-science is the practicing of modern science as a form of application of scientific progress, as a materialization of knowledge. Or, as Marx maintained: techno-science is the development of science and of its technological applicability (Forman, 2007).

Related to the means of production and, technical and politico-technical practices, techno-science is a matter of political, social and economic organization, and as such is interrelated with ideology. Regarding this, Althusser maintained that there was no criterion sufficient to demarcate scientific from ideological concepts, and that all theoretical concepts are marked by ideology (William, 2018). In other words, ideology plays a role in the application of the theoretical to the practical, because in order to understand and generate the material real, scientists need to employ ideological concepts to frame their investigations and its results (William, 2018). In addition to this, the development of techno-science is dependent by political, economic, social and cultural developments.

On the Marxist view, with a full development of capitalism, the 'general knowledge' has become an immediate force of production, positioning the economic and the technical over the scientific (Forman, 20017:16). In this context, technology is a result of the development of the capital and not a determining instance in its own right (Jameson, 1991). Thus, it is through new processes of production and reproduction, that technology is interrelated with social, political, cultural and architectural practices. Considering the relation of techno-science with capitalism and the emergence of the concept itself, one can assume that is a postmodern condition in which this relation is developed, based on Jameson's relation between postmodernism and capitalism (Jameson, 1991). In this context, it is in the shift from modernity to postmodernity, that technology has acquired the cultural primacy over science (Forman, 2007). Jameson insists on seeing technology as a figure for a whole new economic world system (Jameson, 1991); and architecture – of all other arts – is the closet constitutively to the economics:

«Architecture therefore remains...the privileged aesthetic language; and the distorting and fragmenting reflections of one enormous glass surface to the other can be taken as paradigmatic of the central role of process and reproduction in postmodern culture» (Jameson, 1991: 37).

2.3 Architecture's relation with (techno-)science within its ideological context

The philosophical relation between science and technology – theory and practice – can be reflected through Corbusier's Modulor. Presented at the First International Conference on Proportion in the Arts at the Milan Triennale (1951), The Modulor represented an analytical theory and the attempt to propose a comprehensive proportional system, which was ready for implementation at all the scales of architectural design (Cohen, 2014). Thus, it was a contribution to the development of architecture within changing procedures in building (re)production, marked by the emergence of new products and technologies in the post-war era.

Yet, it is Tafuri, who positions architecture as interrelated and even impacted by all the changes in politics, world economy and general cultural production occurring from the sixties and onwards. Thus, it is a postmodern condition – marked by developments in techno-science – framing the discussion on architecture (following Jameson's definition and periodization of postmodernism); even though Tafuri formulates the entire cycle of modernism as a unitary development (Hays, 1989). In this context, for Tafuri, there is a specific relation of architecture – as the ideology of the plan – and the capitalist production: it was architecture that aimed at the reorganization of production, distribution and consumption in the capitalist city (Amhoff, 2012). According to Tafuri, the plan (i.e. the urban plan) positions architecture as a determiner of the destiny of the city, being able to project the future from the present, through a traditional link with utopia. But, with the development of capitalism (when the technical is positioned over the scientific), and the emergence of new modes of production and new technologies as forms of scientific progress, the urban plan as a determiner of the form of the city, became a plan for organizing the building production (Amhoff, 2012).

The avant-gardes' visions of utopia come to be recognized as an idealization of capitalism, a transfiguration of the latter's rationality into the rationality of autonomous form – architecture's "plan", its ideology (Hays, 1998:19). As a result, utopia becomes a realizable ideology (Tafuri, 1973); the state becomes the planner; the architectural ideology becomes the ideology of the plan; and the urban plan is institutionalized as the plan of development of the capitalist city, becoming a political instrument, representing the role of the state in the control of capital. Through its break with utopia, architecture is separated from ideology and it is left without any possibility of the development of ideology itself (Tafuri, 1976). Yet, what one should understand here, is that, architecture when it is most itself – most pure, most rational, most attendant to its own techniques – becomes the most efficient ideological agent of capitalist planification (Hays, 1998). Thus, architecture operates as a political and economic instrument, only to 'hide' its ideological function.

3. Analysis: The National Library in Prishtina as a Representation of the (Post-)modern Condition

An example of the politico-ideological character of architecture, and its products, designed and built within specific conditions created by politico-economic, socio-cultural and techno-scientific instances, is the National Library in Prishtina, Kosovo (Fig.1). The building was constructed during 1971-1984 (Ivas, 2015), and it is a landmark of the Socialist Autonomous Province of Kosovo's late era (1968-1989). Even though the year of construction indicates what is defined as postmodernism (Jameson, 1991), the building is a fine example of modernist architecture.

The architecture of the building represents the "Yugoslav Identity" constructed through a (re)building programme in the name of modernization for the city of Prishtina and other former Yugoslav cities at that time. Having a central position in the University Centre, located in the "new", modern part of the city of Prishtina, the National Library aimed at visually stating Kosovo's political and economic "power", as well as its "equality" to other states within the former Yugoslavia – pointing to the construction of Kosovo's national identity.



Fig. 1 The National Library, Prishtina, Kosovo, 1971-1984

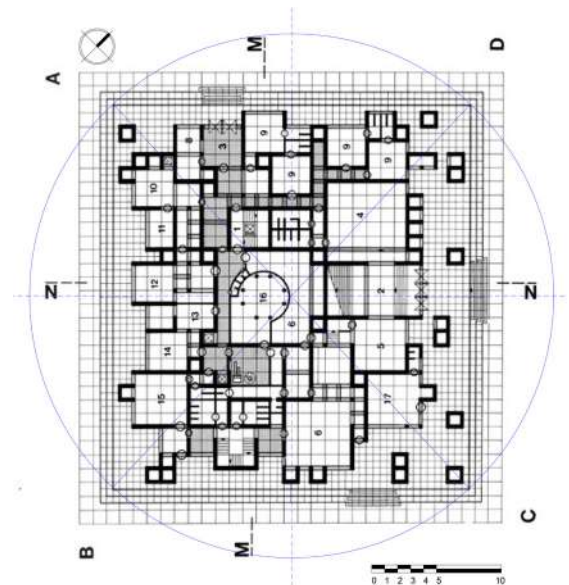


Fig.2 Andrija Mutnjaković, The National Library, Prishtina, Kosovo, Ground Plan (©the author)

The National Library is a mathematical and technological – therefore, scientific – expression in two aspects: 1) through the use of a proportional system combining the grid with concentric circles; 2) through the use of new building standards and technologies. The formal layout (Fig.2) – being around 50x50 meters (Ivas, 2015) – is entirely inserted within a quadrant whose diagonals equal the diameter of the circle (Jashari, 2017). The form of the building is created from a combination of cubes and domes (Fig.3), representing layers of Islamic and Byzantine architecture, to be found in Kosovo (Ivas, 2015). One

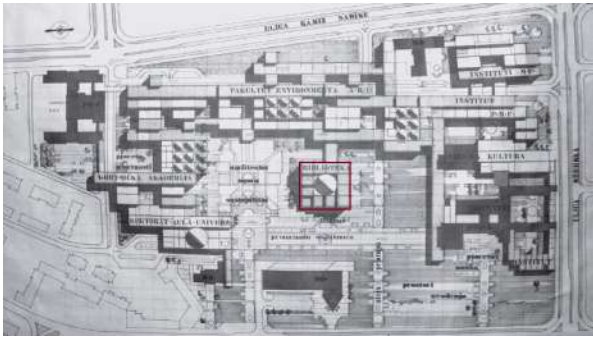
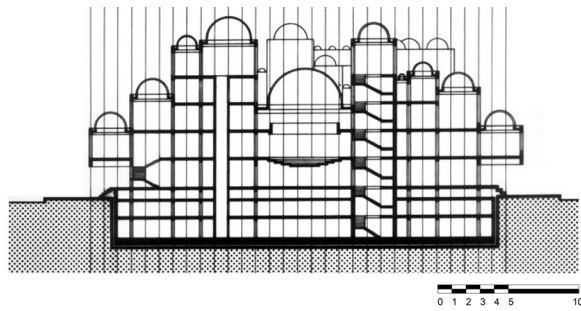


Fig. 3 Andrija Mutnjaković, *The National Library, Prishtina, Kosovo, 1971-1984, Section M-M*

Fig.4 Bashkim Fehmiu, *The University Centre Prishtina, Kosovo, 1970s-1980s* (© Gjinolli and Kabashi, 2015)

Fig.5 Andrija Mutnjaković, *The National Library of Kosovo, Prishtina, Kosovo, 1971-1984, the building during construction* (© Prishtina City Archive)

can understand that it is the form that operates ideologically, in the sense that the form itself, represents a 'regional architecture' interrelated with the 'national identity': the emergence of Kosovo's state within Yugoslavia. The metallic grid, covering the cubic concrete forms as pure expression of brutalist architecture, and the glass surface as screens through which the internal and external communicate with each other; signifies the new technologies and modes of building production (Fig.4). While, it is used to 'control' the interplay of light and shadow, the metallic grid as a techno-aesthetic and techno-artistic element, 'hides' the building's political and ideological character: a character that represents Prishtina (and Yugoslavia) as bounded to a modern and socialist tradition: a 'utopia' through which the future was projected as a contradiction to the capitalist development and the emergence of postmodernism.

What one can understand in this context, through the case of the National Library in Prishtina, is that architecture (re)produces the political, economic, social and cultural. By 'enclosing' a space whose function is the library as a representation of knowledge, education and social emancipation, the architecture of the building aimed at the (re)production of a modern society and state. Put differently, the position of the building in the University Centre (Fig.5), creates a new centrality, rendering the importance of knowledge for the modern society of a "new", modern city and state.

4. Conclusions

Architecture and Techno-science, in relation to politics, economics and culture, are constructs of an objective world – the real world or Althusser's real conditions of existence. Architecture (re)creates this world, it gives formal, technical and aesthetical qualities to it (in particular, public architecture as important field of the representation of an identity – a national identity – i.e., of the state). Even though Tafuri states that architecture is separated from (or left without) ideology, as a consequence of its break with utopia, architecture – i.e. (post-)modern architecture – is a carrier of ideology, because buildings communicate messages, thereby being signifiers of politico-economic, socio-cultural and techno-scientific changes. Thus, architecture is a socially-determined (re-)construction or language of ideologies and politics. In this context, public architecture – for instance, the National Library in Prishtina, – is basically framed by institutions. Architecture itself is an institution – an Ideological State Apparatus as Althusser would put it. Thus, one can assume that architecture is set to meet institutional needs – which are dependent from the political, economic, cultural and (techno-)scientific constructs representing the state. Yet, architecture has an inner structure, as well as a language of its own.

Understanding the 'material existence' as an application of science through technology (what constitutes techno-science), one can argue that techno-science itself is an ideological practice. Being associated with new means of economic and cultural production, it is a representation of the politico-economic and socio-cultural organization. On the other hand, architecture's materiality – achieved with the application of general knowledge through its techno-artistic and techno-aesthetic modalities – renders architecture as a "pure" formal, functional and visual practice. Thus, architectural form – a building and a city – operates as autonomous, only by hiding its ideological and political character, thus, being an ideology itself. And it is through its techno-scientific aspects, that architecture aims at the (re)production. As we have defined technology as the outcome of the scientific progress, it is also through new technologies that (post-)modern architecture becomes an instrument of power, control, and politico-economic and socio-cultural organization.

In conclusion, when trying to decipher architecture's inner structure and language, one should understand that not all architectural works are subject to ideology in the same way, and it does not mean that they do not stop operating ideologically and politically in specific moments. Analyzing and interpreting these moments, would be a future task within the study of architecture's relation to ideology. In this context, it can be said that buildings create networks, which can be framed as "ideological sites", where architecture operates differently and represent different conditions.

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Gravity and Architecture

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In 1985 Italo Calvino writes "Six Memos for the Next Millennium", for the Charles Eliot Norton Lectures at Harvard University. The first lesson is dedicated to lightness, the art of escaping gravity, of finding equilibrium in disposing of the weight. Paradoxically the Italian writer, famous for the refined architecture of his texts, highlights the importance of hiding the fatigue of human constructions. Discharging on the terrain is an inevitable faith of each construction, in a way this action can be seen as a continuous battlefield between structure and soil or some kind of compromise between architecture and science, a conversation about gravity moving through centuries from Vitruvius to Galileo¹. The stratification of some cities could be understood as the history of gravity, materials, and their duration. No matter the typology of architecture, standing between the city and the human body, they all share an endless desire to avoid the inevitable end, to touch the ground again. Archeology is exactly the study of human failures in its most material aspects, the field of every lost battle against gravity, even if the cities represent a logical system of the resistance. The research reflects on how gravity, as an obvious scientific fundamental essence of architecture, is both the ambition to lightness and the pull to the ground. Conclusively, the dichotomy of unavoidable necessity and freedom, durability and caducity, material consistency, and abstraction of physical forces, is an attempt to explore parallel concepts of the city through scientific research on gravity

keywords Gravity, architecture, cities, ground, science

1. Introduction

Science usually refers to Architecture and the City through technology, which, in a large sense, could be understood as the technics applied to production. The experiments of new sophisticated materials and the interconnected devices dominate the discourse on what should be the Metropolis of tomorrow and, if necessary, the Architecture of today. However, Science affected cities and Architecture long before the Digital Era, not just in the physical presence of the constructions, but also in the understanding of the city itself.

Nowadays, the relation between architecture and science is commonly understood as a developing method for technologies and mutation within construction. The urge towards future innovations neglects science in its theoretical and even philosophical interpretations, delineating margins of the alliance along with the mechanization². Against this scenario, the paper aims in the following pages to report the importance of science as a theoretical idea and its spectrum of consequences thought architectural narration. For this reason, in a character of inquiry was chosen the gravity or gravitational interaction, under the name of a concept with what man has been constantly facing by establishing a particular relationship based on theory and judgment. Through human civilization, starting from pre-Socratic philosophers, ideas of an acting force capable of formulating aggregates of elements, overcoming the scientific revolution of the 16th and 17th centuries with Newton and Galileo, and finally arriving at the theoretical and mathematical abstraction of Einstein's general relativity, the apprehension of gravity experienced various interpretations and different combinations describing its nature or characteristics. Moreover, the force of Gravity, by its nature, affects the experience of the environment on a daily base. In particular, one of the consequences of up-mentioned intersection is clearly identified in the continuous struggle against the weight and its manifestation. As a result, it is achieved consolidation of creative interpretation of the practical and constructive world, immersed in a field of forces that in a way dictates its main principles and rules. Against this scenario, physical concept and scientific formulations do not overlap in the same period, and often not even in the same discipline³. Gravity has been a fundamental concept, even before its scientific formulation and beyond its role in statics, because of its effects on the act of construction.

Many ancient monuments could be seen as rudimental representations of the weight, the Egyptian pyramids and the Roman aqueducts share this common nature despite the differences in the structural composition.

2. Method

Considering this impasse, no chronological order and disciplinary boundaries could be properly respected, if we want to recompose the spectrum of cultural attitudes that emerge from the act of inhabiting a place. The fragmentation of knowledge often impedes retracing connections between the history of ideas and the physical reality of the City. In particular, it is common to consider the so-called hard science as an autonomous and parallel field of interest. On the contrary, they define the époque and it would be difficult, for example, to imagine the current tendency to abstraction, especially in Contemporary Art, if we do not understand the progressive scientific interest for immateriality. In fact, derivation of artistic influence on the De Stijl⁴ movement and its manifesto written by Piet Mondrian and Theo Van Doesburg takes origin from the work of the English mathematician Oliver Byrne. One cannot help but notice the aesthetic appeal that Mondrian discovers in the publication of Euclid's "Elements"⁵, through a particularly lively graphic formalism of Euclidean geometry. By proposing a lucid theory, it is necessary to consider gravity both as a scientific object and an active force on physical reality, in particular on Architecture languages and the consistency of the city. In this regard, Gravity could not be considered only in terms of statics, but also as a scientific concept and as a constructive necessity. It would be possible to understand the relationship between gravity and the consistency of the city through the idea of time and duration. The language of architecture, in this case, will not be conceived as a result of external factors, nor even as an autonomous sphere, but as a relationship in which the role of time is central. The interactions in these fields are not visible, but they draw an intriguing pattern of transformation both of ideas and physical reality.

3. A Pattern of Interaction

The same idea of stratification, fundamental in the western discourse on the city, is rooted in the study of gravity. Of course, other forces are involved, as the winds, or human actions. However, gravity is the key agent in the process of Modern Archaeology. In his manual of archaeological excavation, Massimo Carandini explains the principles of the Stratigraphic Archaeology and how to discover the correct relations of the findings buried in the soil (Carandini, 2018:29). This process of excavation does not reveal a static process, on the contrary, it aims to recompose the topography of the site, the position of the objects and the temporal order of the events. This operation could be compared with the Galilean experiments in reverse. The experiment of the falling



bodies on the inclined plane resembles the process of reconstructing the scene of an excavation site, in this case, the original location is a consequence of the various sceneries in which the object can fall or slip. Galileo builds the incline planes to observe the position and the interval of time of a falling object, in the same thus opposite way the Archaeologist aims to reconfigure an original state, starting from the dynamics of the objects in time.

Nevertheless, the analogy between Archeological methods and experiments on gravity presents a significant difference: the events that generate to the archaeological site cannot be reproduced, whereas the experiment initial state must be recreated. It is possible to consider the archaeological investigation as a research of irreversible states, trying to reconstruct its historical, cultural and architectural path. The ambition to last requires not just durable materials, but also the morphology of the structure and solid relation with the ground. At the beginning of his book "A Scientific Autobiography" Aldo Rossi reports a story from the homonymous book of Max Planck "In this book, Planck returns to the discoveries of modern physics, recapturing the impression made on him by the enunciation of the principle of the conservation of energy; he always recalled this principle in connection with his

1. In *De Architectura* the roman Author and Architect, Vitruvius, states that gravity of an object did not depend on its weight rather than on its nature.

2. Mechanization intended through mono directional interest towards science. As a physical studies of technology often expressed in construction materials and innovation.

3. A remarkable example is the philosophic idea of Atom, invented by Democritus and Leucippus, in the 5th century BC, developed twenty-two centuries later by John Dalton in the modern atomic theory.

4. De Stijl, "The Style", also known as Neoplasticism, was a Dutch art movement founded in 1917 in Leiden.

5. "Elements" (Ancient Greek: *Στοιχεα Stoicheia*). A mathematical treatise consisting of 13 books attributed to the ancient Greek mathematician Euclid in Alexandria, Ptolemaic Egypt c. 300 BC. It is a collection of definitions, postulates, propositions (theorems and constructions), and mathematical proofs of the propositions.

schoolmaster Mueller's story about a mason who with great effort heaved a block of stone up on the roof of a house. The mason was struck by the fact that expended energy does not get lost; it remains stored for many years, never diminished, latent in the block of stone, until one day it happens that the block slides off the roof and falls on the head of a passerby, killing him. [...] Actually, the principle of the conservation of energy is mingled in every artist or technician with the search for happiness and death. In architecture this search is also undoubtedly bound up with the material and with energy; and if one fails to take note of this, it is not possible to comprehend any building, either from a technical point of view or from a compositional one. In the use of every material there must be an anticipation of the construction of a place and its transformation. The double meaning of the Italian word tempo, which signifies both atmosphere and chronology, is a principle that presides over every construction; this is the double meaning of energy that I now see clearly in architecture, as well as in other technics or arts." (Rossi, 1981:1).

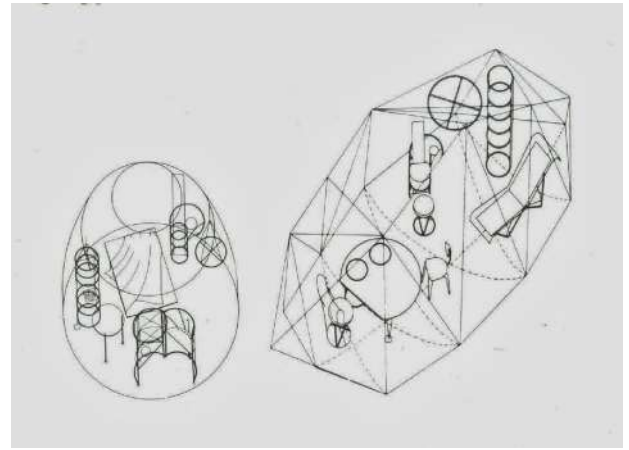


The autobiographical interweaving of the scientist and the architect is articulated on a fundamental theme: the states of the transformation of energy. The scientific study of a sequence of states, in terms of energy transformation, could also be applied to the urban processes. Each city or place has its own duration and its own state of equilibrium. Arrangement of the weight and masses determines the languages of Architecture in its elements, materials and joints, furthermore, it also defines the structure of the city. From this point of view, urban characteristics are often considered as mere responses to external factors. Despite the considerable influence these factors can have on the language of Architecture, the relationship between gravity, duration and construction is an essential component. An archaeological approach to the matter shows us an aspect often ignored or, on the contrary, taken for granted. The presence of testimonies that survive time is not only a method of knowledge of the past but also a sign of the attitude to last in time. The compresence of buildings from different ages refers to the possibility of lasting in time, of using the gravity force to achieve stability.

The discovery of a settlement buried in the soil shows the consequences of the culture of permanence. Unfortunately, the civilization of impermanence hardly leaves enough traces⁶. On the contrary, the massive masonry makes many historical cities an extremely peculiar artefact until nowadays. Palimpsests that record every constructive failure, show The autobiographical interweaving of the scientist and the architect is articulated on a fundamental theme: the states of the transformation of energy. The scientific study of a sequence of states, in terms of energy transformation, could also be applied to the urban processes. Each city or place has its own duration and its own state of equilibrium.

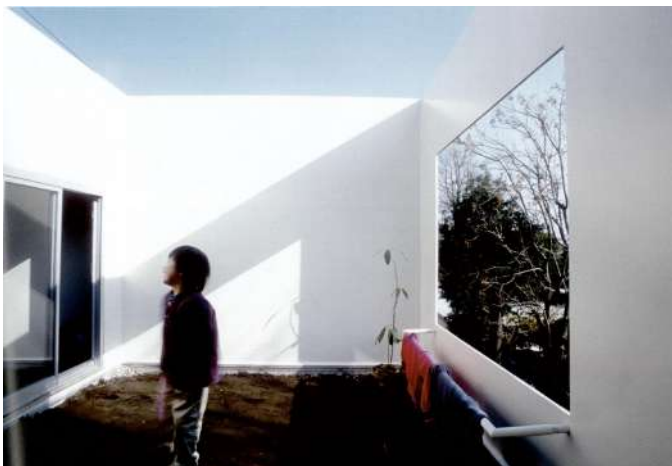
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4. Gravity and the City

Gravity could be scientifically described as a field of forces. In this sense, it pervades every aspect of our world, and consequently, involves a deformation in the interpretation of the phenomena of reality. This characteristic has always been shaping the human relationship with forms and their use; from the construction of Architecture to the urban tissue, it is possible to find traces of this continuous conflict with the weight and its consequences. In particular, gravity has a fundamental role in the structure of the city: on one hand, the use of masses to achieve stability, on the other hand, the process of weight reduction to zero. Also, the inhabitation of the city is conditioned by the understanding of the urban temporality. These two irreducible poles give shape to opposite attitudes from the materiality of the construction to the consistency of the City. In 1985, the idea of the Urban Nomads was presented by Toyo Ito in *Pao: Dwellings for the Tokyo Nomad Woman*⁸. It depicts, in extremely radical aesthetic, a very common condition for citizens of Metropolis, especially in the eighties in Japan as Brendon Nikolas Carlin says "The ephemeral nature, planeness-ness and lightness of the Pao project is an index of sorts to the early stages of a period when a rift begins to open between on the one hand: the contemporary subjectivity of the Japanese individual and on the other hand the earlier subjective modernist models of life and values still popularly and legally maintained as Japanese cultural tradition to this day." (Carlin, 2017:8) The friction between modern forms of living and Architecture of evanescence is the heart of experimentation that cancels the weight of the structure to regain a relationship with the world. The Architecture as a cloth for nomads blurs its boundaries, it denies the typical arrangements of rooms and reshapes the continuity between urban space and dwelling. In his radical vision, it preempts the Architecture of many Japanese houses, such as Plum grove by SANAA with its 16mm interior metal walls.



The tendency to think of the city as a flow of information is inevitably expressed in an idea of Architecture as zero gravity. In the Japanese case, the tendency to achieve an almost zero weight to overcome earthquake leads to the challenge of the conventional relationship between construction and gravity. The structure reflects the needs toward the constant movement of the inhabitants, at the same time, becoming a vehicle of information. The rapidity that characterizes this vision is a precise response to the theme of gravity, and therefore to that of zero gravity. Thin metal structures, semi-transparent skins, the denial of any connection with the ground, are essential elements of the alphabet of Ephemeral Architecture. The temporary nature of events illuminates the architecture of lightness. A sense of suspension constantly pervades this space and reflects more clearly the essence of our times. One could say that a large part of the operations on existing tissues follow this principle of mass reduction and ephemeral lightness.

The intervention of Anne Lacaton and Jean-Philippe Vassal at Tour Bois le Prêtre in Paris, which has now become a widespread method reference, is a condensate of rapidity and semi-transparency, in which the façade stands as a screen for the tenants' life becoming. This extra space has the merit of offering a filter situation with the new city for this type of multi-family buildings but has as an initial requirement not to modify the existing interiors. The project generates a vertical stratigraphy in which a gradual level of transparency and lightness is achieved from the inside. The seasonal use of these spaces

8. In 1989, the second part of the project is exhibited. Pao II consists of a suspended structure which consists of a suspended structure that encloses an intimate living room

represents a reminder of the cyclicity of ephemeral structures. Beyond the languages of Architecture, this attitude toward gravity and lightness shows a peculiar understanding of the time of the city. The lightness of the elements and their precariousness is not only a material reduction but turns the city's time into a short, cyclical interval. The effectiveness of reversible constructions implies the possibility of continuous human intervention, both in terms of transformation and maintenance. On the other hand, it is not negligible that there still exists, even though it is increasingly marginal, an idea of the city as a continuum, both temporal and physical. In the city as a continuous process alongside timeline, affected punctually by cataclysms or natural disasters, Gravity stands for a symbol of endurance.

In "The Architecture of the City" Aldo Rossi affirms this feature of Architecture "In an urban artifact, certain original values and functions remain, others are totally altered; about some stylistic aspects of the form we are certain, others are less obvious. We contemplate the values that remain, I am also referring to spiritual values, and try to ascertain whether they have some connection with the building's materiality, and whether they constitute the only empirical facts that pertain to the problem. At this point, we might discuss what our idea of the building is, our most general memory of it as a product of the collective, and what relationship it affords us with this collective." (Rossi, 1982:29). Without the idea of permanence, there would be no sense in the necessity of any monument, central not only in Rossi's vision but also in the general understanding of Western public space. To whom could memory be transmitted without the materiality of the monument? In cultures of impermanence, the monument expresses nothing through itself, but it is the cyclicity of its construction, or even only its maintenance, that determines a memory, a testimony in time through its careful repetition. The need to transmit the meaning of construction over time requires a codification that goes beyond purely linguistic limits. The idea of novelty is incompatible with the permanence of the construction, while the idea of reinvention, of rewriting, is innate with the idea of continuity. A criticality elegantly expressed by Adam Caruso: "Claims for completely new forms are tautological. Not only is it doubtful whether completely new forms can exist, but the imperative to make forms that have no connection to the past and are the harbinger of an enhanced future is anti-critical and conservative. The condition of perpetual novelty within a void-like tabula rasa, like an empty screen with the promise of networks of simultaneous virtual realities, undermines cultural continuity and denies the location of collective action. A more radical formal strategy is one that considers and represents the existing and the known. In this way, artistic production can critically engage with an existing situation and contribute to an ongoing and progressive cultural discourse." (Caruso, 1998:24) The possibility of defining Architecture within an existing situation requires a physical delimitation of the city's space. The tabula rasa is not so much empty space, but a surface that resists being delimited. Therefore, the notion of locus is essential to explain the western historical city in specific terms, beyond the individual elements that make it up. It is not possible to refer to its validity without a specific relationship between the parties.

5. Conclusions

The language of architecture and the space of the city is inevitably dependent on the relationship that the construction develops with gravity. External factors, often overestimated, such as climatic elements or the availability of materials, are insufficient to determine the essence of the city, but they contribute to determine an attitude to gravity that defines its rhythms and how it lasts in time. The possibility of living in the same circumstances with structures and spaces of opposite nature denotes specific cultural attitudes for the time of the cities and their duration.

In fact, while studying an urban tissue, it is fundamental to understand which core reasons are effecting the formulation of a city structure. Mainly most of them are strictly connected to geography, morphology, landscape, or culture, while behind all these factors history of science remains underestimated. Gravity becomes a decisive element in the definition of ways of living space, in the possibility of the structure to be just a background of the flow of life or an extension of the inhabitants themselves. In conclusion, the seemingly dichotomous approach serves to highlight a range of possibilities rich in nuance

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Towards a More-than-digital architecture

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The transition from the Age of Information to the Digital Era has been a shifting paradigm from the anonymous mass consumption to the individual customization, that has today become the most common model in the society (Negroponte, 1995). Because of its attitude of translating the values that each society exploits with a time-and-space specific point of view, architecture has incorporated the digital transition, or the so-called Second Digital turn, trying to adapt its methodology to an exclusively-technologically-driven approach. The old dichotomies 'architecture-science' and 'man-machine' have become in the last decades more profound, especially with the introduction of AI and Generative Adversarial Network processes. The use of Big Data, together with these two semi-automatic approaches, has stressed the point of the influence of form-finding process -instead of the 'problem-understanding' and 'question-asking'- in the composition of the architectural design. The evolution of digital technologies seems to be going faster every day, whilst architecture has often passively absorbed the results carried out by the digital world (Carpo, 2017). Our homes are becoming so increasingly embedded and filled with lot devices and elements that, architectural design may incorporate not just the technologies brought up by these devices, but the broader sense of a digital diffuse networks that allows defining a relationship with them (Ratti, 2016). From the micro-scale of the technological components to the macro-level of the city (or the infrastructure), passing by the scale of the building, a project that is able to adapt to the needs of its users and that can collaborate with them, will explore the potentiality of a newer way to conceive the mingling of architecture and techno-science in the whole design composition process.

keywords digital composition, adaptive architecture, interactive architecture, Kas Oosterhuis, Theodore Spyropoulos

1. Introduction

In the contemporary age, where the digital element has influenced many aspects of our common lives and professions and quickly grows empowering its features and devices, it is necessary to understand not just the technicality of this process, but its proper aim. Considering architecture as a broad domain that involves several aspects of the society in which it's produced and designed, The question is not whether this digital influence is beneficial or not, but which direction it is currently hearing and how can it benefit the world of tomorrow. Starting with the importance given to the individual, since the introduction of the so-called Digital Era at the end of the XX century, architecture has followed many different paths, absorbing different aspects of the powerful digital revolution and incorporating them in different ways. Although lots of new technologies allow exploring new fields of form-finding and uncommon geometries, it is important to put this technological empowering in strict relation with the environment we live in, in order to guarantee the social and cultural attitude of architecture. In order to achieve this goal, architecture should refer to a Techno-science field with a More-than-digital approach, able to link the outside and the inside into a more efficient way. This approach will be better expressed through the works Kas Oosterhuis and Theodore Spyropoulos, that show with a different approach this desire to link man, architecture, and the environment throughout technology.

2. The Age of Digital

The profound change brought by the introduction of digital approaches in the definition of design processes roots in the concept of the Society of Information, between the Nineteenth and Twentieth centuries, usually referred to as the Second Industrial Revolution. In fact, all the technological solutions, elaborated in this period to empower the efficiency of the industries, were mainly tested in an attempt to resolve what J. Beniger has defined the "crisis of control" (Beniger, 2009) or the need to manage an exponentially large and complex amount of data. But as A. Picon stated in his Digital Culture in Architecture, «information has no social relevance unless circulated and shared» (Picon, 2010, 19): the real shift in architectural paradigm was

on the following turn of the century, when new tools and new approaches were developed and spread. The initial effort to pass from an encoded kind of information to a direct vision led firstly on the necessity to manage a large amount of military data, whilst researches on the field of cybernetic encouraged new introduction in architecture. The introduction of the Digital Era brought with it also a new idea of the human, previously considered just an anonymous element in the mass and later as an individual entity (Negroponte, 1995). This tendency, aiming to a customization process, has defined a new condition not just in the human subject, but in all the fields that interfered with him, including architecture, thought-out the management of information.

The development of digital culture, therefore, understood not only as a capillary diffusion of computerization but also as a transposition of computational processes in different fields, is nowadays a remarkable moment in the development of technologies due to the introduction, on a hand, of new tools (hardware and software, as well as devices) and on the other of a new approach. Whereas the first Personal Computers were quickly developed, in the Eighties a new strand of thought was being elaborated between the USA and the UK. From the researches of Wiener on cybernetics as a new science between mathematics and computer science, the figures of G.Pask, C.Price, and J.Frazer worked together on the definition of the architectural cybernetic approach. In this way, they re-shaped some human faculties in order to re-propose them in the architectural field: language, command, control, and, above all, the -active and passive- capacity of learning. Such a visionary approach, close to the contemporary Avant-garde group of Archigram¹, allowed to define an element nowadays fundamental in the understanding of contemporary digital architecture: the bi-lateral communication (the interaction) between man and machine, where the machine could be a computer as well as a simple device able to respond to programmed parameters. Already in 1976, the idea of a broad collection of data available for a single machine that can communicate with human was set in place through the Generator Project or the so-called *First Intelligent building*, (elaborated in 1976-1980) by C.Price, J., and J.Frazer. What was physically (or, better, virtually) missing was the capacity of sharing information through a network accessible at the same time by different devices sharing (Figure 1). The Frazer mechanism worked for the complex project of the Generator, but they should have waited some decades more to see how powerful the idea of form-definition through interaction would have been. The mathematical root of cybernetics, in fact, implied the possibility to establish a correspondence between neuroscience and computer science, between the brain and the computer and therefore between neurons and bits of information.

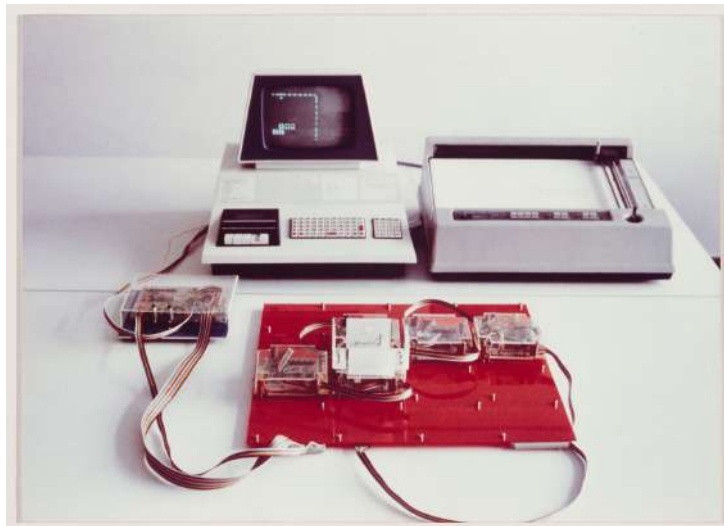


Fig. 1 View of working electronic model of the Generator project_Image source: CCA Canadian Centre for Architecture, Montreal, 'Cedric Price fonds – 1903:2006, predominant 1953:2000', DR1995: 0280: 108

3. Toward New Horizons

As architecture has incorporated the digital transition, or the so-called Second Digital turn, trying to adapt its methodology to an exclusively-technologically-driven approach, it has shown its attitude of reflecting the cultural values of its time, space, and society. What, however, can be noticed is that the new tools that have been introduced to facilitate and empower architecture, have replaced not just the making-process but also the thinking-process, so that it may seem that architecture has passively absorbed the outcomes of the digital revolution (Carpo, 2017). Along with this idea, the increasing use of computational software, based on an algorithmic process of data elaboration, may have given more relief to the actions of computation and visualization, rather than computation and realization (M. Burry in Spyropoulos, 2013), resulting in a less validity of the architectural profile. What needs to be noticed, however, is the fact that, despite an initial enthusiastic moment in which the form-finding process was the unique beneficiary of this technological innovation, nowadays, the empowering of a diffuse network of information, is creating a tangible digital infrastructure able to spread also into the architecture field. The idea of the society of bits, that refers to a society in which the immaterial good prevails on the industry², is now introducing the virtual element of data as a real design matter. It is therefore possible to indicate as architectural matters a triad usually referred to Media Architecture composed by 'physical, experiential and communicative dimension'. The experiential dimension can be easily associated with the process of data transmission, especially if it concerns the environment that hosts the built element or also the human emotions; furthermore, the communicative dimension refers to the approach

1. C. Price and the Archigram group were close friends, as much that Price was called a 'fellow traveler of Archigram') and they both took part in a very fertile moment of the design production at the AA school where they studied and Price later taught.

2. The pillars of the Information society are information technology and telematics networks, elements at the basis of the transition from mechanical and analog to the digital technology of the digital revolutions that have affected our society since the 1950s.

shown before about the interaction needed between the man and the machine. In order to system these three elements with the built environment, it is necessary to configure a broad digital infrastructure, a vehicle that allows us to share information in space and time. What the digital technology has brought also into architecture, in fact, is a changing in the idea of space and time, that can be widely separated or easily unified thanks to the ease of use of new technologies and in the data managing process. These elements also constitute the paradigm of what was initially called the Smart city and now is turning into a more sensitive approach: it is the case of the Intelligent or Sensing or Senseable cities³. These different paradigms show an interest in equipping the city with devices and software: an input device to sense the environmental changings (both physics or human), a software to understand the data and program an answer, and an output device to actuate the answer elaborated. This scheme is proper of every changing architecture, both responsive, or cybernetic (and kinetic) or adaptive and encloses the elements of control, language and learning.

4. The Research

The work presented is part of initial doctoral research at the Università degli Studi di Palermo (Italy) at the Department of Progettazione Architettonica, Teoria e Tecnologia, about the way resilient architecture can receive benefits from the paradigm of adaptive and digital architecture. With this scope, it is important to underline and identify which characters this type of architecture, that is not just adapting but primarily evolving, should introduce and adopt. The strict relation between architecture and the digital world has produced in the years several works entirely based on the potentiality of the digital machines as a powerful tool at the service of a new human-centered design⁴, where, indeed, the presence of man has always been put at the center of the design process. What M.Fox and G.A.Caldwell have pointed out is that, in such a global condition characterized by pollution, climate-changing and consequent loss of biodiversity, it is necessary to reverse the « human exceptionalism and anthropocentrism» (Foth, M., Caldwell, G. A., 2018) in order to conceive a kind of architecture that could give a practical answer to the environmental issue, collaborating with the digital tools. For this reason, it is a belief that an adaptive approach, that implies a different kind of architecture, from the responsive to the adaptive to the cybernetic, can define a new resilient approach. The title given to this paper, Towards a More-than-digital architecture, makes reference to a methodology brought up especially in media architecture, i.e. the More-than-human approach, in which the design process is based on the aim of going beyond the needs of human by casting in the project itself elements from the natural environment, such as plants or animals. What a More-than-digital approach would introduce, instead, is the intention of considering the technological innovation of the digital devices, and especially the information infrastructure of big data, as an equal part of the design process, in order to establish a mutual relationship and an interaction between the immaterial elements, the physical world and the human being that live in it.

5. E-motive and Behavioural

The elements that constitute the dichotomies 'architecture-science' and 'man-machine' that have crossed the history of architecture, can nowadays merge thanks to the introduction of digital technologies. The broad use of data has allowed the development of systems as Artificial Intelligence or even the Generative Adversarial Network, that are able to link the physic reality to the virtual world. However, in order not to over-empowering the technological aspect of the design conception, but still to assure architecture its cultural role, designers have stressed the point on the interactive feature. This allows a project to be a linking element between, for example, humans and nature, still remaining the central focus of the adaptiveness itself.

The methodology presented here is based on the comparison of two different approaches brought up by K. Oosterhuis at the T/u in Delft and T. Spyropoulos at AA School in London. They both believe in the necessity of the introduction of what we can call a More-than-digital element in the process of conceiving architecture with adaptive elements. The first case is related to human emotions, that can be traced by and expressed within the architecture itself, whilst the latter focuses on the adaptivity as a systemic form of interaction that engages behavioral (human or natural) features.

The theory brought by both these architects implies the necessity of the conceived architecture to adapt itself: in this way, the informational background, that drives both these approaches, is not entirely aimed towards the form-finding process. Instead, it is focused on the 'problem-understanding' and 'question-asking' method, which allows a project to understand the reality that surrounds it and to elaborate the adequate response. Again, the themes of control and learning (passive in the sense of understanding and active in the sense of computing) are a main feature of adaptive architecture.

6. E-motive Interaction

Head of the Hyperbody center and the Protospace laboratory at the Faculty of Architecture of Delft, the Dutch architect Kas Oosterhuis has dedicated his academic and professional career to the development of non-standard architecture (NSA) and Interactive architecture (iA). He refers to his work as "e-motive", meaning an architecture that feeds on information, processes information, and transmits information in different forms (Oosterhuis, 2003). In this idea, all the components of these continuous processing buildings behave like birds in a swarm, transposing in the design process a natural behavior that allows adaptivity to be real. Therefore, the building itself is a sensor-adaptor system as it is conceived as a living body, capable of changing form and content in real-time and at the same time it is itself part of a network where information (data) is continuously shared. This feature defines the building as

3. The smart city paradigm, an innovation of the XXI century, brought with it the idea of a city as a computer, capable of interactions, connection and communication in real-time. The introduction of external devices in the real-life (such as smartphones, tablet, ...) has empowered the idea of a city that can sense its inhabitants and their needs, as well as its infrastructures and building. For this reason we refer to the idea of Intelligent cities (Gausa, 2017) with digital communication networks, the ability to process data and the presence of sensors and design application software; as well, also the sensing cities or the so-called Senseable city, a city able to sense, sensitive and sensible (Ratti, 2017).

4. The interaction that the digital technologies have brought into architecture has covered in the years many fields of research and has produced several different branches, named in different ways, depending on the single and particular point of view of its designers. For example, we can refer to HCI, Human-Computer Interaction, which deals with interactions between humans and machines, HBI, Human-Building Interaction, that transposes the previous approach to the relations between humans and the built environment. Finally, the More-than-human approach is recently emerging in the Interaction design field as a post-anthropocentric way to conceive the city. (Foth, M., Caldwell, G. A., 2018)

a flexible networked information processor in a continuous process of a self-learning. Furthermore, the capacity of self-learning and, at the same time, the ability to be adjustable in changing, defines the distinction between reactive and interactive, meaning for the latter a circular system of answer-response-answer that can be articulated in direct manipulation (deliberate control), automation (reflexive control) and hybridized model between the user and the technologies (Sterk, 2006; Kolarevic, 2009). The idea of a circular system, therefore, is easily connected with the possibility to have a built structure in a continuous state of calculation, adapting its structure and envelopes, its colors and patterns: an Hyperbody that changes in real-time. The first speculation of his «concrete science fiction» (Oosterhuis, 2002, 17) is the Saltwater Pavillion, designed and built in 1997 in Neeltje Jans, five years before the Blur Building by Diller & Scofidio + Renfro. This parallel with the Swiss pavilion is interesting because it shows a common interest of the time in building with the environment, aiming at a strict interaction between the building, the environment, and the users. The Dutch pavilion, conceived as a Hydra following the visitor in the form of a structural element or as an interface, is directly connected to a weather station positioned on a buoy in the North Sea (Fig. 2). The information captured in the natural outside environment were sent to a computer that elaborated this data to produce real-time effects trough fiberoptic lights and sounds effect inside the building. At the same time, with a sensor board, the users of the pavilion could interact with space itself by acting on some lights and sound (Oosterhuis, K., & Biloria, N. M., 2008) (Figg. 3-4).

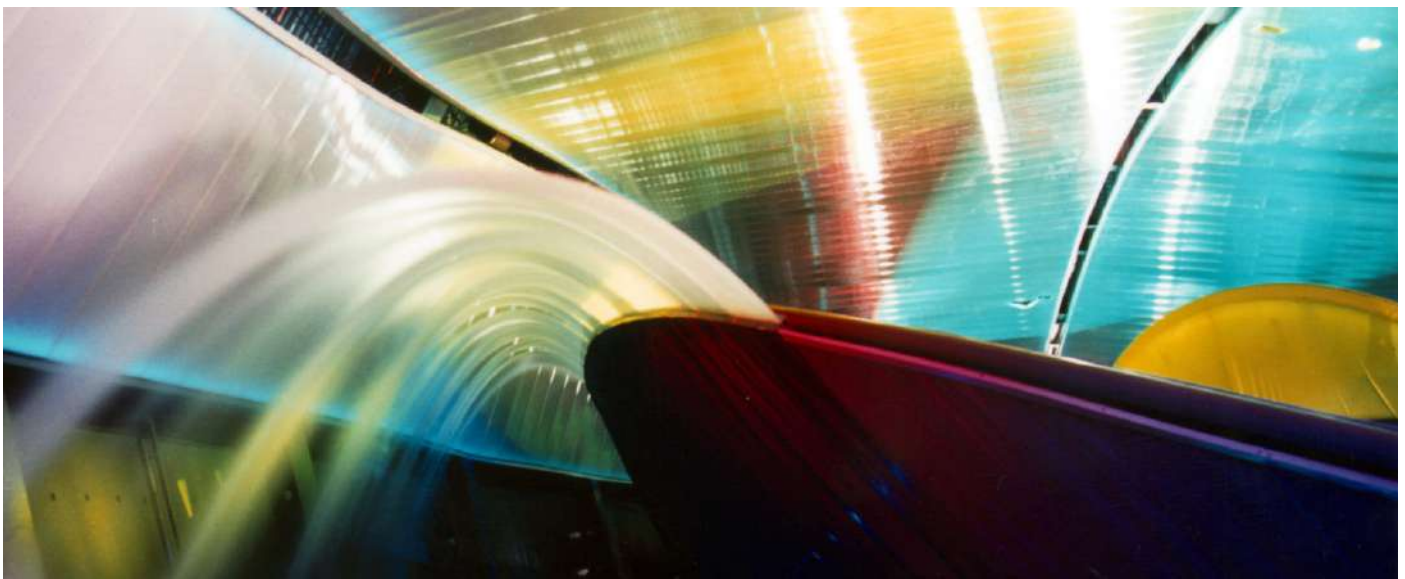


Fig. 2: The Saltwater Pavillion, K. Oosterhuis, Neeltje Jans, 1997; Image source: http://www.oosterhuis.nl/?page_id=412

Fig. 3: The Saltwater Pavillion, K. Oosterhuis, Neeltje Jans, 1997; Image source: Oosterhuis, K., & Biloria, N. M. (2008). *Interactions with Proactive Architectural Spaces: The Muscle Projects*

Fig. 4: The Saltwater Pavillion, K. Oosterhuis, Neeltje Jans, 1997; Image source: http://www.oosterhuis.nl/?page_id=412

The result is a place shown always in different ways, depending on the visitor behavior but especially on the external condition. This attempt of creating a real interactive building works in pairs with the application of the swarm paradigm, here applied for the first time by the ONL studio. As seen before, the swarm paradigm refers to the building as an ensemble of several different elements, all different, that work autonomously (each one of them has its own shape, position, color and code) but that are strictly connected in order to work simultaneously. Like a bird in a swarm, they adapt their characteristic once that one has changes its own. Therefore, the swarm architecture is visible not just in the initial moment of project conception (when, thus, the building is com-posed or synthesized by parametric software) but also in the realization that allows a system to continuously evolve. «The essence is in the genetic code. The genetic code of a building body is a set of rules and algorithms, animated by the circumstantial parametric values placed into the formula's making up the genetic code. The visual appearance is the outcome of the process running the genetic script in a site-specific and time-specific environment.» (Oosterhuis, 2003, 38-39) Space and time have become effective architectural matters, they contribute to the definition of the building due to their continuous evolving feature, in a dynamic conception of architecture that considers the user as central in the understanding of itself and at the same time, as an entity to feed with information. Finally, the conception of the building itself deals with, on a side, an only 3D modeled project, designed through the relation between points on a control curve and the production machine (Figg. 5-6); on the other, it required (like all the cybernetic projects have shown before) a flowchart to program the behavioral system to control the intriguing relations between input sensors or devices, interfaces, receivers and outputs (Oosterhuis, 2002).

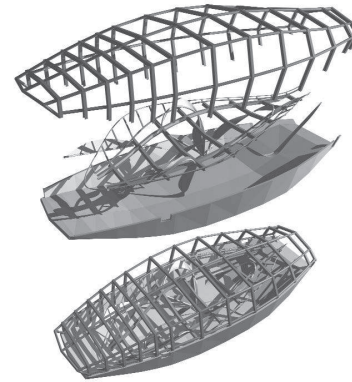
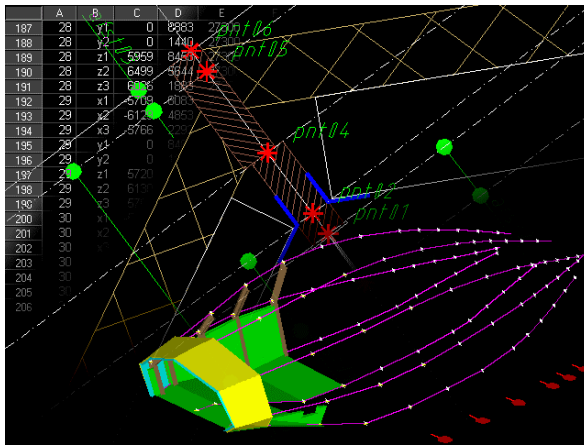


Fig. 5: The Saltwater Pavillion, K. Oosterhuis, Neeltje Jans, 1997; Image source: <http://www.oosterhuis.nl/?p=184>

Fig. 6: The Saltwater Pavillion, K. Oosterhuis, Neeltje Jans, 1997; Image source: Oosterhuis, K., & Engeli, M. (2002). *Architecture Goes Wild*: 010 Publishers.

7. Behavioural Ecologies

Director of the AA's Design Research Lab (AADRL) in London and co-founder with his brother Stephen of the architecture studio Minimaforms, Theodore Spyropoulos works on the attitude of architecture to produce a new form of communication through a generative and behavioral approach. In 2013 he published a book that collects years of research at the AADRL on the theme of Adaptive Ecologies, remarking an idea of architecture in continuous evolution with a constantly adapting behavior. His experience at the AA in London is undoubtedly linked to the long traditions of architects that have studied and taught there since the Seventies and that composed that ambient in which digital technologies begun to develop and merge into architecture. For this reason, in the book, a chapter is dedicated to the direct experience of John Frazer at the AA starting from the Seventies, showing his first attempts to develop a self-organizing architecture, during his thesis (Fig 7).

The approach developed by Spyropoulos is, however, emphasizes the primacy of time over space in the design process, as it is the main feature that defines

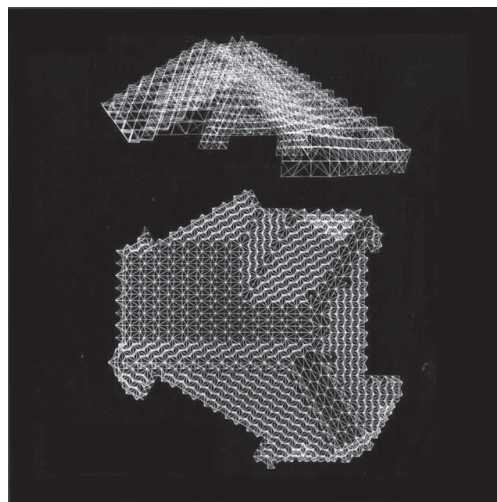


Fig. 7: Reptile, J. Frazer, Thesis Project, 1970; Image source: Spyropoulos, T., & Schumacher, P. (2013). *Adaptive Ecologies: Correlated Systems of Living*. Architectural Association.

the adaptation and, therefore, the change. The concept of changing, indeed, implies a continuous ability to trans-form, producing a time-based architecture that shows a complex revolution in form, meaning by it, the design process played out in time over the life of a project and not its external appearance (Steele in Spyropoulos, 2013). "Living systems are units of interaction: they exist in ambience", quotes Spyropoulos in his volume (Spyropoulos, 2013, 10), so the architecture has to be considered with a living environment that changes over time. Due to this inevitable condition, architecture should be part of this system by using similar behavioral approaches in order to allow a biodiverse network to deal with urban contexts, buildings and materials. He recognize to the adaptivity he claims the character of multi-scalarity (or polyscalarity as he says) defined by the capacity of interaction. From the definition of these systems, it follows the triad of information, life and matter, from the interaction of which it is possible to define that complex reality where is possible to make a new synthesis. The term synthesis, as Schumacher points out in his essay, replaces the idea of architectural com-position, from a parametrical point of view, transmuting this action in three types of correlations: functional, formal-spatial and for-function. Here he shows as not only the time is a parametric value in conceiving adaptive architecture: also the concept of space can be considered parametrically variable, determining dynamic event scenarios. With this idea in mind of designing adaptivity seeking the best behavioral parameter for the ecologies involved, Spyropoulos presents a methodology based on three different scales and three different behavior. To the categories of unit (house), cluster (building) and collective (territory), he associates three frameworks referring to behavioral, self-organizational and morphogenetic approaches. Furthermore, the research shows an attempt to address the complexity of the multi-scalarity the diversity of these behavioral approaches, defining thirteen types of systemic forms of interaction. The

thirteen patterns reveal the basis of the research due to their direct relation to the animal and natural environment and, through academic projects, they show the theorized behavior-based model of living (Fig. 8, 9). In the morphogenetic category, four patterns are showing a method for creating forms and adapting to the external environment without an explicit definition: Mangrove, Polyp Growth, Phyllotaxis and Seeding. In the self-organizational category, four patterns are showing a chain of elements communicating to better define how to adapt: Stigmergy, Hair, Cellular Automata and Swarm. Finally, in the behavioral category, four patterns are showing a complex system that allows adaptation: Surface tension, Siphonophora, Cymatics, Soft-Cast.

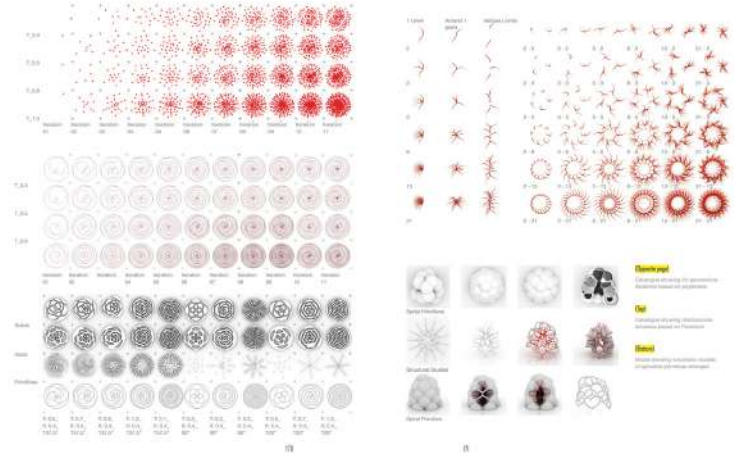
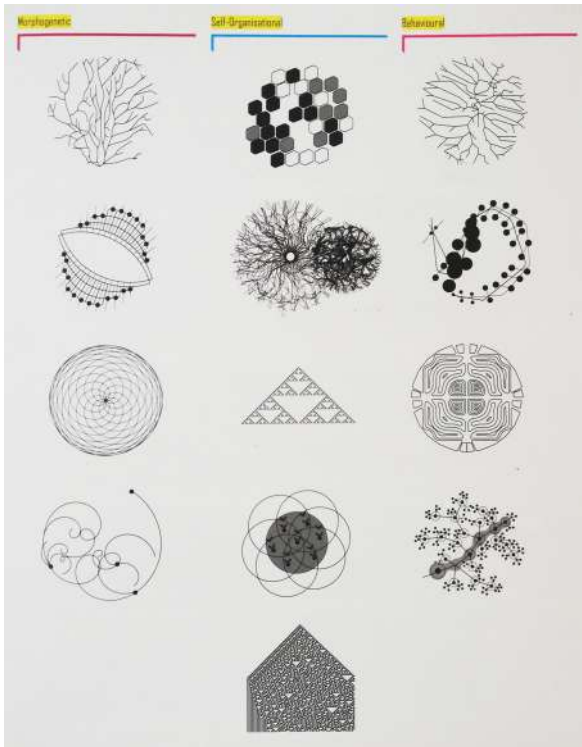


Fig. 8: Morphogenetic, Self-organizational and Behavioral; Image source: Spyropoulos, T., & Schumacher, P. (2013). *Adaptive Ecologies: Correlated Systems of Living*. Architectural Association.
 Fig. 9: Mangrove:Mangal – AADRL 2007-2008/ Chimera; Image source: Spyropoulos, T., & Schumacher, P. (2013). *Adaptive Ecologies: Correlated Systems of Living*. Architectural Association.

8. Conclusions

The two approaches shown, different in the process but close in the aim they propose, reveal a contemporary interest in the definition of an architecture that collaborates with and within the space it's built in. The experiences of data-driven technology in the form-finding process have given way to a more engaged and conscious approach aimed at the environment and human well-being. Conceiving architecture as a living body or as a living ecology allows designers to take into consideration a lot of features proper of different fields, like science or biology, that can improve its matters. Furthermore, including the digital elements not just as an external device, but as a matter that implies new features, shows how it is possible to design projects every day multi-scalar and multi-temporal. Time and space themselves, that in the past have been just constraints of the static design process, can constitute an active part of the process as parameters in continuous change. An architecture that is at the same time digital and human, in the sense that includes digital process with a human (or natural) behavior is not anymore impossible or far from reality. On the contrary, it can be part of a resilient approach that is now what our environment requires. Due to the recent natural catastrophes, architects must implement and empower their way to conceive architecture, with a digital and together adaptive approach that makes possible a newer way to conceive the mingling of architecture and techno-science in the whole design composition process.

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Lost values of the National Theater after the demolition, technical and structural analysis

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This study will focus on the context of Tirana's historic buildings, designed during the 1938-1939s. Tirana represents a very special occasion, unique in terms of intertwining Italian architectural design with Albanian motives. This feature has resulted from many political, economic and social factors of the time that fundamentally changed the way of vision and architectural conception in our capital. Every cultural heritage is inseparable from history as a witness of which it is, as well as from the place where it is located. Consequently, complete or partial interventions in a cultural heritage may not be permitted, except cases when the preservation of the heritage requires, or when this is justified by reasons of great national or international interest. This study aims to analyze the restoration of these buildings, by means of seismic retrofit ways, preserving aesthetic and historical values. The main goal is to turn these buildings into full use of their previous function, increase their lifespan or value identification in our case. The focus of this study is the identification of structural problems in these buildings, secondly 3d modeling, simulations, scenario-investigation and in-depth structural analysis. In this work the peculiarities of the global response of old building are shown with the aid of a simplified physical 3d model, realized with SAP2000 software, able to reproduce earthquake damage to composite-masonry buildings and failure modes observed in experimental tests. The application of this methodology to Albanian composite-masonry typologies points out the difficulties related to existing buildings

keywords cultural heritage, restoration, seismic retrofit, aesthetic and historical values, composite-masonry buildings

1. Introduction

The historical and architectural heritage of Tirana is located along the main axis and the main boulevard of the city. A valuable part of this heritage over time is losing the attention of citizens and the government, demolishing to build high towers. One of these heritage objects of Tirana is complex of the National theater buildings, which was just demolished by the government this June. The national theatre represents features of Italian architecture integrated with Albanian motives during the years. Italian architecture changed the image and history of Tirana, giving it a modern-style referring to the time was a building full of elegance and architectural harmony. Over the years this building changed its function several times. Also, small non-structural interventions have been made several times. (Menghini, et al., 2012) The relationship that the Italian architect built from time to time with the new geographic and cultural context was certainly a guide to his preparation and sensitivity. (Prifti, 2017)

The typology of the building of F. Di Fausto, A. Brasini and G. Bosio consists of building types with retaining walls, the thickness of the walls varies and is reduced by the height of the building, the foundations are of stone and can be considered continuous beams, between the floors there are thin concrete beams and the slabs types works as shells¹. The facades of these buildings are carefully crafted with decorative details of traditional Albanian motives, accompanied by the charm of the Italian architecture. The preservation of historical buildings from damage due to earthquakes, also the need to make their structures stable and safe, especially for their historical value, became essential, also to restore forgiveness and attention to them.

Due to reasons such as age of building, interventions made by people, interventions by modifying the interior facilities of the buildings, or adding new parts, the old codes design methodology² of the time, these types of buildings are vulnerable to earthquakes (Mitrojorgji, 2015). It is therefore important to evaluate the seismic performance and the life of these buildings. So, based on this assessment, techniques must be developed to strengthen these buildings in order for them to resist potential earthquake damages and other challenges in the future. The buildings that will be part of this study doesn't have RC-columns and beams. Their main structure is based on the brick masonry URM typology. Therefore, they are more vulnerable to seismic action³As

a traditional building, this typology can be found almost in all the central part of Tirana. Consequently, it may be subjected to different climatic conditions and may have suffered various degradations. A common approach is to consider all cultural heritage assets as equally important, and the consequence of this is a missing list of priorities of the contrary, it should be considered that the seismic risk could be different from one to another building or heritage asset.... The common belief that risk is low is often induced by misleading observations: If a monument was constructed several hundred years ago, and it did not experience significant damage in the recent past, this does not imply that the risk is low. There is evidence of a large number of very old monuments having collapsed during the recent quakes. This entirely acceptable sentence clearly states the importance of a proper design and continuous maintenance. Testing from past earthquakes is clearly known, but structural safety can be achieved only when proper design, continuous maintenance, and testing are guaranteed. Finally, degradation of construction materials and damage induced by past earthquakes is an issue, especially when this was not properly repaired or not repaired at all. These factors may cause significant reductions to the building's seismic capacity. Damage accumulation should always be considered. The principle of old construction = good construction is again challenged by the inevitable march of time. With our case study shown below we estimate and evaluate the selected building to the action of seismic elastic spectrum⁴ according the Euro code 8. According the methodology, it is used the static linear analysis⁵ and the masonry of the building is modeled with nonlinear behavior⁶.

2. Methodology

The seismic risk class depends on one parameter: which takes into account the damage and refers to the cost of reconstruction of the building; taking into account the achievement of the limit state for safeguarding life (life safety level)⁷.

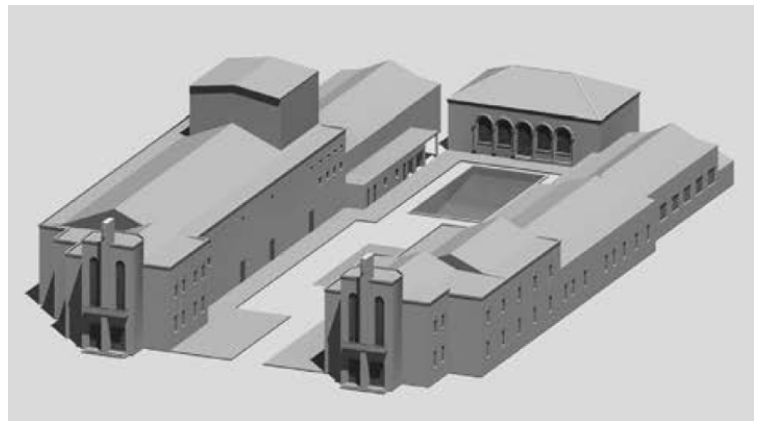
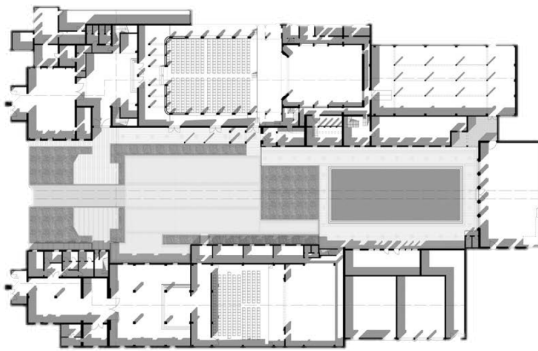


Fig. 1: Theatre of Tirana, the ground floor plan (Menghini, et al., 2012)

Fig. 2: The National Theater 3d view (Menghini, et al., 2012)

Use of FEM⁸ interpretation of the crack Pattern and their distribution

The assessment of seismic performance of URM buildings⁹ requires the identification of the collapse mechanisms and masonry local damages step by step activated by the synthetic earthquake (elastic demand spectrum)¹⁰. Referring the current practice in our region has been taken into account only three first modes of failure, by studying the capacity curves of certain structural typologies, to get the right strategy for strengthening and updating the structure.

The modelling of the structure behaviour and its safety assessment by mesh process (finite-elements) can highly benefit of the ETABS, which enables us to create layered walls, considering the non-linearity of each layer that represent materials data. (Vesho, et al., 2019)

The most important step is transformation and conversion of panels in piers and spandrels labeling []. The vertical panels working in compression are converted in the Piers (frame elements that work in compression), while the horizontal panels under the openings below are converted to the spandrels (beams in bending) (Pitilakis, et al., 2014). The methodology for the analytical part was performed on modal analysis (CEN Eurocode 8, 2003).

Investigation procedures: In general the necessity of monitoring and investigating the building integrity or the load carrying capacity of a unreinforced

1. Shell-type behavior: both in-plane membrane stiffness and out-of-plane plate bending stiffness are provided for the section. The Shell type will combine the rigidities from both Membrane and Plate.

2. Albanian technical code and Italian design code (1920-1940)

3. Shaking and seismic frequency activity.

4. Elastic spectrum represents a series of synthetic equivalent earthquakes summarized in one.

5. A linear static analysis is an analysis where a linear relation holds between applied forces and displacements. In practice, this is applicable to structural problems where stresses remain in the linear elastic range of the used material.

6. Methodology for modelling the unreinforced masonry with nonlinearity characteristics for each layer of the wall on ETABS, a possibility to create the wall as close as possible to reality.

7. Second level mostly used for designing civil structures based on seismic performance levels [Eurocode 8]

8. The finite element method (FEM), is a numerical method for solving problems of engineering and mathematical physics

9. Unreinforced masonry building typology, without reinforced concrete frames.

10. Merging a number of strong short-period ground motions and long-period ground motions. From the merging of these accelerograms, an elastic specter is deduced.

masonry building arises for several reasons including: assessment of the safety and stability of the structure before or after a seismic event, extension of the building and also the change of use, assessment of the effectiveness of repair innovative techniques applied to structures or different materials, and long-term monitoring of material parameters and structural performance. (Binda, et al., June 2000).

3. Case study “Structural evaluation and seismic performance of the National Theater, Tirana”

Below is presented the object to be analyzed, the National Theater building after interventions. The constructive project and technical specifications for this building are taken from the technical archives of Tirana. The typology of the existing building is a composite-masonry structure which consist of a mixture between wood and concrete with 2 different masonry thicknesses, 23cm at basement level and 20cm. The last thickness is mainly used as a separating wall between rooms and on the upper levels. (Menghini, et al., 2012).

This kind of masonry structures have low masses and they respond well to seismic waves, but due to the interventions that have been occurred the masses have changed.

The building has been modeled in SAP2000 v22 and due to the lack of the program for masonry type of buildings the masonry has been modeled as a reinforced concrete wall with a decreased capacity.

Mechanical properties of masonry:

Material property data	Masonry
Directional symmetry type:	Isotropic
Weight per unit volume:	8 KN/m ³
Mass per unit volume:	256 kg/ m ³

Material mechanical property data:

Modulus of elasticity:	E=18608 MPa
Shear Modulus:	G=7753 MPa
Poisson’s ratio:	U=0.2
Coefficient of thermal expansion:	A=10-5 1/C

Materials parameters on SAP2000 are set with a lower percentage of parameters considering the degradation over the years.

The masonry behavior is modeled as a linear shell-thin with a low compressive strength concrete. The importance is to see where the combination of the vertical stresses S1-1 and the horizontal stresses S2-2 would intersect and create additional stresses.

Seismic parameters

Eurocode 8 have a detailed specific way to calculate the seismic spectrum. In this case it depends on several factors: peak ground acceleration PGA[15], the category of the soil, the predicted magnitude (in the case of our country is M > 5.5) and the behavioral factor. This last one as a concept is comparable to the inverse of ductility. Given the studies, Albania has a variety of seismic peak ground acceleration from 0.15-0.3g. (CEN Eurocode 8, 2008) With the same reasoning as above, we choose the seismic acceleration that has greater surface in the seismic map. Eventually the selected parameters are:

- Soil category: C
- Spectral acceleration: $ag/g = 0.27m/s^2$
- Direction: Horizontal
- Behavioral factor: 1- Damping factor: 5%

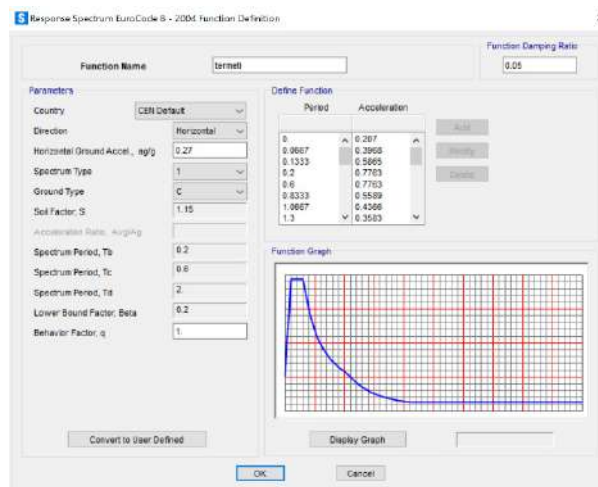


Fig. 3: Elastic demand spectrum, referring Tirana ground parameters (SAP200 V22)

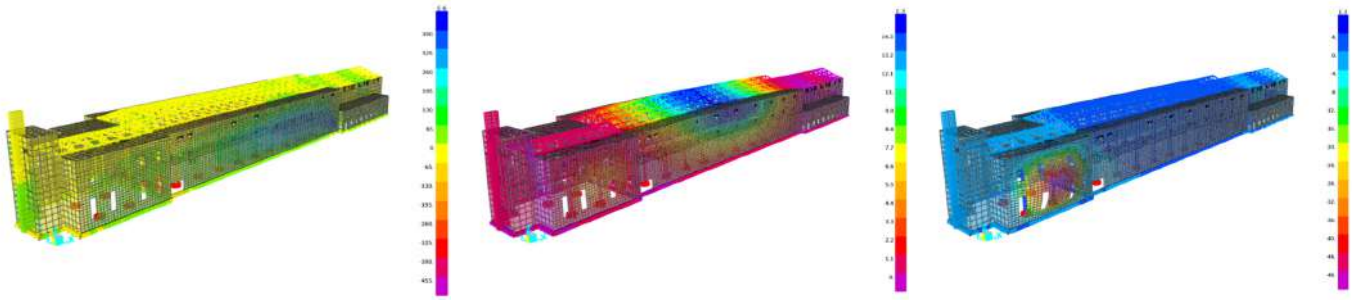


Fig. 4: First 3 modes of vibration according to SAP2000 V22 for the case study

4. Analysis and Results

Given the above explanation in methodology, historical heritage was primarily analyzed to define seismic parameters and their walls load carrying capacity. Modal analysis was conducted in order to determine fundamental mode shapes and natural frequencies of the structure during free vibration. The purpose of modal analysis is to obtain the maximum response of the structure in each of its important modes, which are then summed up in an appropriate manner. Modal analysis of the structure included different modes of vibrations in combination.

	OutputCase	StepType Text	StepNum Unitless	Period Sec	Frequency Cyc/sec	CircFreq rad/sec	Eigenvalue rad2/sec2
▶	MODAL	Mode	1	0.490144	2.04021740...	12.8190640...	164.328402...
	MODAL	Mode	2	0.367381	2.72197177...	17.1026530...	292.500741...
	MODAL	Mode	3	0.348863	2.86645507...	18.0104684...	324.376973...
	MODAL	Mode	4	0.327664	3.05190840...	19.1757060...	367.707703...
	MODAL	Mode	5	0.285879	3.49798084...	21.9784618...	483.052784...
	MODAL	Mode	6	0.255425	3.91504389...	24.5989462...	605.108156...
	MODAL	Mode	7	0.246978	4.04894648...	25.4402810...	647.207900...
	MODAL	Mode	8	0.24152	4.14043852...	26.0151424...	676.787638...
	MODAL	Mode	9	0.237891	4.20360048...	26.4120008...	697.593786...
	MODAL	Mode	10	0.235172	4.25221222...	26.7174373...	713.821458...
	MODAL	Mode	11	0.233253	4.28718464...	26.9371756...	725.611429...
	MODAL	Mode	12	0.230605	4.33642688...	27.2465736...	742.375777...

Table 1: Modal data, frequencies and seismic parameters SAP2000 V22

Pre-conclusions referring the Allowed period: $[T] = 0.075 \times H_b^{0.75}$ (CEN Eurocode 8, 2008)

First mode: $T_1 = 0.49 \text{ s} > [T]$ Translation move on X-direction
 First mode: $T_2 = 0.367 \text{ s}$ Translation move on Y-direction and problematic torsion
 Third mode: $T_3 = 0.348 \text{ s}$ Pure torsion

The most problematic part is in the Y direction due to the fact that the building is more flexible in that direction and it shows problematic translation move in the middle of the building. This phenomenon is problematic because it causes additional flex and in masonry buildings this causes serious problems.

To get more detailed information for the vertical and horizontal stresses the south part of the building has been meshed 50cm by 50cm.

The minimal stress amount occurs on the lower end of the building and the maximum on the upper part, the part where the roof lay. Beside the uniform stresses there is one concentrated stress on the upper left corner of the second surface. The maximal uniform stresses are between 1.2-1.6 N/mm² and the maximal concentrated stress is 4.2 N/mm² which is a way higher value than the 1.1 N/mm² which is the maximal stress allowed on masonry buildings. (CEN Eurocode 8, 2008)

This kind of stress has been removed on the other corner due to the seismic gap that has been applied on the model.

5. Summarized Conclusions and Recommendations

This study focuses on historical heritage masonry structures situated in Tirana, located in a seismically active zone. The objective was to analyze damage mechanisms and seismic vulnerability of the selected building. First a brief description of structural features and architectural characteristics of Italian

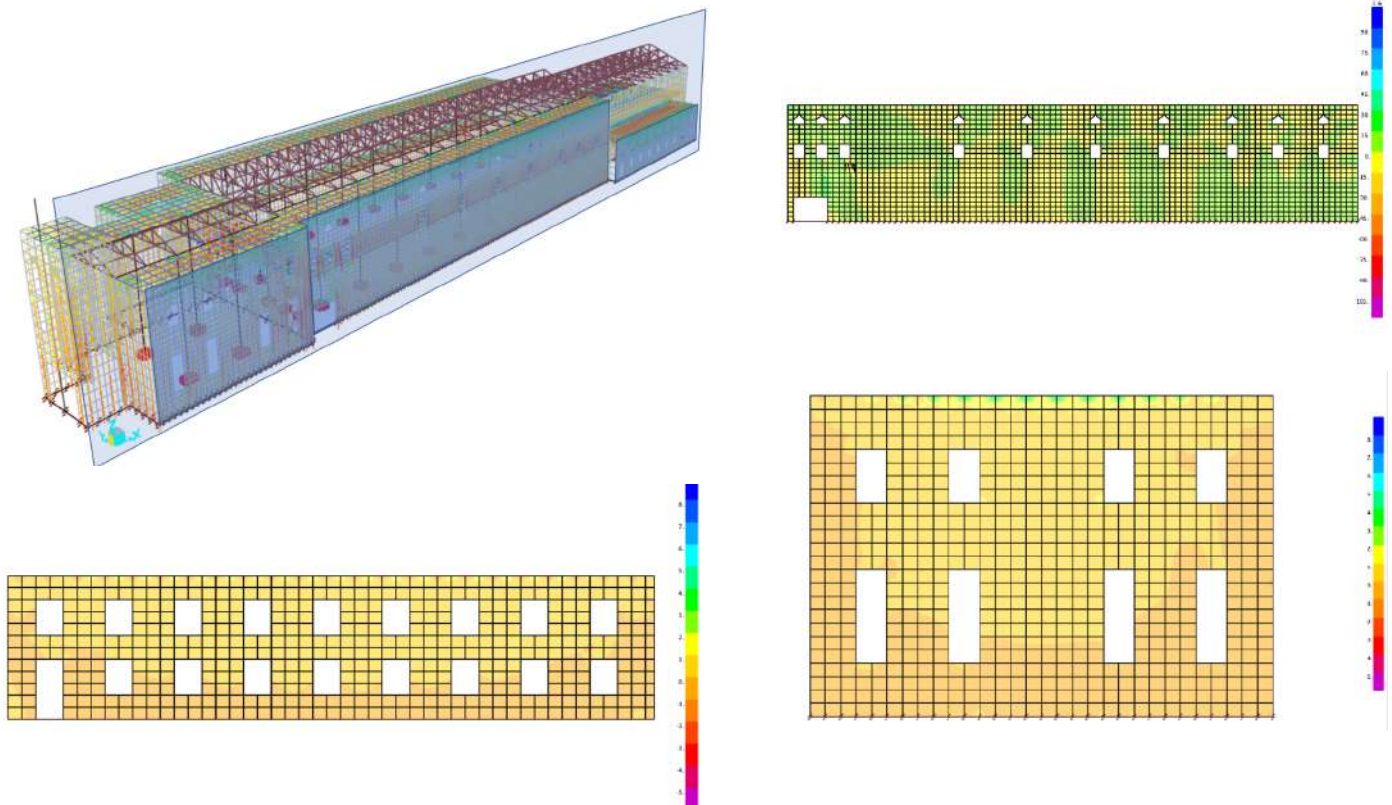


Fig. 5: The National Theater finite elements structure analyzed on SAP2000
 Fig. 6: Main three surfaces taken in the study (SAP2000 V22)

typology was presented. This is followed by modelling one of the most typical building of this period to visualize structural response behind seismic events. A 3D model was prepared in order to show behavior of the structure and its probable local and global weaknesses under seismic actions. The modal analysis is applied to predict possible damages and seismic vulnerability in weak zones of the structure under expected seismic intensity.

The static and modal analysis results have revealed that the critical section for the selected building is the transition zone between the section changes on the X direction and this is due to the lack of the seismic gap because the building length overpasses the 100m and there should be 2 seismic gaps on the section changes. This kind of stresses creates structural stability problems and it might be considered as one of the first interventions that should have been done to the building. The addition of the new interventions and the new additions might have increased the weight of the building and the period might have changed, making it even higher and more problematic. The findings of this study can serve as a model for other similar heritage cases in Tirana.

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The Use of GIS Technology for Waste Management in Albania

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Characterized as a post-communist country, Albania has been given due consideration to environmental issues only during the past 20 years. With the current rate of rapid developments, and as a country that is very close to the negotiation process for EU accession, the environmental field has been given a higher importance in the political arena. Within this field, the waste sector presents several problems, with regards to not only adopting EU policies, but also actual implementation of legal obligations. Infrastructural and planning implications have only of late been in the forefront of the environmental discussions including here waste management. The country has recently taken a leap forward with the creation of the Waste GIS Map and the use of information technology in the planning of future waste management investments. This paper will examine the implications of this leap and discuss (i.) the effectiveness of the GIS mapping technology in the Albanian national setting as a tool for more sustainable environmental planning, (ii.) the creation of this type of smart environmental infrastructure in the national and local levels of governmental planning, (iii.) how fast can the local level adjust to the smart technology of the national/international level, and (iv.) any suggestions for future improvements in the field of planning with smart technology in developing countries.

keywords GIS technologies, sustainable environmental planning, smart infrastructure, waste management, national and local planning

1. Introduction

Albania is a small predominantly mountainous country in South – Eastern Europe, on the Mediterranean Sea and has a total area of 28,748 km². The country shares borders with Montenegro, Kosovo, Macedonia, and Greece, while its coastline extends approximately 476 km into the Adriatic and Ionian Seas. Albania is known for its rich in water resources, with eight major rivers, three large trans-boundary navigable lakes, a great number of significant wetlands and ample groundwater resources. Almost 70% of the country is composed of mountainous areas, while the entire country is divided in 6 main water basins. According to the National Strategy for Development and Integration 2015-2020, Albania's most notable achievement in recent years have been the granting of candidate country status from the European Council on June 27, 2014. A fully-fledged member of the North Atlantic Treaty Alliance (NATO), and enjoying in place a SAA with the EU, Albanian citizens can travel without visa to the Schengen area. With an average economic growth of 5% during 2007-2011, Albania is now considered a middle-income country according to the World Bank classification. The national vision is to strive and become a vibrant democracy on the path to integration with the European Union, with a competitive, stable and sustainable economy, with guarantees of fundamental human rights and liberties. Since 2014, Albania's economy has steadily improved and in 2017, there is a foreseen increase in economic growth projection with about 3.8%. Albania is a parliamentary constitutional republic. The current government is comprised of a prime minister and 19 ministries. The country is divided in 12 counties, and since the constitution of the administrative reform in June 2015, there are now 61 units of local administration. The reform merged 373 local government units that were governed by communes and municipalities into only 61 hopefully stronger municipalities.

With regards to environmental issues Albania has made significant steps forward in the process of legal alignment with the *acquis* however some persistent challenges that can be mentioned in this sector are manifold and include: i.) further development of capacities at both central and local level government for developing and implementing policies, ii.) further alignment with the EU environment and climate policies and legislation, with

special emphasis put on the iii.) ensuring effective implementation.

In 2009 Albania developed and adopted the Cross-cutting Strategy for the Information Society 2008-2013, through Decision No. 59 of the Council of Ministers, dated 21.01.2009, thus setting out the main development directions and objectives in the field of information society. While the country has taken giant leaps in this field, the Digital Agenda Strategy 2015-2020, has strengthened the country's mission. Though currently, there is a rich legal framework that directly or indirectly regulates ICT, more efforts are necessary for the improvement of ICT, e-governance and information society legislation with the aim to establish a single digital market integrated with that of the EU and beyond.

Linkages between smart technologies, infrastructure, planning and the environment have only of late been taken into consideration and are slowly being applied. In 2013 in an attempt to take a more holistic approach about these issues the Government of Albania included waste management, into its 6th priority area of the 4-year governmental program, together with land management. Increasing the control on the territory was one of first actions of this government. Not surprisingly waste management posed a heavy burden on the territory as well. The former 373 local government units (municipalities and communes), had a separate take on waste management, and possibly an individual waste disposal site, even though the National Strategy on Integrated Waste Management had prohibited the 1 unit – 1 waste disposal site practice since 2011. Not having a clear picture of the current situation with regards to the distribution of waste disposal sites in the territory, in 2014, the Ministry of Urban Development engaged in a fact finding mission with the collaboration of the local municipalities of that time. These activities culminated in 2015 with the presentation and the making public of the GIS map of disposal sites for the entire territory of Albania. Evidently the country has recently taken a leap forward in general with the creation of several Information Technology Systems which such as the online licensing process, the creation of e-Albania portal for civic services, the online construction permitting system, among which also the GIS Waste Map. The map provides free access to the public, it includes the latest orthophotos for urban and rural areas, several layers outlining the national road and railway networks, buildings, some hydrological projects, cultural monuments, topography, vegetation, the old and new territorial and administrative divisions. With regards to waste the map shows the dumpsite location, its polygon and extension in the territory, the administrative document of its creation, and several indicative distances from the closes house, inhabited areas, water sources, airports etc. One of the main initial findings of the map was the existence of 92 active dumpsites, with only 3 of which in sanitary conditions. A total of 35 municipalities reported the lack of an environmental permit for their existing active dumpsite. Only 15 municipalities reported having separate dumpsites for construction waste, while 45 municipalities were observed not to have any security measures in their dumpsite. Further data processing by the map showed that more than 32 municipalities had less than 15 tons of waste per day, 23 dumpsites serve a community with less than 10.000 people, while 2 municipalities had undertaken activities to move the waste to a different dumpsite without any further actions for rehabilitation or closure of the previous dumpsite, while 4 municipalities had plans to extend the surface area of the existing site.

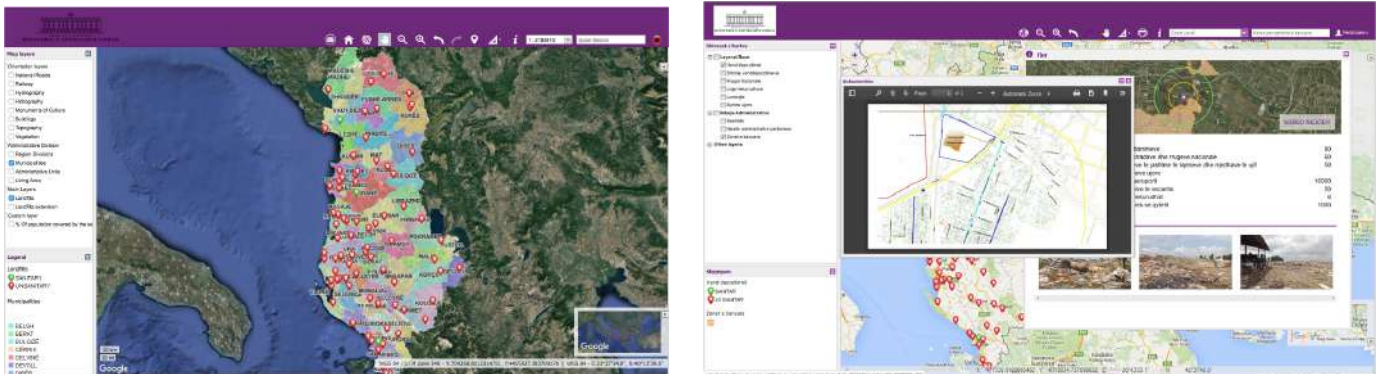


Fig.1: GIS waste map, showing layers, administrative units, location of current disposal sites distances and other downloadable materials made available by municipalities.

With the map becoming public, several members of the donor community and civil society in Albania became interested in it and started small projects for the purpose of elevating the information presented in the map for the purpose of transforming it in a planning tool. The German Government has also dedicated some funds in order to divulge the Albanian waste master plan; a document that is going to direct all future national (capital) investments in the field of waste management in the country, and further populate the map with a layer on where these investments will be placed in the territory.

Though the map in itself is an innovation, it is important to note that for it to reach its whole potential and be used as a planning tool by national and local government it needs to be part of a wider ICT system including crucial information on a national scale. For example it would be very beneficial to know with a click of a button how far a current dumpsite is from a potable water resource, or a site with high seismic risk, or a major planned development such as an airport or a main road. For this to happen other responsible bodies in Albania need to develop their own systems. The created a GIS cadastre for water resources has been in the talks for two years now, and though the system has been provided by the donor community, it is not yet populated with information. The "leg work" for identifying all the necessary information to input in this system might take much longer than the two years.

In addition though the map was created by the national government with information provided by the local level it has been noted that there is some resistance in the local level with regards to the independent use of the map. Often the Ministry of Urban Development receives official requests from the local level asking for information with regards to the map. Recently the map was coupled with financial data based on the information provided by the municipal staff on their costs for waste management. This work has been backed up also by a Decision of the Council of Ministers, which obliges the municipalities to use the methodology developed by the Swiss development agency working in Albania in the waste sector for a significant amount of years. The methodology has been translated in an online system that is connected directly to the waste map, and municipal staffs have been extensively trained on the use of this system. However there are still problems with the quality of the data provided, and with the general acceptance of the methodology and ICT system.

In addition, while Albania is not yet in the countries that have adopted the European Union's INSPIRE legislation, it is one of our aims to integrate the waste map into this program and implement Directive 2007/2/EC of the European Parliament and of the Council with the purpose of achieving interoperability of spatial data sets and services. capability to communicate, execute or transfer data among them. Albania's spatial data services need to be further documented with additional metadata and be harmonized with regards to content of the service. For the moment Albania has a national geoportal, hosted by ASIG, the State Authority for Geospatial Information, which has already retrieved some information from the waste GIS map however both systems need to consider the INSPIRE directive.

In closing the effectiveness of the GIS mapping technology in the Albanian national setting as a tool for more sustainable environmental planning is highly dependant on the creation of an integrated national system. The creation of this type of smart environmental infrastructure in the national has to be coupled with extensive capacity raising efforts especially in the local levels of governmental in order for these tools to be used for future planning purposes. Both the national and local levels of government need time to adjust to the smart technology of the in order to come close to the international level ICT use. Future improvements in the field of planning with smart technology in developing countries might need considerable funds and knowledge transfer and sharing by the international community active in Albania, providing more holistic systems. Though the current innovations seem more like acupuncture interventions here and there, they should be beneficial and be considered as steps forward, while continuously built upon in order to create an integrated approach.

The city as a software. A paradigm shift in the era of global crisis

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The transition from an industrial society to one of information has had several huge impacts on the development of the contemporary city. This transition can be seen more like a change of software than of hardware. A vast and complex urban digital ecosystem extracts, aggregates and analyzes big data in order to predict its citizens' behavior and to provide them with better services. When the city is seen as software and everything is information, IT corporations can easily start transforming the physical space of our cities with new products and services or through the design, construction, and management of new smart neighborhoods. The Covid-19 outbreak has clearly shown the power of new digital technologies, and thus the opportunities and the risks related to their diffusion. The pandemic must be seen not as an exceptional event, but more like a manifestation of the wider environmental crisis. From this perspective, how can the city, being viewed as software, help us achieve sustainability, understood here in its three aspects: economic, social, and environmental? How can we use new technologies to contribute to the creation of a more sustainable and more inclusive society?

keywords paradigm shift, information technology, software, sustainability, crisis

1. From hardware to software

The transition “from the second to the third wave” (Toffler, 1980: 7), from an industrial society to one of information, has had significant impacts on the development of the contemporary city. The superimposition of the IT layer on the physical city does not simply represent a hybridization of the latter. The language of hybrids is at the same time as reassuring as it is dangerous: when something new appears we are often led to identify it as a combination of already known elements and for this reason we are unable to fully grasp its disruptive effects (Bratton, 2017: 5). If the language of hybrids in the short term is useful for tracing continuity and analogies, it is clear that the pervasiveness of information in contemporary society has meant a fundamental paradigm shift and that the city of information is something completely new compared to the city underlying the industrial paradigm. The interest is in its being software rather than hardware. To fully understand the extent to which information has permeated all levels of our existence and how decisive software has been, just think of how trivial actions such as paying for groceries or checking in by plane are impossible in the event of a blackout or systems failure. In this sense, thinking of space as information and the city as software allows us to grasp the implications of the paradigm shift, but above all, as a designer, it shows us new directions and viable alternatives. Today, IT is so intertwined with the city that it is not possible to imagine urban development without understanding how these new processes work. If it is true that the field of action and the social role of architects has been reduced relative to the past, then today the immaterial layer of information offers new fields of investigation and experimentation. A new lifeblood to the discipline. If we think of architecture as the practice of organizing time, space and the relationships that take place in it, then we can transcend its physical nature and start focusing on the intangible processes that it underlies and that are shaping our built environment more than architecture itself.

The contemporary city is the result of the interaction of bits and atoms. Never in the history of mankind have we produced so much data and had access to so much information. IT corporations influence the development of the city and transform it mainly in two ways: the aggregation of big data and the implementation of new services.

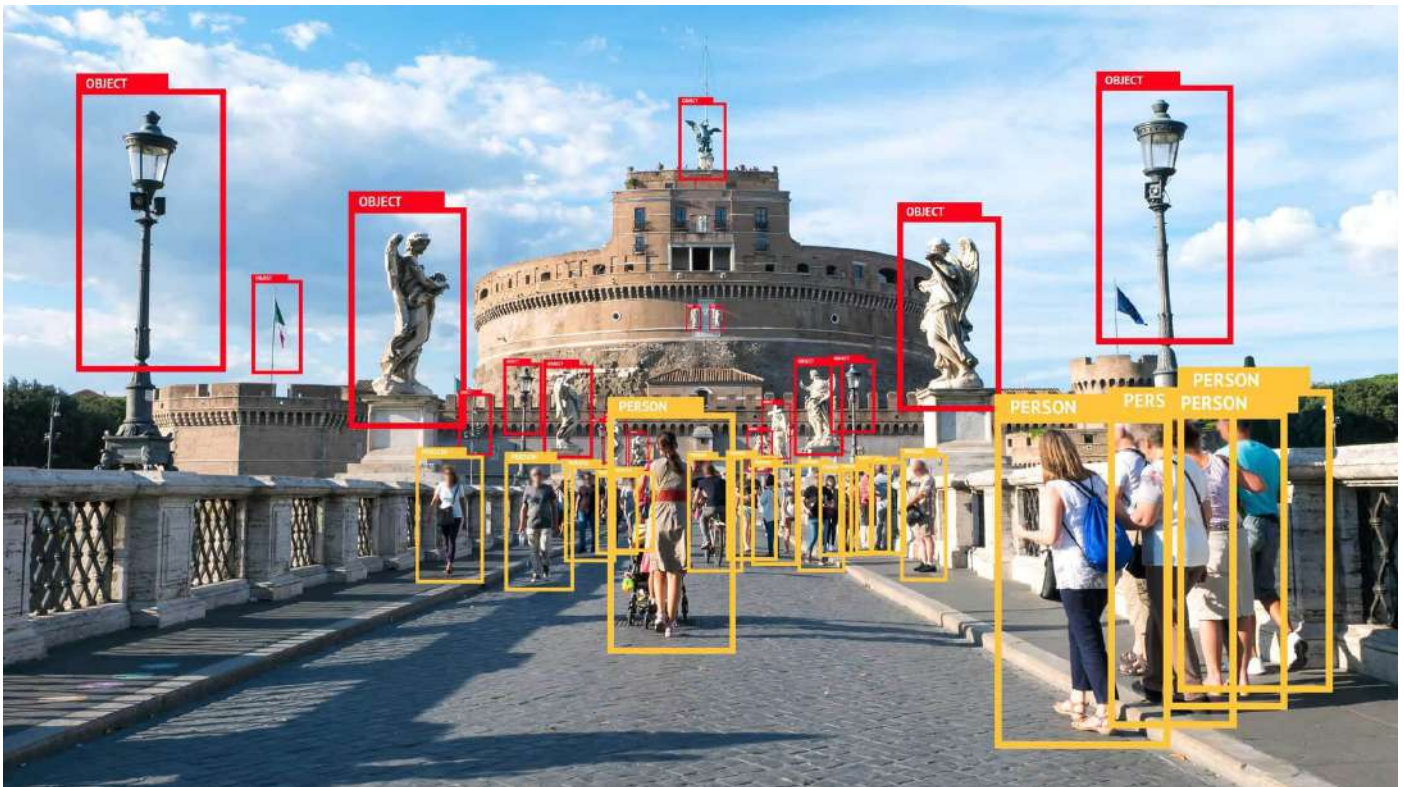


Fig.1: Visual recognition and machine learning in Rome

2. Big data: to aggregate, to analyze, to predict

Big data is radically changing the way we look at the city. Today municipalities and corporations have access to a huge amount of data which aggregated together generates a great deal of information that helps us understand the functioning of the city and the habits of its citizens. The data collected and analyzed can be of various kinds and is mainly collected through sensors and cameras and connected objects that together form the infrastructure commonly called the Internet of Things (IoT). This urban data collection ecosystem is complex and varied and involves both people and objects. Cameras, weather sensors, and air quality and GPS detectors installed on public transport all together generate a dense network of sensors. At the same time, citizens, although often unaware, become urban prosumers : producers and consumers of data. The main tool through which they perform this double role is the smartphone, through the numerous sensors contained in it, above all, the GPS detector. In February 2020, the artist Simon Weckert hacked Google Maps: by carrying a small cart containing 99 smartphones he managed to deceive the algorithm of the platform for traffic, which detected a strong concentration of users who proceeded at a walking pace. As a result, the road was deserted, as the algorithm suggested to drivers the routes with less traffic. The power of the gesture is to have shown how much the immaterial layer of information has permeated the contemporary city, so much so that it has become the basis for its functioning. At the same time, that the consequences of the computer world on the physical one are absolutely real. This example clearly shows the power of information in urban context. More and more often private corporations have more data and information than the municipality itself. Consequently, the former has gained a big competitive advantage over the latter. Especially in western countries, the neoliberal economy has blurred the distinction between the public and private sector and today IT corporations plays a key role in the development of the city.

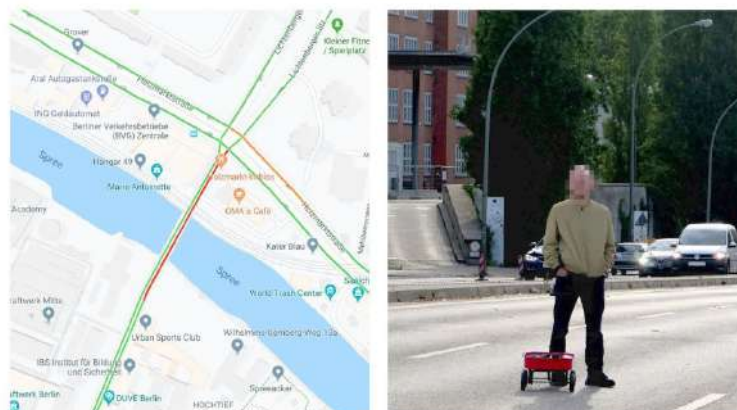


Fig.2: Simon Weckert, Google Maps Hacks (2020)

3. Urban Tech. Gimme! Gimme! Gimme! data

The city is software, and everything becomes information. If everything is information, then the IT corporations can also conquer the physical space of our cities: designing new products and services or building new smart neighborhoods.

It should be noted that the contemporary city is the accidental result of the interaction of complex and very often invisible forces. If architecture is a spatial practice, not only referred to the physical construction of spaces, but to everything that has a consequence for the built environment, then Amazon, Uber and Instagram are also architects (Self, 2015). IT corporations are transforming the face of our cities one bit at a time with often immaterial actions that have enormous consequences: the impacts are not only on the physical city, but also on the political, economic, and social level. When Amazon, the largest retail chain in the world has no shops, when Airbnb, the largest tourist accommodation chain does not even own a hotel, when Uber, the largest taxi company does not have cars, it is clear that we can no longer refer to old models.

In May 2020, Sidewalk Lab, a subsidiary of Google in the Alphabet group, announced that the Quayside project on the Toronto waterfront was canceled due to the uncertainty resulting from the global Coronavirus crisis. The project for this smart city was innovative and certainly of interest from different points of view and represented an example of a second-generation smart city, less cumbersome, more attentive to the environment and the needs of citizens. The heart of the project was the central IT system that managed the entire neighborhood, from mobility to waste collection, from the production and distribution of energy to the temperature control of buildings. However, the project was opposed from the outset precisely because of its being software: the huge amount of data produced by the neighborhood constituted a real possibility for Google to transform this neighborhood into a massive surveillance experiment. In a smart city, information is at the center of the discussion and until a solution for its management is found, any future development appears difficult, at least in liberal democracies. The Quayside example clearly shows the limits of a technocratic society, if it is true that on the one hand science and knowledge can help us solve many concrete problems thanks to new technologies, on the other a clear political vision must guide us in decisions. It could be said that science provides us with the tools to achieve a goal, while politics should indicate the goals we want to achieve as a society.

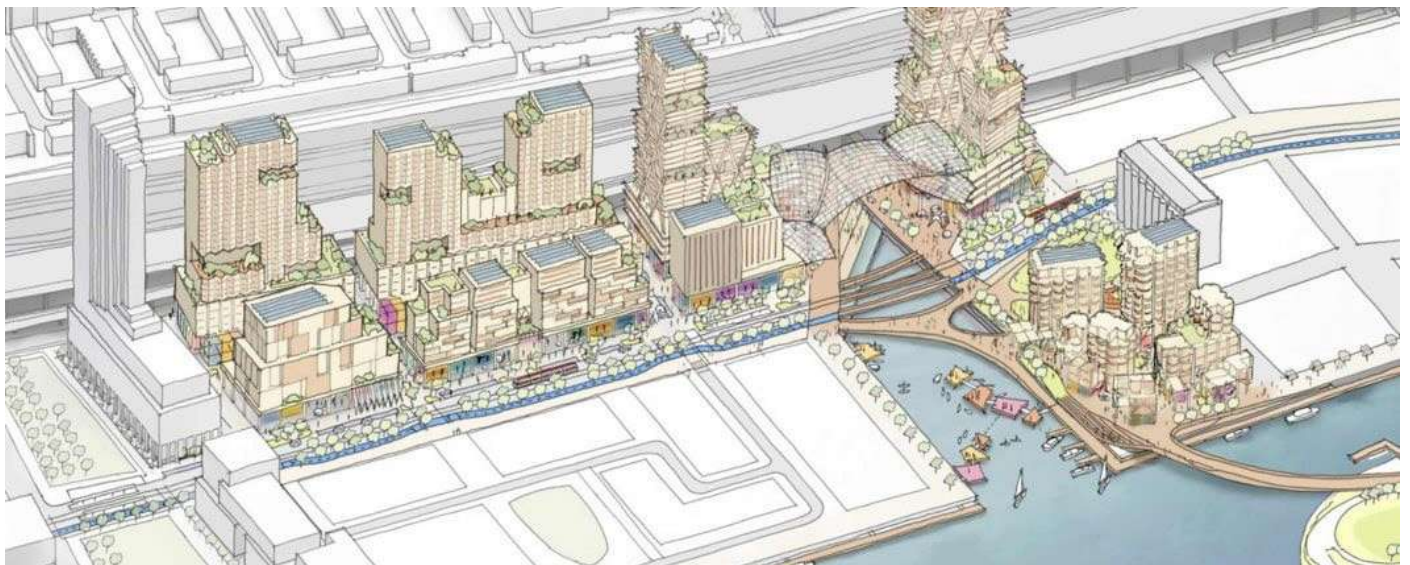


Fig.3: Toronto Quayside project by Sidewalks Lab, Snøhetta and Heatherwick Studio

4. Covid-19, the pandemic crisis

As often happens, crises bring to the surface phenomena and trends already underway and there is no doubt that the Coronavirus crisis has acted as a catalyst and accelerator of latent phenomena. Historically, crises have allowed great changes and transformations in short periods, they are periods of transition: from an urban point of view, this crisis will be an important watershed towards the total digitalization of our society. The two most important expressions of the city as software were made explicit during the Covid-19 emergency: the use of big data and the development of solutions and products by IT corporations.

5. Mapping: a digital urban ecosystem

If so far for many it was still a nebulous concept, due to the Covid-19 outbreak, East Asian countries have especially shown off their technological might by using a powerful infrastructure for contact tracing in order to contain the spread of the virus. "It could be said that epidemics in Asia are not only fought by virologists and epidemiologists, but above all by computer scientists and big data specialists. A paradigm shift that Europe has not yet learned." (Han, 2020)

The most effective and at least at first glance least invasive strategy to stem the spread of the virus is that of the so-called Asian model, or active massive surveillance. It is in this context that information technologies reveal their enormous potential, but above all they clearly show how the immaterial layer of information has gradually overlapped the physical city and that the latter has decisive impacts on our lives and our cities. The crisis forces us to think of the city as software and no longer as hardware. Thanks to the use of Artificial Intelligence, big data from the urban ecosystem, in particular from

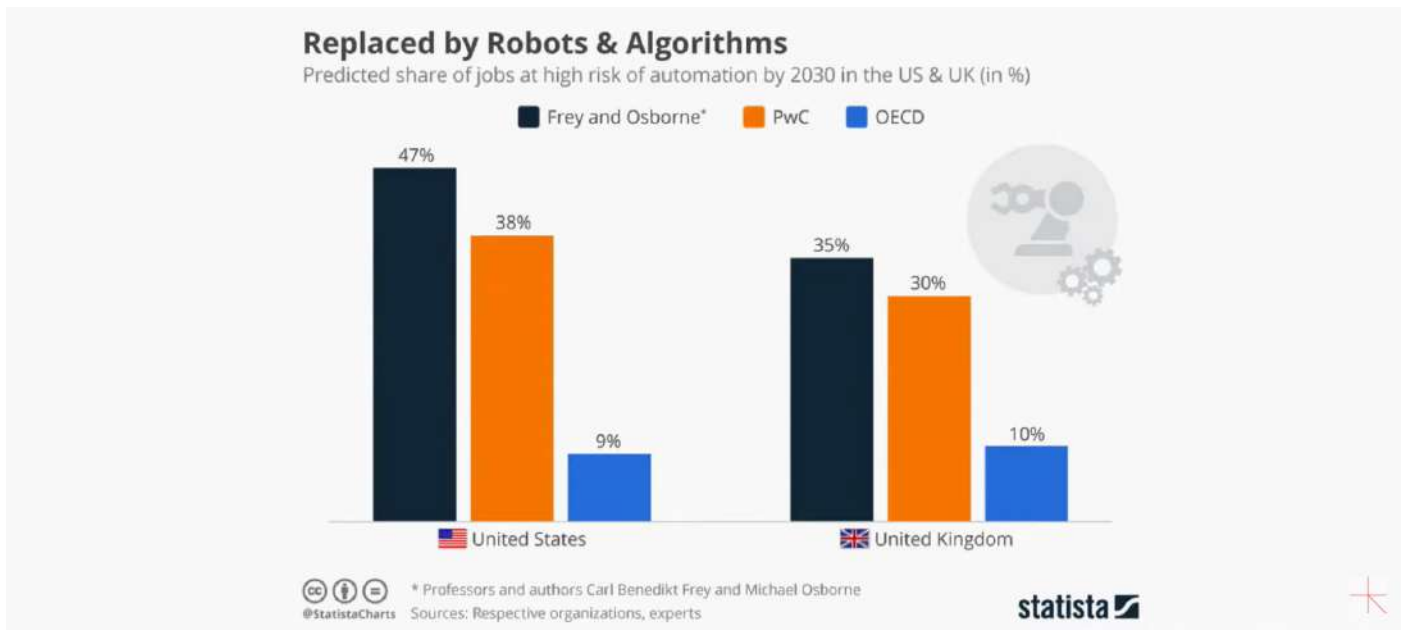


Fig.4: Different statistics of predicted share of jobs at risk of automation by 2030

public cameras and from geolocation reported by specific mobile applications, it is possible to trace all the potential contacts that an infected person has had, notify them through a message and invite them to take a swab to check whether or not they were actually infected. Obviously this active surveillance poses big questions related to control and privacy and it is no coincidence that it has been introduced in a massive way in the East Asian countries, where the concept of privacy and use of data is very different from that of the western countries.

6. Automation: the city as a platform

The crisis linked to the spread of Coronavirus is a clear demonstration of how the contemporary city is at the same time software and hardware: while the physical city seems to have stopped, many productive, economic, social and educational activities are possible thanks to IT services and tools: the intangible infrastructure allows the operation of the physical one. Since prehistoric times man has had to leave the cave to get food. With the birth of cities, the places of exchange became its beating heart. With the advent of the internet, the process has reversed: it is not we who reach the goods, but she who reaches us, usually in our homes. The lockdown has pushed us to buy online even more because it was safer and because many stores were closed. When we think of e-commerce platforms globally, we think of Amazon and Alibaba. It is interesting to notice that the latter was fully established in China during the quarantine for the Sars epidemic in 2003. During the Covid-19 outbreak, the pressure on Amazon has become so strong that the company, unable to cope with all the requests, has decided to give priority to essential products. At the same time, to keep up with increased customer demand, the company hired 100,000 new workers in the United States alone. Amazon increasingly looks like a public utility: it has partnered with the Canadian government to distribute medical equipment and with the UK government to deliver at-home testing kits. Indeed, it may be one of the few retailers to emerge from this pandemic stronger than before (Liu, 2020). In retail and many other areas, automation is becoming increasingly real. An Oxford Economics study predicts that more than 20 million industrial workers will be replaced by robots worldwide from 2030. If we start considering AI as automation, then the share of jobs at risk by 2030 in US and UK is from 47% to 9% and 35% to 10% respectively, depending on the studies and statistics, with incalculable consequences at economic and social level.

7. The environmental crisis

In the same way, 2030 is a significant date for the fight against climate change, in fact it corresponds to the deadline for staying within an increase in temperature of 2C° compared to pre-industrial levels, a goal that according to the current situation seems impossible.

The relationship between the Covid-19 pandemic and climate change is remarkably close. They are both the consequence of the problematic relationship between man and nature. In order to identify a consequential relationship between the more general environmental crisis and the spread of the virus, it is necessary to look at the urban models perpetuated until now: uncontrolled expansion of cities, deforestation, invasion of natural habitats and exploitation of intensive animal farms. Furthermore, pandemic and climate change are both manifestations of the tricky relationship between science and politics. The scientific community for decades had warned us about the risks associated with the spread of a pandemic and has done the same for the environmental problem. Unfortunately, due short-sighted policymaking and an incapability of wide-ranging visions, action is almost always taken in response to emergencies rather than prevention.

The pandemic has made it clear that the old models of sovereignty to which we are attached are no longer able to respond to complex problems on a global scale. Similarly, to face the environmental crisis it is obvious that a shared and cooperative policy is the only way forward, therefore to move from geopolitics to a biosphere politics (Rifkin, 1991: 286). Finally, both the pandemic and environmental crises are gradually pushing us to question the concept of normality: when the presumed normality in which we live leads us to the sixth mass extinction in history, perhaps we should rethink what it is normal and what is not, but above all if we really want to return to normal so quickly and what future we hope for our society.

8. The Terraforming: from Biosphere 2 to Oceanix

Perhaps one of the biggest paradox of our time is that on the one hand our behavior is altering the natural ecosystem bringing about the Anthropocene era, and on the other we don't have a collective plan to make a (positive) difference in climate change. We should start thinking about Earth as a huge experiment and in this sense, we can name Terraforming a planetary design initiative for the next century to ensure that the planet will be capable of supporting Earth-like life (Bratton, 2019: 2).

In this context Biosphere 2 and Oceanix are two interesting experiments. Born in different eras they share the same purpose, exploring alternative scenarios to terrestrial life, the first simulating living conditions in a space context, the second imagining a marine colonization that copes with the risk of raising ocean levels. Biosphere 2 was an artificial ecosystem designed in Arizona from 1987 to 1991 by a group of researchers led by American ecologist John Allen. The intention was to reconstruct and study the applications of a self-sustaining system such as that of biosphere ecosystems, for future space colonization. The architectural design consisted of a complex system to which a technological apparatus was intertwined. Oceanix was designed



Fig.5: Biosphere 2 and the eight "Biospherians"

to imagine an alternative for people to live sustainably on the ocean. Its mission is to design floating cities where humanity can live in harmony with life below water. Thanks to massive use of new technologies, Oceanix is trailblazing a new industry that meet humanity's shelter, energy, water and food needs without killing marine ecosystems.

These pioneering researches points to innovative solutions and new approaches to sustainability. By imagining our cities as a closed artificial system as in the case of Biosphere 2 or as an ecosystem in the case of Biosphere 2, we are forced to include a high degree of circularity and systematicity in urban design. Circularity and systematicity are two intrinsic characters of the computer paradigm and especially in extreme conditions can make a difference. In Biosphere 2 computer technologies were mainly used to capture, monitor, and analyze the different elements of the system, from air purification to water recycle and waste disposal. In Oceanix computer technologies became catalysts for the whole project. Although there are many different technologies in different fields, from energy production, to water cycle, recycling and waste disposal, to smart mobility, software is the big brain that controls and coordinates all operations, making them possible. The IT city of the future has much to learn from this proposal, as is often the case, the limited resources and the extreme conditions in which the project was imagined, have facilitated the implementation of many technologies replicable at the urban scale. Oceanix represents much more than an experiment or a design speculation. It indicates a possible direction of development, in which man shapes his habitat and where ecological patterns are the result of direct human interaction with ecosystems.

9. The paradigm shift, a vision for the future.

We have seen how information technology has been used to fight the spread of Covid-19. How can the city as software help us achieve sustainability, understood here in its three meanings: economic, social, and environmental? How can we use new technologies to contribute to the creation of a more environmentally friendly, fairer, and more inclusive society? Up until now, IT, even in urban areas, has failed to deliver on many of the promises made, rather than for their liberating and emancipating character, they have been used to replicate and strengthen the power structures of capitalism.

If there has been a paradigm shift from an industrial society to an information society, it has relied on obsolete structures and infrastructures. In the history of industrial revolutions, a technological advance was made up of three inseparable factors: new telecommunications, new mobility, new sources of energy. In the case of the IT revolution, the appearance of such a powerful tool has revolutionized many areas, however in sectors such as mobility and energy production we are still far from the possibilities offered by this change of paradigm.

The relationship between the IT revolution and the energy revolution is of fundamental importance, it is a one-to-one relationship: on the one hand, IT tools are often accused of being energy-consuming and therefore very dependent on electricity, on the other, the IT tools themselves are being used for the management of smart grids for the production and diffusion of energy produced in a distributed way and from renewable sources.

Similarly, the mobility of things and people, on an urban and non-urban scale, has undergone huge development with information technologies: we live in an increasingly globalized and interconnected world, both physically and immaterially. However, even in mobility we have not yet seen a real paradigm shift, we still have one foot stuck in the industrial era, in which an enormous number of polluting vehicles are used to move by land, water and air. Information technologies have made possible innovations such as car-sharing, Uber and soon driverless cars, however mobility still has to evolve a lot to reach acceptable standards in terms of sustainability. For the paradigm shift to take place completely, therefore, information technologies must become the catalyst for a renewal and a wider transformation, which focuses on issues related to economic, social, and environmental sustainability.

10. Conclusions

Obviously, a transition phase is necessary for a paradigm shift to take place completely, the duration of which may vary due to diverse factors. Right now, we are exactly in this phase, in which one era is coming to an end and another is about to appear. These drastic transformations have a great impact on our society, the repeated crises to which we are subjected are a clear manifestation of this passage.

Even though living conditions have improved for everyone worldwide, never has there been such high economic inequality. Although well-being is widespread in a large part of the world, we see a worrying convergence on the horizon, of which the pandemic crisis was a clear anticipation: a highly unequal world, with very high unemployment rates and very high pressure deriving from climate change.

To face this combination of serious threats we need a new vision, a new project for the future of humanity. Just as it happened in the last century, in which the combination of electricity, the car and the telephone gave life and shape to the world as we know it today, in the same way we are at the dawn of a new society in which information technologies will have a central role in transforming the world in a sustainable way.

In the past, many crises that have impacted the economy have been overcome through the injection of capital into the economy and massive investment by the state to create new jobs. The Coronavirus crisis is having and will have devastating impacts on the already precarious global economy; therefore, the hypothesis of a Green New Deal appears more than ever like a solution that is not only viable, but desirable. As it often happens, we can transform the crisis into value, foresee substantial investments to complete the paradigm shift through the construction of a new IT and ecological infrastructure that will generate jobs for at least one generation, but above all will guarantee the future of those to come.

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The new possibilities of 3d virtual interactive technologies on after covid-19 pandemic time

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The human-machine cooperation has become commonplace through Computer Aided Design tools, but a more improved collaboration and better support appear possible only through an endeavor into a kind of artificial design intelligence and Augmented Reality. The real-time 3d technology for creating interactive and immersive experiences is emerging as a solution in our days after covid-19 pandemic time. The architecture design process always changes because the software always updates with new tools and the development - innovation is in the first line of progress. This paper presents a new design process of 3d virtual interactive technologies using new techniques and tools. This research recommends the easy to use WebGL-Based 3d Virtual Reality Roaming System which runs without the need for plug-ins or third party components. Experiments in many domains show that this method has fluency and a strong sense of reality. This is mainly due to advances functionalities, capabilities and cost-effectiveness of instruments and deployment procedures for 3D modeling software, image-based-modelling techniques, and new tools of real time rendering engines. According to all the above, there are opened new possibilities of Augmented Reality Technology with novel and unique perspectives for real-time immersive experiences. Additionally, the crisis caused by the global coronavirus pandemic has had a major impact on our mobility, and it is changing our habits. In the context of such limitations, the online accessibility and new digital techniques can be an effective solution for everyone. Finally, this research makes an original contribution to changing 'attitude' towards the modeling of architectural design. This is achieved by introducing multi-industry systems and technologies for a more flexible modeling by proposing a collaborative design platform - identifying design specifications - resulting in a new and more versatile model. Experienced with all this, for finding ideas, ways, creating a more efficient architecture.

keywords design process, augmented reality, modeling technologies, tools, Machine Learning

1. Evolution of Computational Tools

During the 2000s, designers started to recognize the benefits of using computers to simplify laborious or complex tasks, to save time and resources, and to acquire a higher level of precision and control over the design process. Notably, architecture firm Gehry and Partners made early use of the parametric software Catia to assist the design and fabrication of the Guggenheim Museum in Bilbao, Spain. Around the same time, in 1993, Jon Hirschtick developed Solidworks a CAD - CAM (computer-aided design - manufacture) software that is now used by millions of designers and engineers. The use of CAD, whereby designers use software to replicate hand drafting more efficiently and accurately, quickly became very popular.

After this initial "digital phase," which focused largely on the replication of human tasks by computers, a new way of using computers for design emerged. Recently, a new generation of designers has started including the use of algorithms and computational logic in their work. This approach necessitates a much greater understanding of how computers work and involves the use of computational thinking as a fundamental part of the design process. This new digital age in design includes an awareness of algorithmic logic, datasets, and data driven models. In this aspect, as design becomes increasingly big data-driven, designers find themselves learning more about this data and developing more effective ways of handling them. The technique of form finding is a clear example of such an approach, where the shape of a building is not created by the designer but by a combination of algorithms. The designers develop a series of tasks for the computer to perform, they set certain conditions, and then they use computers to run a series of simulations/tests that will eventually return the desired shape. Such approaches have been applied to many fields in design including jewelry, product, and furniture design (Philippe Morel's algorithmic chair is a good example of this); fashion (e.g. 3-D printed garments); graphic design (using software like Casey Reas and Ben Fry's Processing); as well as architecture and construction.

In general terms, design practice is a vast and complex discipline and it would not be possible to automate or optimize all aspects of it. For example, aspects pertaining to intuition, synthesis, and creativity within the design process are hardwired into human nature and cannot be easily

through two train stations in Paris. They used a multi-layered analytical process called deep convolutional neural network (DCNN) to evaluate indoor legibility in the Gare de Lyon and Gare St. Lazare. Indoor legibility is the extent to which a space is organized in a clear and coherent pattern and can be recognized by users. Researchers in this project used photographic images as an input in order to observe people's behaviors and space utilization, as well as visual portions of the spaces. The second type is design tools that have been developed to support designers in their projects and research, mainly running on open platforms. These include Dynamo (an open source graphical programming tool), Autodesk Revit (one of the main pieces of building information modeling software used widely by architects, mechanical engineers, and contractors), and McNeel Rhinoceros' Grasshopper (a visual programming language and 3-D modeling software). This group includes applications – plug-ins like Dodo, Owl, or Lunchbox where traditional parametric 3-D modeling programs can be augmented by libraries that add machine learning capabilities (e.g. artificial neural network, nonlinear regression, K-Means clustering, etc.) to be used in conjunction with spatial data modeling. The third group includes management and information tools and can be considered as an extended version of more traditional building information Modeling (BIM) systems. These tools are generally referred as part of "City Information Systems" (CIM) and are characterized by a wider application of ML to urban policy and management. New ML-led approaches are being developed across the private and public sectors to combine existing urban information (property, location data, and ordinance survey) with information generated by the actors involved in the planning process. A particularly successful example is PlanTech, an initiative developed and supported by Connected Places Catapult's digital planning group. The aim of this project is to foster new ways of managing the public digital infrastructure of planning through increasingly more interconnected databases being used by the different actors involved in the planning process, and more automated and optimized services for final users.

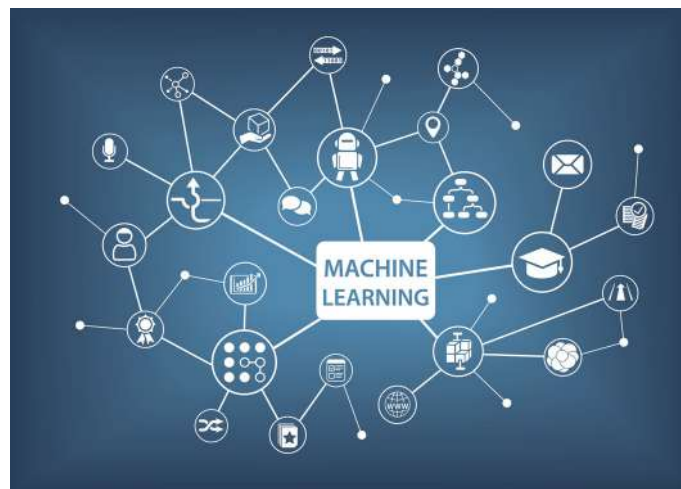


Fig.3: A diagram of the connections of our lives about Machine Learning.

3. Computational Design and the new design process

This study is fairly representative of the work that progressively hybrid profiles of architects, engineers, and data scientists are conducting under the umbrella of computational design. Increasingly, global architecture and design firms are establishing in-house research clusters to carry out advanced research in data analysis and visualization, building optimization, simulation, and building performance. Zaha Hadid's Code, KPFFui Urban Interface, and Foster + Partners' Applied Research and Development group are all well-known examples of this trend. Research like the study conducted by Tarabishy and colleagues is increasingly relevant both for designers and, more importantly, for everyone involved in the planning, management, and use of cities and public spaces. Research into optimization within design is helping to produce quicker and more accurate simulations, tests, and prototypes in projects where each decision in the design phase corresponds to a large number of actions, costs, months, and years of work and resources. Simulations and analyses of buildings and cities are becoming increasingly more precise, leaving a smaller margin for error and human mistakes. Automation and optimization of processes in design yield better outcomes (that are more performant, functional, and appreciated by users).

There are many aspects of design that are not computational and still rely on human perception, taste, preference, and intuition. However, the systems for the computational aspects have come a long way and will allow for much more complex systems in the future. A number of challenges still exist for the years ahead. Such approaches are still generally sporadic and characteristic of only a small number of cutting-edge research groups within traditional design firms and universities. In other words, research in optimization, classification, sorting, and machine learning more generally are only possible today within those practices and institutions that can allow investment, in terms of time and resources, into computational research. This tends to occur on a centralized level (research centers, universities, and large design consultancy companies), and is much more difficult (and rare) for small-medium design practices, start-ups, and individuals to engage in. If this line of research is considered to be vital for the progress of design, we are still quite far from reaching a critical mass whereby computational design becomes a collective effort, shared by the entire global design community instead of being promoted by a few small groups of excellence.

As technology progresses at a fast pace, the AEC industry is constantly pressured to embrace new ways for processes to be automated and optimized, projects to be planned and controlled with higher accuracy, and new data to be produced around each design process (from the exact quantity of certain building materials present in a construction site to metrics to monitor the user's experience in cities). The next 5-10 years will be characterized by an increase in attention to computational design, optimization, and ML techniques to support design. Cities are likely to be increasingly governed by intelligent systems where ML will be a fundamental component, and young designers currently enrolled in a growing number of new university programs that include computational design in their curricula, will be able to contribute more significantly to urban projects. They will consider ML as one of

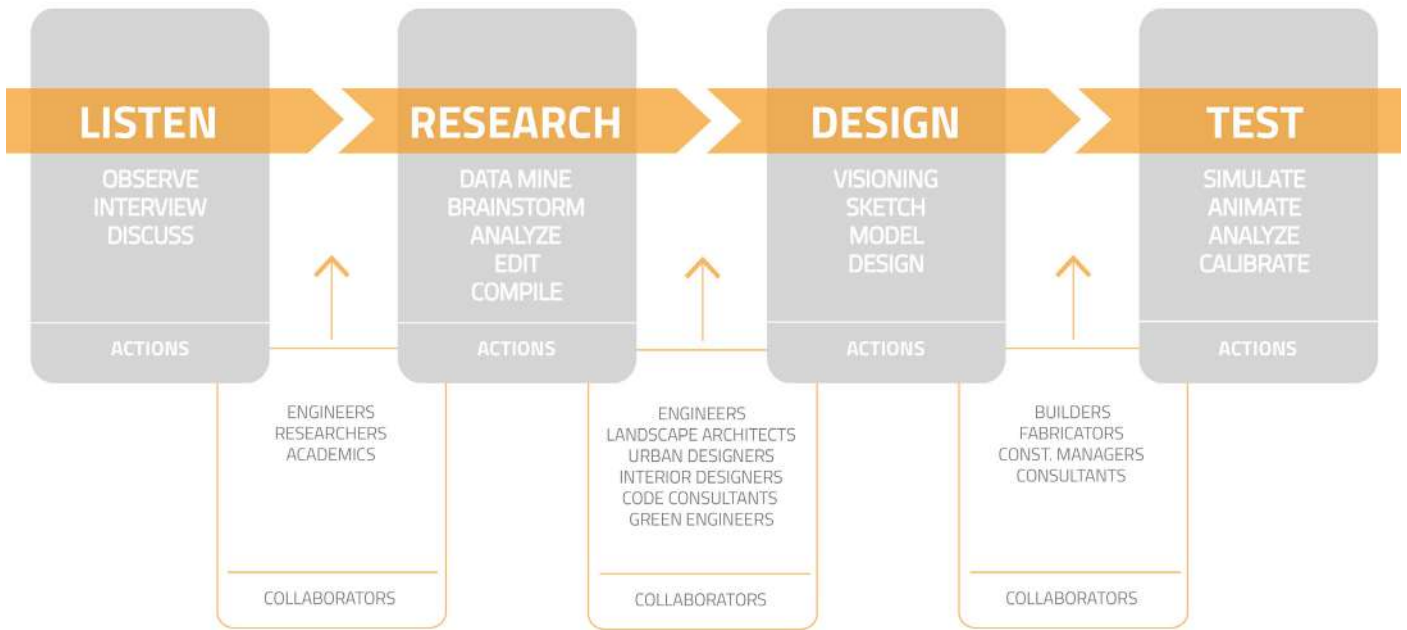


Fig.4: A workflow diagram illustrating the phases of a design process.

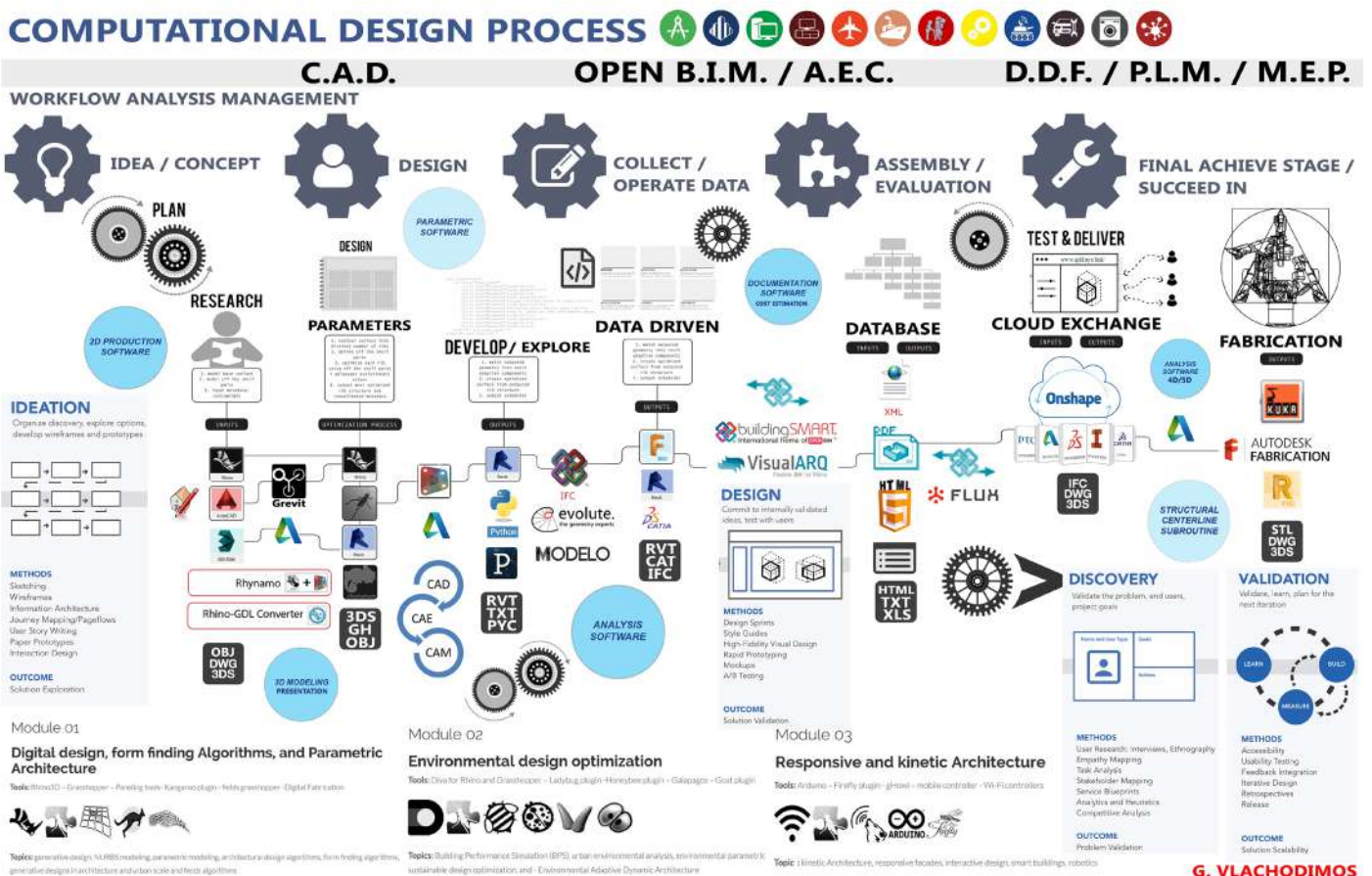


Fig.5: Experimental workflow diagram illustrating the all context of a design process with the programs.

many options in their design toolbox, therefore normalizing and extending the use of ML within the design process. This would allow the extension of computational design and ML to a larger platform, whereby the number of designers engaging in the use of (and proportionally in the research associated with) machine learning reach a critical mass extending to small groups and individuals as well.

According to all the above, the architectural design process is depended from many factors like the final product – model – building, the level of the details (LOD) and data, the capabilities of the users and the available software or hardware.

4. The world of 3d virtual-real time interactive technologies

In general, 3D rendering is the process of producing an image based on three-dimensional data stored on your computer. It's also considered to be a creative process, much like photography or cinematography, because it makes use of light and ultimately produces images.

With 3D rendering, your computer graphics converts 3D wireframe models into 2D images with 3D photorealistic, or as close to reality, effects. Rendering can take from seconds to even days for a single image or frame. There are two major types of rendering in 3D and the main difference between them is the speed at which the images are calculated and processed: real-time and offline or pre-rendering.

In real-time rendering, most common in video games or interactive graphics, the 3D images are calculated at a very high speed so that it looks like the scenes, which consist of multitudes of images, occur in real time like designers interact with their model. That's why interactivity and speed play important roles in the real-time rendering process.

Most architects and designers have switched to computer devices for their work long ago. Since 2D drawings don't offer enough clarity and cannot even be understood by most clients, it has become a trend to create 3D animations, models, and 3D renders that will help clients understand what is being done on their behalf. All this has led to 3D visualization and VR technologies which have the power to present designs of future constructions in a clear light. Clients can manipulate models, move through all of the spaces, and go through every tiny detail of the designs presented to them. VR and 3D visualization combined offer interactivity and users can now even change the elements that they don't like on their own.

The only way that a person can really experience 3D models and environment and interact with them properly is to have the right technology. After a 3D model or an image has been created, it needs to be viewed properly to get all the details, features, and depth. The main goal is to achieve the highest

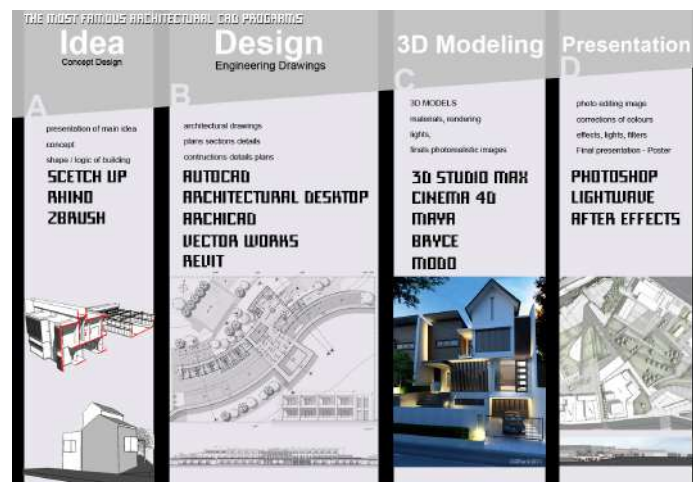


Fig.6: Different stages of design with proposed programs.

possible degree of photorealism at an acceptable minimum rendering speed. Even though rendering is based on tons of sophisticated calculations, modern software's can offer some fairly easy parameters to understand and work with. A rendering engine is usually included in a modern 3D engine and it can achieve really amazing graphics. When creating an interactive project in Unity, a designer can go from luminous day, to gaudy glows of neon signs at night, from sunshafts, to dimly lit streets and shadowy tunnels, to create that evocative atmosphere that enraptures your audience.

No matter if want to develop a 2D or 3D game for mobile or a console game, Unity's Scriptable Render Pipeline (SRP) allows to establish gorgeous imagery and optimize for specific hardware.

There's the High Definition Render Pipeline (HRDP) which targets high-end PCs and consoles, and there is the Lightweight Render Pipeline (LWRP) which targets mobile.

In this case, the hardware choice can be VR glasses or VR headsets. The better the models are and the more details they have, the more sophisticated the hardware needs to be. This includes VR sets used for viewing. Quality headsets such as Oculus Rift have complex 3D models which allow them to immerse users into an interactive and realistic 3D visualization.

Another example, is the 'Nanite' engine of Epic's inc. in the new debut of Unreal Engine 5 (available in 2021) developers virtualized micro polygon geometry frees artists to create as much geometric detail as the eye can see. Nanite virtualized geometry means that film-quality source art comprising hundreds of millions or billions of polygons can be imported directly into Unreal Engine—anything from ZBrush sculpts to photogrammetry scans to CAD data—and it just works. Nanite geometry is streamed and scaled in real time so there are no more polygon count budgets, polygon memory budgets, or draw count budgets; there is no need to bake details to normal maps or manually and there is no loss in quality. Plus, just release the Lumen what is a fully dynamic global illumination solution that immediately reacts to scene and light changes. The system renders diffuse antireflections with infinite bounces and indirect specular reflections in huge, detailed environments, at scales ranging from kilometers to millimeters. Nowadays, artists and designers can create more dynamic scenes using Lumen, for example, changing the sun angle for time of day, turning on a flashlight, or blowing a hole in the ceiling, and indirect lighting will adapt accordingly. Lumen erases the need to wait for light map bakes to finish and to author light map UVs saving a huge time of work.

Finally, originally aimed at game developers, Unreal Engine has grown so powerful that it is now used for creating professional architectural designs too. This has opened up many opportunities in various industries and brought many benefits to both businesses and customers. Here is why these two are a perfect match and how they are shaping our reality through a virtual environment.

5. Conclusions

The concept shown in this paper describes an interactive 3d virtual environment based on a real volumetric model and combines established design tools in a new and intuitive way. The direct coupling of a physical working model with an interactive 3D sketch tool opens up totally new ways of approaching architectural design problems. Taking into account ergonomic aspects and the patterns and workflow of architectural design problems, an interactive 3D environment was developed and realized in prototypical form and in real time interactive. The resulting system overcomes many of the interruptions caused by switching from model to computer visualization, creating the conditions for a continuous design workflow.

It's a technique that's growing in stature and usability in the various communities that rely on being on the precipice of rendering and visualization technique. In this article, you'll learn future of design and design communication.

Experiences with all these techniques allow them to respond well to design expectations with less frustration and greater satisfaction than with traditional digital media. The forms are more complex and richer than those made only with 3D programs, thanks to the information introduced manually from parametric and BIM platforms. With regard to space, AR allows greater understanding and the detection and correction of design errors and aesthetic issues. Representations also show the personality and style of the designer and it only takes a few minutes to adapt to spherical panoramic drawing.

In the design process, intentions should remain ambiguous until the designer is ready to go on to the next stage. The border is being built where virtuality is accessible to explore concepts without affecting creation. The information must be handled by designers themselves, without fear of imprecision. Computers must not be seen as a vital instrument for design: it is proposed that we re-evaluate manual action and the dominance of design tools. In this new approach to computers in design, the computer must be integrated with basic traditional tools to thereby improve them and make them more effective. Designers must concentrate on their work of creation and the tool must help this task, responding to the demands of designers as well as recognizing their.

An initial assessment of the evaluation undertaken shows how the tool presented here can be used...

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The new science of cities - Predicting versus Inventing

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Like many cities around the world Tirana is a multifaceted city. At a glance one can catch the lack of continuity or incoherence of the urban context, but observing it more carefully this can be interpreted as diversity and richness of the urban text. This characteristic and the absolute "freedom" of the built environment can be equally found at different scales of the urban hierarchy - architecture, city and metropolitan levels. Regarding these issues, the paper focuses on the challenge Tirana is facing in the reconfiguration of a new metropolitan system in the condition of an advanced state of dissolution. Initially, I describe the main "pieces" of the system, and further I continue to analyze in a more detailed way a part of this system, Tirana 5.

The main characteristics of Tirana 5, especially those considered as problematic, are presented in a positively reframed/invented vision, namely the way in which these features can contribute to preserve the original character and identity of the area. Despite this piece of the city being quite different from other western European cities, some theoretical concepts have been appropriated to describe it. At the end, recommendations related to an all-inclusive approach as the main underlying philosophy are given. Among others, some important practical and theoretical issues, such as urban sprawl and the specificities of the Albanian Sprawl, the urban conditions and the degree of urbanity in the area, the importance of avoiding a deterministic approach and conventional planning and design in these kinds of cities, etc. are treated.

keywords design process, urban design, city science, urban sprawl, all-inclusive approach

1. Inventing Tirana(s) - the 5th Tirana

Tirana was not the same ...

Tirana 2 is still clearly visible in today's urban fabric. That includes: "the ideal city" (the ministry square and the surrounding residential areas) founded during the monarchy period, the '20s and '30s of the last century; and the "Tirana e re" extension that continued to be developed during the fascist period under the influence of the Italian official architecture, '39 to '43. The 2nd Tirana was partly imposed over the organic city (the 1st Tirana), and partly founded in new territories. After that, Tirana was no longer the same ...

Tirana 3, the one I call "the proletarian city" (from '45 up to the late '80s), guided by ideological dogmas and projected towards a communist society, where supposedly there were no rich and poor, was another experimental and despotic imposition on the city. Historic bazaars, religious centers, urban villas, and many other artifacts were considered to be compromising evils for the new society. The historic city was meant to be diluted. Instead, modest proletarian blocs or "satellites" considered as incubators for the new proletarian life developed in the center or around the newly created industrial poles in the periphery. A new city was about to come and, along with that, a new "human creature" was envisioned, a "real superhero" supposed to live in a collective life, deprived from any luxurious pretensions, and clean of the viciousness of capitalistic society. The objective of the 3rd Tirana was "almost" fully achieved: the everywhere present ghost city deprived of any free expression lost any attractiveness that may come from difference. The new proletarian blocks mushroomed on the ashes of the organic / historic city which had to go away. Once more, anemic as it was by the end of '80s, Tirana was not the same ...

Tirana 4 (starting from early '90s), the one I call "the vaporized city", a second return to the organic city, is a shapeless structure that started to grow in peripheral areas. After returning to this organic logic, Tirana was, in a way, living its resurrection. The city started to be reborn from its own hidden latent layers. Evidently, the "proletarian city" did not fully succeed to in sterilizing the human and the city energy. Life invaded the city again. Tirana

drastically changed ... It was absolutely not the same. This city which initially used to be called "informal city", continued to extend in endless ramifications at that point, which in many cases created a certain degree of independence from the central core, despite the gravitational tides produced by Tirana 1,2,3,4. The system is being dismissed: it is resulting in an always bigger, shapeless and unstable organism. Tirana 5, 6, 7, (n+1) ... are just some of the created numbered cities under this metropolitan proliferation process. This fact, a metropolis in formation, in Tirana has been observed by the Berlage Institute since 2004 (The Berlage Institute, 2004)¹. The newly fluctuating entities are not only physically detaching from the center, but they are also creating their specific image due not only to the natural features of the areas in which they have spread, but also to the differences in the "architecture" and urban expression, social structure and lifestyle. These sprawl areas range from the massive informally built residential areas to high-rise apartment blocks, and "luxury" gated communities. At this point a reflection about the degree of "urbanity"² in these different parts of the city may be valuable; however I will come back to this issue in the next paragraphs.

Tirana 5: The one I call "the triangular city", is confined by three main national axes: the Tirana Durres Highway which connects the capital city with the main port in Durrës; the highway directed to north of the country; and the highway which connects the center of Tirana to the airport. Tirana 5 is a ramification of the vaporized city developed in former agricultural land around some preexisting villages or small towns, and former state agricultural centers - kooperativa. Tirana 5 resulted from the "jokes" of gravity interplayed between Tirana and the historic city of Durres with the main port; the International airport located in the middle of this area; a number of second level satellites, small or mid-size towns such as Vora, Kamza, Fushe Kruja, Kruja, Kashar, etc. which are considerable in terms of population but lack services and a civic core; and groups of "asteroids", small villages such as Laknas, Domje, etc. which are continuously extending in low-rise and low-density housing / dormitories. Due to such a complex intersected location, this triangle can also be envisioned as part of Tirana that aims to play an important role in the larger region.

2. Is it a city? - will Tirana 5 continue to be a victim of psychological impasses?

After positioning Tirana 5 in the complex universe of historic, territorial and strategic relationships, it is worth addressing another important issue: what kind of urban conditions exists in Tirana 5? Can we "measure" the degree of urbanity through a set of criteria? Different approaches to these questions can drive towards different design proposals. Concerning these issues, it is important to be aware that to overcome the current planning and design impasse in Albania, it is vital to trigger a new mindset among the professional community. These were some of the theoretical questions that we tried to address during the design process of Tirana 5. Hence we can start with a basic reflection: what is a city? There are many answers to this question. With the term city we often understand an artificial phenomenon which has many varied and differing versions. Trying to answer this question in the book "The city shaped", Kostov (1991) refers to two definitions from 1938; for L. Wirth, a city is "a relatively large, dense, and permanent settlement of socially heterogeneous individuals." For Mumford, a city is a "point of maximum concentration for the power and culture of a community" (in Kostov, 1991)³. C. Aymonino (2000) in his book "il significato della città"⁴ brings some other important premises related to our question. According to him, a city is the place where the accumulation of energy and capitals create the conditions to jump from the fulfillment of basic needs to more opportunities. In this regard the city is a place where each époque tries to leave its traces through architectonic representation (monuments).

These quotes provide valid premises for understanding many things which are still under process in Tirana 5: for example, related to heterogeneity, understood more in the sense of diversity, we can say that there is still a high degree of homogeneity and a high social pressure that works against diversity; or related to the city as the place of growing opportunities – the main reason why people from poor areas settled in Tirana 5 – the inhabitants are still satisfying only the basic needs. Despite that fact and the very low quality of architecture in the area, (including public buildings and public space) signs for architectonic representation can be distinguished in the aspiration of simple people to build the "the biggest and most beautiful" house. It can be easily concluded that these processes in this part of Tirana are still in its infancy and the entire system is still under formation.

To enrich this vision with more elements from the "theory of the modern-day city" (De Cauter in Xaveer de Geyter Architects, 2002, pp. 9) it would be worth to "submit" the study area to the "test" of urbanity. The book "After-sprawl" presents a list of urban features based on the thoughts exchanged between the Belgian cultural philosopher Lieven De Cauter and Xaveer de Geyter Architects (2002, pp. 9-11). Based on these thoughts, first, de Cauter grants the sense of suave to urbanity; courteous and refined ... he refers to a "kind of indifference" that forms this courteousness (Xaveer de Geyter Architects, 2002, pp. 9). In a later section De Cauter comes with a long series of urban features: "The city is a machine that connects and disconnects ... detaches people from their traditions, creating anonymity ... reduced social control, and thus the freedom to be different. In the modern world the city is a shelter for anarchists, communists, socialists, gay men, lesbians, artists, feminists, the poor, migrants. Urbanity signifies estrangement in a positive sense, the blessing of anomie.

The city is a hybridization machine where all manner of influences coalesce." As part of De Cauters' list, he summarizes the basic qualities of urbanity in the following three: Theatricality (grandeur), Hybridity (detraditionalization, courteous indifference, tolerance, etc.) and Density (critical mass, plurality, diversity, mixedness) (Xaveer de Geyter Architects, 2002, pp. 11) But most importantly, beyond understanding the status of the urban condition in our project area and listing what is lacking there, which would require further field research, something can be made clear from De Cauters' list: the wide range of expected trends supposed to create a stronger urban condition in the area. All this is happening in Tirana, especially in Tirana 5.

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2. Xaveer de Geyter Architects (2002) *After Sprawl, research for contemporary city.* NAI Publishers, Rotterdam; deSingel International Art Center, Antwerp

3. Kostov, S. (1991) *The City Shaped – Urban Patterns and Meanings through History.* Fourth printing 2003, Bulfinch Press AOL Time Warner Book Group, Boston, New York, London

4. Aymonino, C. (2000) *Il significato della città,* by Marsilio Editori, Venezia

3. Specificities of the Albanian Sprawl: layers of a new coming city

We can define the phenomenon of spreading suburbs around Tirana, and the creation of the new nucleus / towns around the urban core, with the term of "urban sprawl". At this point it is important to understand some similarities and distinctive characteristics in the occupation patterns of what we are considering here as sprawl and, specifically, the European one. References from previous studies related to this issue in the Albanian context are missing; however some evidence that needs to be further explored can be listed. The general distribution patterns in Tirana show characteristics which for the most part coincide with what is considered as the negative, global and generalized idea about sprawl: chaos, lack of structure or demonstrable catalysts. However there are big variations in the distribution patterns at different places (Xaveer de Geyter Architects, 2002, pp. 21). Looking more positively at the phenomenon, if we set aside the urban rural contradistinction, this situation may be seen as an opportunity for experimentation. In the case of the European "Blue Banana," sprawl is characterized by separate fragments that are interconnected by a dense network of infrastructure. Under these conditions, increased mobility has introduced a freedom and a choice that covers the whole territory and the inhabitants can compose their own city; the sprawl areas are no longer peripheral but have become poles of attraction. This form of development is no longer compact, or continuous, but marked by different densities alongside great voids; each fragment obeys its own logic and each area has a distinctive character (Xaveer de Geyter Architects, 2002, pp. 23, 24).

The differences in Albania derive from the different socio-economic conditions that triggered and motivated sprawl as a phenomenon. These factors include the high demand for housing in urban areas combined with the poor economic situation and the inability of people and government to provide housing, the insensitive institutional culture, the lack of an operational and realistic planning system, the total un-clarity of land property, people's total un-respect towards the rule of law, to name a few. All these contributed to the distinctive characteristics in the occupation patterns of sprawl in Albania. In relation to that, there is an important conclusion: sprawl in Albania, especially in the first period (1994-2000) started as a phenomenon of the poor people and it is this stratus of society which is still feeding new sprawl contingencies. During the last decade, this kind of informal sprawl is undergoing an organic consolidation process. Only during the last five years sprawl is also emerging as a phenomenon of rich people who are "safely isolating" themselves in gated communities around the periphery. This phenomenon is expected to grow in the next coming decade. These two typologies of sprawl differ not only from the density and quality of space, but most importantly from the quality of life, especially in terms of access to services and infrastructures. Evidently, Tirana 5 is not a sprawl area created by rich people; it is mostly an informal sprawl. In this respect, in order not to view sprawl only from a negative standpoint we can consider it also as a series of added layers in a city which is still in flux and still growing.

4. Internal space in Tirana 5: free space, public space, allowed and not allowed space

Tirana 5 is part of the dissolved city located in the vastness of former agricultural land fragmented by mega-scale textures such as the airport, or still resisting former agricultural infrastructures (drainage and storm water canals), former dairy production farms, former mine and material extraction industries, etc., and natural elements such as river streams with a lot of green alongside the river beds. Despite the "informal sprawl city" it encloses within it a lot of "free" space, which apparently is a "luxury" situation; it is difficult to make a distinction of what is really public, or what can really be accessed by the "community" (if we can use this term). A quick survey in the area evidences that most of the "free space", including the river beds, or the huge areas of former dairy production farms, the former mining industrial buildings, and other important former public assets, are illegally occupied and totally outside the attention of the local authorities. Consequently even the "free" areas in the nearest contact with the residential areas, are perceived by community as a kind of "prohibited space". The sense of "culpa" is even more perceivable when an "outside visitor" penetrates in the intimate visceral parts: typical are the river beds, or gated former public assets. The reason for that are multiple; among others, the lack of security in visiting the space, hidden illegal activities within the isolated areas (to be further investigated), or interest in illegal property development and, most importantly, no public activities are happening there, etc. This kind of pseudo-autonomy of land use makes of Tirana 5 a kind of "self-governing entity". In addition, the lack of exchanges between the residents of Tirana 5 and the "core city" reinforces even more the perception of inaccessibility, not only physically (lack of infrastructure) but, most importantly, psychologically.

This process of illegal land subdivision and sprawl started after the '90s, occupying indistinctively private or public agricultural land. What was left, mostly access roads, drainage canals, river beds and their adjacent areas, or some agricultural parcels, etc. are potentials for "public space", but not used as such. This "free" space is almost empty of activities (except the main access roads). This make it quite difficult to describe Tirana 5 through elements traditionally used to analyze a city, such as roads, squares, parks, etc. attributing quite a bizarre and peculiar character to the area.

"Typology" of images

It is important to list some unique characteristics that produce the unrepeatable image of Tirana 5. Each of them is typified with a key word expressing the sensations linked to it. This kind of reframing may be an important vehicle of transformation towards a more conscious urban condition.

Between a fairytale and a nightmare

"Bucolic": a combination between the intimacy of the private gardens and free open spaces; Flat landscape crowned by distant hills and mountain ranges, necklaces of trees alongside the river beds, houses hidden by high vegetation and bordered by vernacular fences, fruit trees within the private gardens (apples, pears, khakis, oranges, plums), unpaved former agricultural road services sheltered by big trees which create tunnels of perspective views towards open spaces; the sense of abundance and welcoming comfort.

"Alice in wonderland": discovery of unexpected and hidden facilities such as pedestrian bridges crossing over the river, small and mysterious grove (wood) along the river, experimental agricultural parcels / laboratories, curiosity to watch on the other side of the "wall" or beyond physical barriers (walls, doors, fit green, etc.) when you know something is behind; the sense of mysterious curiosity and exploration.

"The day after" scenario: absurd combinations between former industrial / mining industry and current informal occupations; images of isolated young or strange people using the abandoned structures for fun, leisure, or illegal activities; sense of insecurity, fear and inaccessibility.

Visceral-ity

"The secret core" – includes the areas alongside the river stripe; the perception of inaccessible secrecy and intimacy, challenged by the insecurity and danger in going through; this contradictory sensation generates the motive to explore the un-exhaustible core.

"Chateaux": former public assets enclosed by walls: former dairy production farms protected by walls, currently occupied by illegal activities or housing; Agriculture university campus and experimental parcels; the sense of isolation and protection as well as frustration in not being able to get in;

In the middle of nowhere

"Proletarian cities": apartment housing areas built during the communist regime in the middle of agricultural land (example: Valias); indifferent and no relation with former and existing territorial elements; in a state of severe degradation; the sense of poverty and life "frozen" in the past.

"Science-fiction within the townscape"⁵⁷: the airport represents a relatively alien structure in the middle of this mixture. It reminds us of the freedom to experiment with a futuristic approach not only at an architectural scale but also at the urban one, with sustainable community models, etc.

Grids and contrasting textures

"Agriculture grids": areas where agriculture still resists, preserved or leftovers: along the runaway strip of the airport, or around former mine industries, etc. the sense of vastness.

"Sprawl city": Here we find a wide collection of different housing typologies: mostly one-to-three story houses ranging from the "king's houses" to the "farmer's houses", or "twin-triple brothers' houses", etc. When viewed all together they create an irrational and bizarre image.

"The out-of-scale mix": textures created by mixing or putting together (unconsciously) natural and artificial elements with different scales; tiny grains of individual one to two-story houses, formal or informal, facing the immense mega-fragmentation of the former agricultural land, facing the runaway strip of the airport, or natural fragments (river beds, hills, etc.); the sense of dimensional confusion.

5. A matrix of open issues: challenging conventional planning – predicting versus inventing

The aim of this paper is not to give a definitive answer, but explore alternative and unconventional directions. We can start by listing some important issues: What kind of planning approach is needed in the area (if we can still use the conventional term planning)? Could conventional zoning / master planning instruments be effective in this case? Could a conservative restrictive approach bring more order in the area? What could be the impact on the local economy in this case? What combination of conventional and alternative approaches needs to be applied? How will Tirana 5 and the rest of "numbered cities" enter in a new type of relation with each other and with the core city? Do we want to change the character or the image of the area? If yes, to what extent? What is the fundamental DNA to be preserved and to guarantee that the area will not be sterilized? How will this be introduced in a new genetic code? How will the list of unique characteristics be used and interpreted in an opened combinatory matrix? What kind of natural and historic / human / legal restraints exist in the area? Can Tirana 5 be a promoter of a new lifestyle in the entire system? What programs should be introduced in the area in order to make this happen?

The above indicates the high degree of flexibility needed to be applied if we want to avoid unrealistic planning / projects. For this we need to be inventive.

6. Fitting sprawl into the category of urbanity – enabling coexistence

Tirana 5 can be an opportunity for courageous experimentation, a laboratory to test an open framework of opportunities where the strategy of "chance" is not completely avoided like in conventional planning ... if we don't want to risk the traditional utopian dream (Xaveer de Geyter Architects, 2002, pp. 17). Positivity and inclusiveness, often mentioned in urban studies but rarely used as transformational catalysts, may be the key to an organically regulated approach, where the freedom of creativity can still be enjoyed without creating chaos. This can start by discovering and interpreting without prejudices the existing situation, including the stigmatized areas or the "bizarre" character. This is a real challenge for a country where the only successful form of planning is considered to be the authoritarian one applied during the communist regime.

In the view presented in this book, Tirana 5 is not going to be a typical modernist extension around the existing core, or a typical (marginalized) suburb; it is also not going to be the ideal / perfect continuation based on the relations type, city, and territory. The existing developments thus far push away these options. An "eclectic" logic and lack of coherence is visible in Tirana at all levels of urban hierarchies. Tirana 5 will also not be based on the application of a single planning and design principle. Creative application of planning regulations should give credits to the local particularities in order to enable life to unfold. At a first glance it seems there are a lot of divergent things in the area, but a spatial and design plan for Tirana 5 can be effective only within the specific condition of enabling coexistence. Whatever the solutions proposed may be, most important is to recognize reality as the starting point and to envision a strategy that can enable the incremental transformation of the area.

5. Used in another context by Rowe and Koetter in "collage city"

Reframing chaos into complexity without eradicating the layers of real life is vital in avoiding utopist approaches. Tirana 5 can be considered as a palimpsest where more layers can be recorded and more programs that are missing, not only in the area but in the entire metropolitan system, can be located. This palimpsest contains not only the traces recorded over by the recent organic human movements, but also the former territorial, agricultural, or industrial grids including the ones left by decomposed pathological structures. Inserting new programs and creating more legibility from reconfiguring undiscovered "traces" may be a way to give a new meaning and identity to the entire sprawl system.

7. All-inclusive urban design approaches – some theoretical references

Within this all-embracing inclusiveness and enabling approach, a similar urban design strategy open to people's creativity is needed. In the following paragraphs there are some theoretical references which lead in a similar direction. Despite most of them having been written for a different reality and a different period they constitute an important source of inspiration. Venturi is one of them. He recaptured the mechanism of a more complex architecture that valued freedom over norm. He was arguing that Reality architecture is not simple and that we cannot ignore the multiplicity of factors which is architecture's duty to address⁶ (Venturi, 1977) ... Further, he continues, I like elements which are hybrid rather than "pure", compromising rather than "clean", distorted rather than "straightforward", ambiguous rather than "articulated", ... I'm for messy vitality over obvious unity. But an architecture of complexity and contradiction has a special obligation toward the whole: its truth must be in its totality or its implications of totality. It must embody the difficult unity of inclusion rather than the easy unity of exclusion (Venturi, 1977 pp. 22-23). Even this was written as a denunciation of the ideology of modern architecture and we can use it as a "denunciation" against any form of technocratic form of planning, design and architecture. An all-embracing inclusiveness towards things, people and their behavior is expressed by De Geyter in the book *After Sprawl - research for contemporary city* (2002) which I referred and cited above, and also in the book *Tirana Metropolis*. To note here is the fact that both cases are visions beyond planning.

Tirana Metropolis (The Berlage Institute, 2004) is a strategic vision for the definition of a more intelligible metropolitan geography. The city is seen as an archipelago: complementary centralities outside the city center. This vision consists of projects that propose to reinforce what already exists by following a super contextual approach; It would be worth mentioning some of them: "Fine and tuning" that proposes to discover in the existing urban tissues spatial devices that have sustainable effect on the city; "Reinforcing patterns and structures" that attempts to radically transform the urban experience through small scale design instruments; "Structuring Tirana in Formation" that proposes to fully benefit from the city existing natural and urban assets across the entire topography; "Modes of Concentration" that deals with the configuration of the strategic centralities discovering the latent local conditions; "Parallel Tirana", a mirror-ring city, a vision that reflects on the epidemic of sprawl in Tirana; "Durana" an imaginative anticipation of an eventual fusion of Tirana and Durres in a new Metropolis with a green heart in between (The Berlage Institute, 2004, pp. 21, 22).

There are also some other important ideas and principles we can learn from "Collage city", a research work conducted by Rowe, and Koetter⁷ (1978), as an anti-utopian theory of urban design based on a revisionist version of the Modern Movement. Analyzing the end of the city of modern architecture, they raise some dilemmas and argue for a more open and inclusive approach for sanitation of chaos through the collage technique (an alternative of modern proposals): eclectic, hybrid, juxtaposition, and layering are presented as formal correlatives conducive to urban life. Can we also find solutions that favor the coexistence of different models? In terms of this question, they argue that the situation to be hopped for should be the one which might allow for the joint existence of the overtly planned and the genuinely unplanned, of the set piece and the accident, of the public and the private, of the state and the individual (Rowe and Koetter, 1978, pp. 83). From their rigorous analyses, contrasting figure-ground images of urban modernist proposals with the rich and continuous texture of historic urban contexts, they bring to attention some important design principles such as: the urbanistically active model: responsive to the close context engaging empirical circumstances and at the same time stipulating an ideal world, reconciling self-conscious order and spontaneous randomness, conferring value upon both new and old (Rowe and Koetter, 1978, pp. 68); or they speak about the use of multiple design strategies: simultaneously the empiricist reaction to site and the idealist concern with normative condition, passive recipient through responding, adjusting, translating, asserting and active reverberator (Rowe and Koetter, 1978, pp. 72, 77). These strategies can be used to provoke the lack of sensitivity and the total absence of human touch and inspiration in the Albanian technocratic approach. This requires, amongst others a different education for architects and urban planners.

Another urban design approach relevant for the area is the one based on the perception and experience of the specific places. Gordon Cullen's focus on townscape as opposed to the rationalism of modern theory, despite a tendency to see his position as simply picturesque, illustrates a theory based not on images but on visual relationships that evoke a broad range of human responses (Cullen, 1961, in Watson, D. et.al, pp. 3.1-1)⁸. According to this author, we can try to unlock the surplus of vision to evoke memories and emotions which have the power to disturb the mind. He argues that this happens in three ways: Concerning optics, which examine the serial visions that divide the environment in here and there, and create the drama of juxtaposition of existing and emerging views; Concerning place, which examines the sense of position of our body and the experiences from the impacts of exposure and enclosure; and concerning content, which examines the fabric of the town / landscape: color, texture, scale, style, character, personality, uniqueness (Cullen, 1961, in Watson, D. et.al, pp. 3.1-2, 3.1-3, 3.1-4). Tirana 5 embodies a series of characteristics that may be examined under the townscape optics of the ... "accident ... the tendency to provide sensation without plan, to appeal to the eye not to the mind ... sponsoring a perceptual world"⁹ (Rowe and Koetter 1978, pp. 33)

6. Venturi, R. (1977) *Complexity and Contradiction in Architecture*. Second edition, 1977; The Museum of Modern Art, New York

7. Rowe, C. and Koetter, F. (1978) *Collage City*. The MIT Press Cambridge, Massachusetts and London, England

8. Cullen, G. (1961) *Introduction to townscape*. In: *Time-Saver Standards for Urban Design*, Editors Watson, D. Plattus, A. Shibley, R.G. McGraw-Hill, credits: the article is reprinted from *Townscape*, Architectural Press, London 1961, with permission of the publisher.

9. Cited from *Collage City*

8. Reinventing Tirana 5: interstitial city Vs dichotomy-ic city

What to do with the city of sprawl? It shares nothing similar with the city of modern architecture, nor with the traditional historic city. It is a city in an advanced state of dissolution with a lot of interstitial spaces formed by a mixture of natural, agricultural, or all kind of uses in between. The challenge would be to create a more legible urban condition in Tirana 5 and to conjecture a "form" with a catalytic role in favor of public consciousness. This interstitial stripe model, enriched with catalytic programs symbolically considered as "forests" of social instruments, can feed the unrealized dream of an "ever-evolving return to nature" (hired from Rowe & Koetter, pp. 51). Thus sprawl city supposedly is a transitory status where nature and the city can be potentially hybridized. This can be an inspiring concept to provide another option to the classic dichotomy center and periphery. This reorganized interstitial system and the specific elements within it may be the structuring formula or the backbone for rationalization of sprawl and re-aggregation towards new urban foci. They will be the urban containers to incubate social interaction which is an important element for urban condition and urbanity. At the same time, the labyrinth structure of the existing units will be one of the specific patterns to be reinforced maintaining the character of deviating perspectives, closing internally, and creating the intimacy of the hidden "private Eden". Along these lines of thinking, Tirana 5 can present an alternative to the monoblock building schemes which is typical for Tirana and cities in general.

In conclusion we address some important issues: will the architect or the urban planner be the protagonist of a new social and cultural integration of the Albanian society? Will architects and planners finally demonstrate their serious commitment to this aim? To overcome these limitations architects need to go beyond the conformist taboos and appeal to the power of the mind to reframe the stigmatized existing situation in a new identity. As Bandler and Grinder¹⁰ (1982) argue, all behavior takes place in some context. The meaning that any event has depends upon the "frame" in which we perceive it. When we change the frame we change the meaning (Bandler and Grinder, 1982). Framing is another word for contextualization, and reframing is re-contextualization. In a similar way the architect can help others "see" a new / different point of view and take others factors into consideration. Reframing is also crucial in the creative process through the ability to put a commonplace event in a new frame that is enjoyable ... this has to do with the ability to simultaneously associate an event in two separate and different contexts, as Koestler calls it, "bisociation" (in Bandler and Grinder, 1982). Thus instead of looking at the existing context as chaotic we can look at it as a complex and multilayered phenomena. Reading / discovering the hidden potentials is the first step towards discovering the richness and specificity of the urban patterns. Then, reframing should guarantee the passage from "unreadable" to a legible "urban text" as a more conscious and community shared experience. Instead of "killing" the richness of the context we can reframe / recreate the existing in a new identity.

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Supermassive Public Space

A research on Skanderbeg Square in Tirana as a fully dense empty space and the possibility to understand it using art and architecture, through different levels of Time.

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Glaciers melting in the dead of night

And the superstars sucked into the super massive (you set my soul alight)

Muse – Supermassive Black hole

keywords SMBH, Supermassive Black hole, Black hole, Space, Time, Universe, Public Space, Architecture, Art, Art in Public Space, Skanderbeg square, Tirana, Albania.

1. The sound of the Universe

On September 14th, 2015 we heard the sound of the beginning of the Universe through an experiment started 50 years ago, when a few scientists imagined a technology that wasn't yet invented, to capture the sound of the universe. The chirp the scientists were able to record, travelled over a billion light years to reach us. Over a billion light years ago, somewhere in the cosmos two massive black holes they slam together, this encounter creates waves that spread outward. Waves of gravity fifty times the power of the entire universe. At that moment on our planet the supercontinents were forming. The waves continues their journey till that night, September 14, 2015 when finally they hit our planet and in the laboratory of LIGO¹, scientists record this sound which is made of the same fabric of our space and time. This was the evidence of the existence of black holes (fig. 1).

When Albert Einstein started to developed his general theory of relativity in 1916 he understood the existence of a strength capable of tied together the celestial bodies in the universe. This strength was the universal gravitation and Einstein demonstrate, in the beginning in an intuitive way, that the universal gravitation in its circular rotation was at the base of the functioning of the universe, as John Archibald Wheeler wrote later: « matter tells Space-Time how to curve, and Space-Time tells matter how to move» (Wheeler, 1973: 75)

The universal gravitational law has at its origin an infinite strength, so power and dense to generate a so dense time-space area that Einstein himself could not believe it was possible that such a thing could exists. He discovered the black holes, even if he doesn't accepted his own discovery. Actually the term black hole began to be use to describe this very dense areas of the universe, which works as a Binary Star, only from the beginning of the Sixties. The term has been taken from another very dense space in India, a dungeon named "The Black hole of Calcutta". During the Seventh Years war², on June 20th 1756,

1. LIGO: Laser Interferometer Gravitational Wave Observatory, more info at: <https://www.ligo.caltech.edu/>

2. In India, the outbreak of the Seven Years' War in Europe renewed the long running conflict between the French and the British trading companies for influence on the subcontinent.

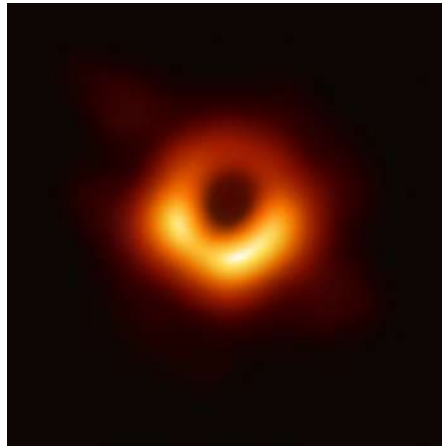


Fig.1

the nawab of Bengal attacked the European Troops in Calcutta, 146 soldiers were imprisoned in the Black Hole, a room 18 feet (5.5 meters) long and 14 feet (4 meters) wide, with two small windows. The prisoners were packed so tightly that the door was difficult to close. 123 people died from suffocation and heat exhaustion during the night (fig. 2).

2. A fully dense empty space

One can imagine that scientists were so scared about the power of the Binary Stars they discover, to name them as a tiny, dense space on earth that caused the death of hundreds of people. The macabre similarity stands in the concentration of atoms the two shares together. The Black Hole of Calcutta was a space originally imagined to imprison not more than two, three men at the time, the overcrowded situation of the night of June 20th, 1756, created an unnatural density for that space that caused the death of all those people. Black holes they have that kind of density, it is not possible here to use the word unnatural, because black holes with their structure and behavior are part of our universe, but it is a so concentrated density, that even light cannot escape from it. The inner region of a black hole, where the object's mass lies, is known as its singularity, the single point with zero-volume in space-time where the mass of the black hole is concentrated. The black holes are of different weight and power and scientists nowadays are convinced black holes are responsible for the structure of the universe as we know it. Over the past decades in fact researchers discover that every galaxy has at least one black hole in their central regions. These black holes have a size millions, sometimes billions, of solar masses. Even the Milky Way, our home galaxy, has at its center, a four million solar mass black hole. Is it really possible for humans to imagine such a mind-blowing object? Researchers said, for the sake of argument, if one could be in the middle of a black hole, he/she would see the future of the universe happens in front of his/her eyes. Black holes are made of the same fabric of the space-time of the universe, so the perception of space and time it could not be the same we experience in our understanding of reality.

Yet humans named those objects as a very physical space, a prison, something which is supposed you could not escape from. There are other spaces humans build that have, for various reasons, those characteristics of density and where the perception of time and space it's completely altered, because of a different physical or emotional approach to those places. This paper will focus on one specific area, Skanderbeg Square, the main square of Tirana, the capital of Albania, describing how the void of the around 40.000 m² of the square is actually a fully dense empty space, that would be possible to read using art and architecture through different levels of Time.



Fig.2

3. The supermassive public space

Skanderbeg Square is dedicated to the Albanian national hero: Gjergji Kastriot Skënderbeu. The square has a long story of changes during its almost 80 years of life, it started with the first masterplan of the city developed during the Italian occupation in the forties by two Italian architects and engineers Florestano Di Fausto and Armando Brasini. They drew the square surrounded by buildings in perfect neo-renaissance-style and a boulevard that moved in the two directions of the square (north-south). The square was a roundabout with a fountain in the center. At the end of the Second World War, the Italian troops withdrew and a Socialist Government started in Albania (fig. 3). This government changed very soon into a very harsh communist regime and Skanderbeg Square was used as the reference point for the propaganda of the Grandeur of the regime. A statue of Stalin was erected in 1951 at the south entrance of the square. This statue was substitute in 1968 with the statue of the national hero Gjergji Kastriot Skënderbeu. In the following years, other emblematic buildings were erected reinforcing the borders of the square; on the northern side there is the Tirana International Hotel (1979) and the National History Museum (1981), the country's biggest museum. On the eastern side, where the old Ottoman bazaar used to be, there are the Palace of Culture (1963), which houses also the National Theatre of Opera and Ballet (1953) and the National Library (1922). Next to the Palace of Culture there are the eighteenth-century Et'hem Bey Mosque (1819) and the Clock Tower (1822). The mosque is one of the few religious edifices spared by the communist regime. The Tirana International Hotel was constructed on the former site of the old Orthodox cathedral. Moreover, several government buildings are situated around the square, these including the City Council, the National Bank, and the Ministries of the Economy, Agriculture, Infrastructure, and Energy (fig. 4).

When Enver Hoxha died in 1985 the celebration of his person happened in Skanderbeg Square, a kilometric row of crying people moved slowly along the boulevard to reach the coffin with the dictator corpse. Independently from the party, that forced people to honor the figure of Enver Hoxha, this was one of the strongest event happened in the square since the end of Second World War II. Again another strong and symbolic act was the erection of a huge monument in bronze to Enver Hoxha in 1988, on the west side of the square, monument that was toppled by Albanian citizens rose up in a mass protest against the dictatorship in 1991.



Fig.3-4

At the end of the regime, with the beginning of the democracy and the first phases of capitalism in the Country, Skanderbeg square was again one of the crucial point of reflection of the identity of the entire city (fig. 5). In the beginning of the thousands, the square was a kind of roundabout with some fountains situated in the north part of the square and an empty space in the middle that was divided from the car traffic only with the aim of some big planters. In 2004 a French studio (architecture studio), drew a new concept for the square trying to densify the area through the construction of a number of towers all around the square. In 2008 the former major of Tirana Edi Rama decided to give a more "European" identity to the square, transforming it into a pedestrian area. He organized an international competition won by the Belgian studio 51n4e, which proposed a project realized together with the Albanian internationally well-known artist, Anri Sala. In 2011 the Democratic Party won the local elections and the new major, Lulzim Basha, aborted the project transforming the image of the square completely, with a project drew by the Tirana Municipality. The result was a huge roundabout with a green area in the middle that left alone and isolated the statue of Skanderbeg, depriving the square of any possible interaction with people (fig. 6). In 2016 the socialist party won again the administrative elections and the new major, Erion Veliaj, implemented the previous project of the transformation of the all area of the square into a pedestrian space, adding other decorative elements. The final project was than initiated in 2017. Today (2020) Skanderbeg Square, in the description of 51N4E studio: «presents itself as a void in the chaos of the city, a flat pyramid lined by a densely planted periphery, formed by a collection of old and new public spaces and gardens. The resulting green belt acts as an antechamber negotiating the transition between the congested city and the square. The oppressive monumentality of communist architecture is counteracted by the ample and low pyramid making up the square: when standing at its tip, the citizens find themselves on a par with the authoritarian architecture of the past». The square is a void space of 40.000m² paved with stones from all over Albania and ground fountains situated alongside and at various points of the square, but is not exactly flat, as the architects described, the square is shaped like a pyramid with a slope of 2.5%. The pyramid shape was the result of the collaboration with Albanian artist Anri Sala, who imagined the possibility for all people passing by the square to have a favored point of view when in the middle of the pedestrian area. A point of view that place people at a highest level, as they are on a "pedestal". The idea of the pyramid-shape flooring, link us to another architecture of the city, the so-called pyramid, located not far away from Skanderbeg square, along the boulevard south to the square, an object built after the death of the dictator, originally thought to be the funeral mausoleum of Enver Hoxha. It is possible to declare that in this solution there's also a kind of revenge towards the figure of Enver Hoxha and the power he took from the people during his 50 years regime (fig. 7).



Fig. 5-6-7

In almost 80 years Skanderbeg square changed completely its shape 5 times, as if something was always missing, or as if changing its shape, politicians could assert their power. It's a strange destiny, that of Skanderbeg square, always changing but always a crucial area of the city. In this discourse it is particularly relevant the actual shape of the square, as if its atoms had found a kind of equilibrium, an equilibrium that can stand stronger than the previous ones. It could seem a dichotomy, because nowadays the square is nothing but a 40.000m² empty space, but this shape could be actually stronger than the previous ones, just because it's a huge void surrounded by almost the same "historical" buildings (fig. 8).

Once in the middle of Skanderbeg square, close to the tip of the pyramid, one can feel a physical distance from all the buildings around it (fig. 9). A new understanding of the space is now possible, starting from the shape of the square, we are on the highest part of the area and our gaze is different, so it is also our body. According to Maurice Merleau-Ponty « my body is a thing among things; it is one of them. It is caught in the fabric of the world, and its cohesion is that of a thing. But because it moves itself and sees, it holds things in a circle around itself. Things are an annex or prolongation of itself; they are incrustated in its flesh, they are part of its full definition; the world is made of the very stuff of the body» (Merleau-Ponty, 1964: 125). This means our perception of reality is different depending on our gaze on it, depending on our physical relation with it. The new shape of Skanderbeg square creates a new understanding on reality, starting from its very physical relation with space. Walking through the square one is walking "on" an artwork, with a slope of 2.5% that gives back a moving perspective that change step by step. Still we're in the middle of a void, but this void is full of different perspectives on reality, and these new points of view are a direct consequence of the shape of the square. The square is a Time-kaleidoscope which creates new images according to our eyes and body movements (fig. 10).



Fig. 8-9-10

4. All the Time, all around us

From the beginning of its modern foundation, Tirana discovered the peculiar strength of Skanderbeg square. A magnetic strength able to attract the most important events of the city, and of all Albania in its perimeter. From the beginning of its history Skanderbeg square has been a pivotal area of the city, the main boulevard, still today the main axis of the city, developed from the square as its own center.

The square was used as a manifesto for the propaganda of the Enver Hoxha's dictatorship. Again the square was the main spot of the revolts against the political power. Skanderbeg square witnessed all the important events of Albanian socio/political history. Now, in the newest configuration of the space of the square, once in the middle of it, close to the tip of the pyramid, one can feel a physical distance from all the buildings around. This distance is not empty, at the contrary, it is the densest space in all Albania. It is a space very similar to the inner region of a black hole, from where our speculation started. The region where the object's mass lies, known as its singularity, the single point with zero-volume in space-time, where the mass of the black hole is concentrated.

Scientists stated that time do not really exist, it is a matter of gravity and masses of the celestial bodies orbiting in the universe. Their move tells space-time how to curve and space-time tells them how to move. So time is a matter of magnetic strength, that strength also Skanderbeg square carry out all around it. From the singularity of a black hole one can eventually see time happening from the past to the future of the universe, the same happen in the singularity of Skanderbeg square, on the tip of that pyramid, one eventually see the past and the future of Albania happening all around, with any possibility to escape this dimension. So as black holes are responsible for the structure of the universe as we know it, we could state that Skanderbeg square is responsible for the structure of Tirana as we know it.

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Picture Credits

Figure 1: Image of Black Hole, Messier 87 taken from: <https://www.eso.org/public/images/eso1907a/>

Figure 2: The Black hole june 20, 1756. Unknown author. Public/domain taken from: https://en.wikipedia.org/wiki/Black_Hole_of_Calcutta#/media/File:The_Black_hole'_june_20_1756.jpg

Figure 3: Skanderbeg square in 1943. Unknown author. Public/domain taken from: [Bundesarchiv_Bild_1011-049-1605-30A,_Tirana,_Raupenschlepper_Ost_mit_Anhänger.jpg](https://www.bundesarchiv.de/Bild_1011-049-1605-30A,_Tirana,_Raupenschlepper_Ost_mit_Anhänger.jpg)

Figure 4: Skanderbeg square in 1963. Unknown author. Public/domain taken from: http://www.fortepan.hu/_photo/download/fortepan_41847.jpg

Figure 5: Skanderbeg square in 1988. Author: Peter. Public/domain taken from: <https://www.flickr.com/photos/80942291@N00/480483177>

Figure 6: Skanderbeg square in 2012. Author: Alban1989. Public/domain taken from: https://en.wikipedia.org/wiki/File:Tirana_Night_View.jpg

Figure 7/8/9/10: Skanderbeg square in 2020. Author: Stefano Romano

Building classification according to the period of construction and their typology.

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The buildings in Albania, throughout history, belongs to different typologies according to different construction periods, that means a variety of sizes, shapes, functions, building materials etc. There are buildings based on national design codes which date from 1963 to the last one still officially use in Albania, which was in 1989. Recently there are different types of objects designed according to European codes. Another typology of constructions is that one based on traditional techniques without a consultation with an architect or an engineer and with poor quality material. Since Tirana, as the capital of Albania, is a city with a variety of buildings and it doesn't exist yet a study for buildings classification, the objective of this paper is to make that one according to some main time periods and the typology of construction. As a purpose, we will be able to highlight the problems occurred in any construction period, whether in terms of design, materials or project implementation technique. The methods will be based on visual inspection combined with maps taken from GIS and statistical processing of data collected in the field. The final output is to make a database for the classification of buildings according to the time, typology and their damages that will be useful for new researchers, academic etc.

keywords objects, classification, typology,

1. Background

Tirana the capital city of Republic of Albania is the biggest city in the country by the area and the population. The country has gone through different historical periods which have led to diversity in the typology of housing construction. There may be several classification of the buildings based on different criteria such as the time of building, the age of the building, according to the design code, material or constructive system. In this paper we will focus on the classification according to the construction period and the constructive system. Each period has had its own characteristics in the construction methodology, in the design codes, in the techniques and in the materials used.

Typical residential buildings are design and implemented mainly with the masonry technique, as one of the most economical and widespread techniques for the time.

- Building before 1944 (based on time experience)
- Building in the years 1944-1963 (based on KTP-1952);
- Building in the years 1964-1978 (based on KTP-1963);
- Buildings in the years 1979-1990 (based on KTP-9-78);
- Building after 1991 (based on KTP-N.2-89);
-

The transition from one period to another did not take place immediately. During different periods new typologies appear but at the same time they continue to use the previously ones and to build new buildings with typologies of the previous period. Even today it is built using traditional techniques

but modern materials.

The first codes used were those proposed by the Russians then the KTP (Kushte Teknike Projektimi) were introduced starting from KTP-52 in 1952, KTP- 63 in 1963, KTP 1,2,3,4,5,6,7,8,9- 78 in 1978 and the last one KTP-89 of 1989.

2. Classification

2.1 Building before 1944 (based on time experience)

Buildings before 1944 are built were built based on traditional techniques or the traditions of the regime of that time. The structure of the city was that of a city of Ottoman character or between the years 1939-1944 were influenced by the Italian fascist regime.

Tirana home: one of the earliest typologies of construction in Tirana and which is one of the most characteristic buildings in the entire territory of Albania. This residential typology is also called the "Fire House" because the fire room is surrounded on all four sides by other living quarters. The constructive system of this typology is built with retaining stone or brick walls with a thickness of 38-50 cm. Stairs are made by wooden construction. Some of the most famous building before 1944.



Fig. 1: Villa "Pustina" built in 1927, on the street "Qemal Stafa"(source: accessed 02/09/2020)

In 1929 another typical housing model was introduced by Arc. KOHLER. These apartments were already used by more than one family. The spaces have another division and no more concentrated around the fire room.

MOSCATES buildings built in 1940, located in the Quarter between the streets "MUHAMET GJOLLESA" and "SAMI FRASHERIT". This object has been repeated in the complex on the edge of Lanes.

AERONAUTICA villas, these villas are located in the new Tirana in the quarter between SAMI FRASHERI streets, BAJRAM CURRI boulevard and GJIN BUE SHPATA street.

Typical plans of the buildings (TIP) on the edge of Lana river, this typology is located in the quarter between SAMI FRASHERI and ZHAN D'ARC street and has been repeated 4 times.

2.2 Building in the years 1944-1963 (based on KTP-1952)

During this period in Albania was presented the first design code in 1952, before that year was used the Russian codes.

Buildings of 1958 type "2BT" that are 2-storey buildings. The novelty this year is the use of spread footing foundation, the use of brick element and the roof beams are montage. The living conditions were much improved because the apartment is plastered both inside and outside.



Fig. 2: Building built with red brick in 1963 (source: the author)

2.3 Building in the years 1964-1978 (based on KTP-1963)

During this period the buildings began to be designed with KTP 1963 which was later improved to KTP 1978. The seismic performance of the buildings was improved by taking in consideration the effect of the earthquake in the building. The buildings were designed for areas with intensity 7-8. Although the construction system was made of load bearing masonry, we also have some constructive elements such as reinforced concrete lintels. Seismic calculations in these years was based on the seismic map of 1963.

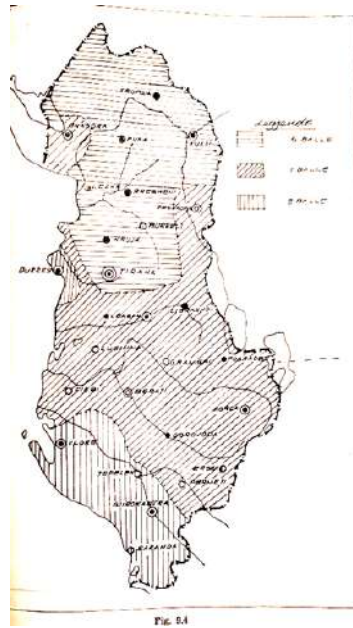


Fig. 3: Intensity zonation used from 1963 (source: IGJEUM)

These years were characterized by TIP (same plan of the building in different area), buildings with reinforced ceramics such as the one of 1977 which was later created in several subdivisions such as; TIP 77/4, 77/11.



Fig. 4: Typology 77/4 (source: Guri M. (2015))

2.4 Buildings in the years 1979-1990 (based on KTP-9-78)

Over the years, the construction of buildings in Tirana has improved, not only in terms of plan schemes (expansion of spaces, addition of new functional facilities), but also with the evolution of constructive schemes (new typologies of foundations, soles, use of concrete-reinforced skeleton type), use of new construction materials, etc. As we will see below the reinforced concrete material will start to have a fairly wide spread and gradually become the most used material.

From 1979- 1990 further improvements were made in order for the structure to better react to seismic loading. The joints were detailed better, reinforced anti-seismic columns in the corner or crossed wall sections of the buildings were added. All the columns were connected with the anti-seismic belt. Together with the masonry structures the application of prefabricated structures continued. In this period the first high-rise reinforced concrete building

was constructed in Tirana, it had 15 floors and it was used and still works as a hotel (Tirana International Hotel). According these code, seismic load is determined as follows:

$$S_k = Q_k \cdot k_E \cdot \beta \cdot m_k$$

Formule 1: (Seismic load according to KTP 78)

In this period, we distinguish some typologies of constructions analysed below:

- The first type: " TIP building with reinforced ceramic slab " – build in 1977. The buildings were designed for areas with intensity 7-8. There were used prefabricated reinforced concrete elements which helped in the construction process and in shortening the construction time.
- Prefabricated buildings – build in 1980. In these years not only some elements were prefabricated but the whole building except the foundations which in some cases could be monolithic.
- Type apartment with reinforced concrete frame - build in 1982. In the apartments of 1982 we have some innovations in constructions both in the architectural aspect and in the constructive one. In the constructions of this type we have slightly smaller spaces compared to the prefabricated buildings, with a column pitch of 3.4 m and 4.2m. In the constructive aspect, we can mention the use of footing type foundations, which are connected with beams for prefabrication, the use of concrete-reinforced frames; brick is used only for plowing the premises, so it has no supporting function.
- TIP building with pre-reinforced concrete slabs - build in 1983
- TIP buildings with core system build in 1988

2.5 Building after 1991 (based on KTP-N.2-89)

Political and economic changes after 1991 have dramatically influenced the architecture and urban development in Albania. From 1989 until the 2000s no state control and no building regulations were established even though the construction sector in Albania had a huge progress. In 2001 the Minister of Public Works organized the workshop which was focused on the importance of Eurocodes in the construction sector, after the workshop for several years a grouping team was formed with the aim of translating and adopting the Eurocodes with the national directives. Beside the work these codes served only as drafts not as directives to be used by the specialists. Only after the earthquake of November 26, 2019 the Albanian government approved the original version of Eurocode 8 (not translated).

Seismic events occurring in previous years required revision of design codes and a revision of the seismic map of Albania so from the 1963 map they switched to the 1989 map as showed below:

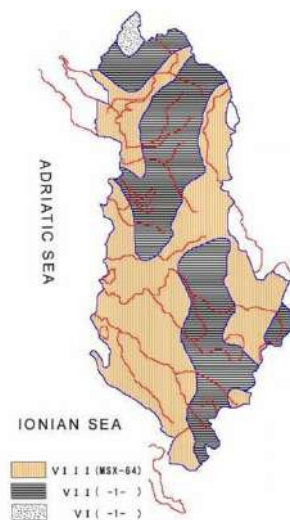


Fig. 5: Intensity zonation used from 1989 (source: IGJEUM)

According these code, seismic load is determined as follows:

$$E_{ki} = K_E \cdot K_r \cdot \psi \cdot \beta_i \cdot \eta_{ki} \cdot Q_k$$

Formule 2: (Seismic load according to KTP-N2-89)

Some of the most used construction system

Frame. The joining of the beams and columns forms the reinforced concrete skeleton. Structures with concrete-reinforced skeletons are also called frame structures. The frame is the geometrically unchanging and statically stable unity of columns and beams. In the structural frame systems the coping of horizontal and vertical forces is entrusted to the spatial frame. The beams must be able to withstand without being destroyed by all the vertical

forces that discharge from the slab into them (permanent + temporary loads).

Shear Walls. This system consists on vertical concrete-reinforced walls that work as shear walls and beams. The walls are reinforced with vertical and horizontal reinforcement. Placement of walls in the cut along the perimeter of building is advisable to cope twisting moments.

Dual. It consists of columns, beams, reinforced concrete walls, cores. In all cases it should be avoided as much as possible the twist, as they are created as a consequence of tangential stresses.

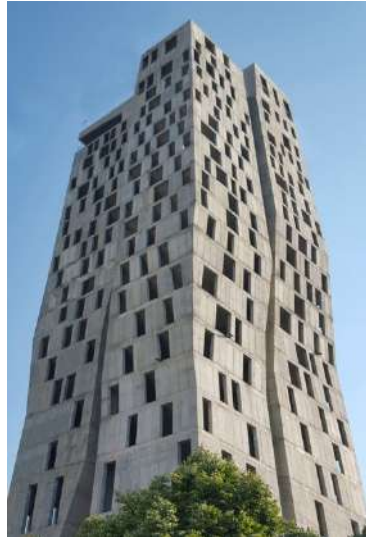


Fig. 6: Shear wall building, (source: <https://ales.al/project/4evergreen-tower-center-of-tirana/?lang=sq>)

3. Typological risks

For each of the aforementioned typologies an analysis regarding the damages will be done for four main actions:

1. Degradation by seniority and atmospheric agents
2. Damage from human activity
3. Damage from foundation settlement
4. Damage from seismic activity

Damage in different typologies of structures

- Unreinforced and reinforced masonry structures
- Degradation by seniority and atmospheric agents

The exposure of an object towards atmospheric agents lead to a number of damages which can be listed below:

- Damages from material degradation
- Carbonization, Sulfate Degradation
- Erosion
- Freeze-thaw degradation
- The effects of strain
- Damage from human activity

After the 90s in all of these structures there have been several interventions from the habitants in order to gain space in their dwellings. The interventions have resulted in changes regarding the performance of these objects and have led to an increasing potential of damages. The interventions may be classified as side vertical and horizontal extensions over existing floors. A characteristic intervention for this typology is that of water deposits on the terraces and the usage of balconies for different purposes.

Damage from foundation settlement

The foundation for this kind of typology are the strip foundations made of concrete or stone which are prone to the settlements to due the weight of the structure itself and the subsoil conditions. The Tirana region is mainly characterized by weak soil deposits and this is the reason why a number of structures have had differential settlements which have resulted in cracks in the masonry.

Damage from seismic activity

As all the Albanian territory, Tirana also is prone to earthquakes with values of PGA varying from 0.25g to 0.37g. The effects this event can have on this typology can be classified in two types of damages:

- Damage to In-Plane Walls
- Damage to Out-of-Plane Walls
- Reinforced concrete structures

The damages in these structures are tightly depended with the typology of the reinforced system. For example, in the frame system the orientation of frame

is the main factor that controls the damages in the joints and the infill walls (the orientation of columns), in the case of dual systems or wall systems the wrong distribution of shear walls can bring problems related to the torsion which can highly affect the structure structural stability.

Regarding the degradation due to atmospheric action for this typology some of the following problems are present:

- The concrete cover of the reinforcement can be damaged due to erosion and therefore the reinforcement will be exposed and eventually corroded
- Freeze-thaw degradation
- Carbonization- sulfate degradation

4. Conclusions

Since the performance of every structure under an earthquake is different it is necessary to carefully study each of these building's performance based on proper methodologies and depending on the results of evaluation proper reinforcement measures need to be taken in consideration where needed. In order to do so there is a fundamental need of classifying the structures based on several factors like: the time of construction, quality of materials, structural systems. Beside the classification the maps that give the values of PGA and geological configuration are also a must. The aim of this report, based on the detailed methodology given in the beginning of the document, was to give a general idea about the collapse mechanism taking in consideration their structural system. The evaluation was done based only on the visual inspection by carefully studying pictures and photos and also using site visit.

It is given, in a theoretical way, some of the techniques to be used for the improvement of the seismic performance for different structural systems. After the first 6 months after the earthquake, some of these structures were reinforced based on the technologies mentioned in the report. Based on experience in New Zealand Building Act 2004, there is a need of determining a percentage of strength for which the building is considered earthquake prone compared with new building standards. For the case of New Zealand this percentage is around 34 %. According to A. Charleson "*... following the damage of the recent Durres earthquake, Albanian designers need to avoid the incompatibility of large areas of exterior and interior stiff and brittle hollow brick masonry walls and flexible reinforced concrete frames*" which is of course applicable even for the case of Tirana.

Taking in consideration the aforementioned conclusions and recommendations some of the interventions and measures the municipality can make are listed below:

1. The creation of a database regarding several important information about the buildings. This database includes information in the form of tables, graphs and specially maps that would give a complete overview regarding the buildings in terms of time of construction and structural typologies and possible existing interventions for the upgrade of the performance.
2. The hiring of specialized structural engineers is very important to achieve the creation of the database
3. Based on the information from the database and the advanced analysis as given from the methodology in the beginning of the report an evaluation regarding the risk imposed to each of these buildings from a potential earthquake can be given. In this way a pre- earthquake evaluation can be done rather than post- earthquake interventions. This risk will be given to decision- making authorities.
4. The experience offered by New Zealand can be an important point even for the Tirana municipality for estimating if a building is earthquake prone or not. The percentage for which these buildings are considered earthquake prone (34% for New Zealand) must be carefully decided by the engineers hired by the municipality. This percentage is important also because it is tightly related to the economical part. After the obtained results it must be given a specified time (in case of need for intervention) for properly upgrading the building. The time is decided by the council of municipality and if the owner does not reflect the changes then the object will be demolished.

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Reconstruction with the principle 'where is was, as it was'

The case of National Theater, Albania

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In terms of urban heritage monuments, those located inside the city core, in Albania, are often target to new development, disregarding the cultural heritage values, and though destroying them partially or totally. The purpose of this paper is to clarify the importance of National Theater (Teatri Kombëtar) of Albania, from the point of view of citizens architects and historians. The building was destroyed on 17 Maj 2020, after a protest in its protection was on by 27 months. The research questions is if historians, architects and the citizens, think that the National Theater carries enough cultural heritage values and to be built 'Where it was! As it was?' case study should be defined as Research strategy is chosen as case study the National Theater, in order to inquire and investigate the phenomenon within its real-life context. As instruments are used interviews to citizens part of the target group. Desk research is conducted to also evaluate the three variables taken into consideration for purpose of this research: the historical values of the building; the architectonic values; social and cultural values, from the point of view of the target group. Part of the interviews the citizens part of the protest's group in protection of the theater, called 'Alliance for the protection of the theater'¹ as a group of interest. As conclusion to the research, on the point of view of the interviewers, the National Theater, carries architectonic, historic and social values as a to be reconstructed with the principle 'Where is was! As it was!'

keywords cultural heritage, common heritage, 'where it was, as it was', destruction, reconstruction

1. Introduction

Culture Heritage are in great danger. Beside benign architectural and archeological natural disasters and man-made disasters such as war, civil conflicts or uncontrolled development are the major factors that contribute to the destruction of the heritage sites. Since 1954, European Cultural Convention, heritage has been identified as a vehicle for building peace and a new cultural and political cohesion. The abandonment and lack of maintenance are the main causes these sites are intended to be destroyed due to natural causes. Since these eminent threats are often inevitable, their values, are often multiplied after demolition. In Albania, cultural heritages are poorly maintained and with lack of investments. As the country is politically and economically not stable, heritage is perceived as a luxury.

2. The National Theater Albania

The National Theater was demolished on the 17th of May 2020 at 4:30 am through an operation of the municipality of Tirana supported by around 1500 policemen. The demolition decision and the unprecedented form of the destruction, by dawn at 4.30 AM, during a global pandemic lockdown, caught the Albanian society unprepared for what would happen next. Public opinion described the act barbaric and the method used a terrorist one. They approached the scene to the ones seen during Kosova war, when Serbs military bombed the historical sites of the country.

The European Union through the Commissioner for Culture Mariya Gabriel and Europa Nostra, had in the previous days before the demolition

¹ Alliance for the protection of the theater', is the group of citizens part of the protest in protection of the national theatre from demolition formed in 2018.



Fig. 1: National Theater of Albania, before demolition. Author: Doriana Musaj

had called upon the Albanian government to not proceed with their proclaimed aim to demolish the historic building of the National Theatre which on March 24 had been included in the 2020 "7 Most Endangered" programme of Europa.

The time of the destruction a protest was going on, as citizens protesting from February 2018, occupied the theater the 24 of July 2019. They revitalized the theater, organizing a festival for the protection of the theater, and took night shifts to guard the building, until the morning when the demolition happened. People were still inside the building when the demolition began. It should be emphasized that Albania is lacking a justice system since 2017, due to the justice reform; High Court and the Constitutional one are suspended due to the vetting process of judges.

3. Problem Statement

Albania lost more than 90% of its cultural sites during the Hoxha dictatorship, between 1944-1990 (Phelps, 2019). Heritage conservation has been an issue from decades in Albania. The country is facing big challenges in its technological area, adapting its protocols of care and archives to all public records, the heritage is treated more as a luxury to invest, than a need to preserve them. The destruction of the historical site of the National Theater, is proclaimed by the government as the effort to remake the country's great by Reborn² it. Albania suffered from these types of autocratic methods a lot during the Hoxha regime, whom in a mission to eradicate religion, Hoxha and his government launched a campaign to destroy hundreds of cultural sites all over Albanian territory. Hundreds of churches and mosques were destroyed and priests and imams got arrested and persecuted. The most prominent site that resembles the act of destruction of the National Theater, during the country's lifetime, is the Cathedral of Saint Mary, in Vau i Dejes³ in North Albania, the Catholic zone of the country. It was criminally blown up on an early morning in 30 May 1967. Thus the cultural heritage lost one of the most irreplaceable evidences of the ecclesiastical iconographic painting of the thirteenth century.

Albania is still struggling with the rule of law and its democracy is weak due to corruption. In terms of heritage monuments, those located inside the city core, are often targets for new development, disregarding the cultural heritage values, and though destroying them partially or totally. These sites struggle with high development pressure, political neglect and abandonment due to unclear land tenure titles and deep state corruption. It should be emphasized that the level of corruption in public administration in Albania is alarming⁴.

4. Literature Review

Cultural heritage

Cultural heritage, regarding the Faro Convention, 2005 essentially meant, cultural monuments in the form of historic buildings, archaeological sites and monuments, according to Fojut, 2009. The definition of heritage, in the last century, was narrow and heritage practices were exclusive. While for many countries, buildings and monuments recognized just for their potential values in economy and tourism and not to a wide public service.

The new concept that heritage must serve society, rather than heritage being served by society, was introduced during the 90s, until the mid-2000s seminal meetings of Unesco. The Framework Convention on the Value of Cultural Heritage for Society ("the Faro Convention") that took place in Portugal, in 2005, according to Fojut, 2009, was a widespread agreement within the membership of Council of Europe that existing conventions were focused too strongly on conservation for its own sake. New instruments needed to be introduced which could affect a comprehensive repositioning of heritage.

Common heritage

A World Heritage Site (International heritage) is a landmark or area with legal protection by an international convention administered by the United Nations Educational Scientific and Cultural Organization (UNESCO). This new vision offered something very different, the concept that the great heritage sites were the property not of individual countries but of all humanities (Fojut, 2003).

Common Heritage of Europe, according to Faro, 2005, consists of a) all forms of cultural heritage in Europe which together share constitute a shared

2. Reborn – in Albanian 'Rilindje' - is part of a political campaign of the socialist party in 2013, as the strategy to remake each city center a new contemporary urban design with 21st-century architecture.

3. The Catholic Church of "St. Mary" in Vau Deja was blown up by mines in 1969, the video still circulates in public. <https://youtu.be/P2eyfncjZ18>

4. (Transparency International report 2018, ranked Albania on 106/180 countries with a score of 35/100 where 0 is highly corrupt, to 100 very clean) <https://www.transparency.org/en/countries/albania>

source of remembrance understanding, identity, cohesion and creativity (Fojut,2009).

The convention also presents a new definition, "a heritage community" which consists of people who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transit to future generations" (Fojut,2009)

The Common Heritage of Mankind

Principle (CHP) as it was presented to the united Nations General Assembly in various declarations and treaties, and as it is understood in the early-twenty-first century, affirms that the natural resources of the deep seabed and of outer space are held in common by all nations, and should be distributed equitably for the benefit of all humankind⁵."

Referring to Oxford bibliography⁶: "The "common heritage of mankind" (CHM), sometimes also called the common heritage of humankind or humanity, compared with age-old concepts such as *res nullius* and *res communis*, is of relatively recent origin. It represents the notion that certain global commons or elements regarded as beneficial to humanity as a whole should not be unilaterally exploited by individual states or their nationals, nor by corporations or other entities, but rather should be exploited under some sort of international arrangement or regime for the benefit of mankind as a whole."

International Cultural Heritage Conventions

In 1972, on its 17-th session in Paris countries member of UNESCO, noting that the heritage was highly threatened not just from nature but also by the phenomena of damage and destruction by men, during economic and social changes, had considered that parts of the cultural heritage are of outstanding interest need to be preserved as part of the world heritage of mankind as a whole.

According to the conventions the country signed, the evaluation of the heritage monument, should definitely include the cultural, educational activity, the archive of all the activity created over the years, the events, the human and institutional activity, the artistic wealth that it has created. These elements that must be taken in consideration and cannot be excluded from the assessment of an issue of such importance and sensitivity to national cultural heritage. Fojut describes the philosophical, political and pragmatic roots of FARO convention in 2001, and concludes that, changed the way the heritage was understood.

European civic actions in protection of heritage

During the 60-s Europe states founded Europa Nostra organization, in order to protect and lobby for cultural heritage. In their mission⁸ the organization states "To give shape and voice to an ever-growing citizens' movement to support cultural and natural heritage across Europe; To be forceful advocates of heritage – with its multiple benefits for our economy, society, culture and the environment – towards policy-makers at all levels of governance: local, regional, national, European and on a global scale." Since then, the Pan-European federation of non-governmental organizations active in the field of heritage, built a wide network involving especially individual, nonprofit organization from civil society, and stakeholders with the mission to "to defend the cause of heritage and its role as an essential and dynamic component of European identity, which constitutes for European citizens both a unifying factor and a guarantee of the protection of their cultural diversity"⁹ as its statute notices in Article 2.

The purpose of this research

The purpose of this paper is to clarify the importance of National Theater (Teatri Kombëtar) of Albania, from the point of view of citizens, architects and historians. The social values that the complex carries for citizens living in Tirana. Its historical and architectural values, are been valued from experts on the fields interviewed on purpose of this paper.

Research question

Do historians, architects and the citizens, think that the National Theater carries enough cultural heritage values and should be built with the principle "Where it was! As it was"?

5. Methodology used

Method and design

A descriptive qualitative research design is used for this paper. Interviews and desk research are used to evaluate the three variables taken into consideration for purpose of this research: the historical values of the building; the architectonic values and social ones. For purpose of this paper, are going to be considered only the urban common heritage sites and as case study is chosen the National Theater of Albania. As variables are chosen; the historical values; architectonic values, and social values in accordance of international convention.

6. <https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/common-heritage-mankind-principle>

7. <https://www.oxfordbibliographies.com/view/document/obo-9780199796953/obo-9780199796953-0109.xml>

8. <https://www.europanostra.org/organisation/>

9. <https://www.europanostra.org/wp-content/uploads/2020/04/Europa-Nostra-STATUTE-2019.pdf>

Population and samples

For purpose of this paper, are conducted several interviews on historians, architects and citizens. Part of the interviews are also a couple of the citizens part of the protest group, in protection of the theater, the so called 'Alliance for the protection of the theater'¹⁰ as claim the share right to the cultural heritage, as group of interest.

6. Results and Discussion of National Theater case study

Architetonik values of the building

The complex was designed and built in 1938 by Giulio Berte, an Italian futurist architect and was open to public in 1940, when Albania was annexed under the "empire" of fascist Italy. The complex named "The Italian-Albanian Circle Skanderbeg", and was designed as a cultural and sportif complex with a theater, cinema, restaurants, library, and public spaces in the interior. The space between the twin buildings, has a public square, a park and a swimming pool.

Built in the backside of the ministries's complex, characterized by humility, simplicity, human proportions and a light and penetrating architecture, this complex is an architectonic space, which dissolves into an urban space in the square. Lying before the square and naturally reaching further towards the main boulevard, thus bringing a special projective value to emptiness, one of the rare cases still surviving in the city.

The National Theater architectonic characteristics described from the interviewed architect: *"This type of architecture was not able to materialize any such work even by the compiler of the manifest on futurist architecture Antonio Sant'Elia, but it is more than true that his proclaimed ideas had much more importance and influence in Europe than the futurist movement itself. Thus, we can say that if its author is Giulio Bertè, the influence of these ideas on this work is all the way more sensitive than in all the works of his contemporaries built in Tirana"*

National Theater as a Historical footprint

Beside being an outstanding architecture, the National Theater Complex was also a historic artefact that has witnessed many historical important events during its lifetime. After the Second World War was finished in November 1944, the communist took power and soon after they begun to arrest and persecute hundreds and thousands of political opponents. It was March 1, 1945, the communist regime had officially installed its power, and organized the first political trial called the 'special trial', which would take place within the walls of "Cinema Kosova"¹¹. This special trial was conducted inside the theater, at the end of which, intellectuals and public figures of the country were arrested and shouted to death. All cultural institutions that were created after the second World War, had their headquarters inside the Skanderbeg complex. Here can be mentioned: the National Theater of Opera and Balet, the Philharmony of the state, the "Institute of Albanian Studies". It is there that the first performances of what was originally called "The Tirana Theater", and then "The State Professional Theater Group", with the participation of actors who are known to nowadays to have marked their time in the Albanian Theater. On these bases, in 1946, the "Institute of Sciences" was created there, whose departments subsequently served as new foundations for the institutes of History, Linguistics and Literature, Archeology and Folklore. The current Academy of Sciences of Albania that the origins of its work lie there.

7. Social and cultural values

Placemaking and place gathering

After occupying the National Theater, the civil group called "Alliance for the Protection of the Theater", began organizing. Organizing by grassroot, this group of people, took several initiatives to save the building from demolishment, as considered it a common cultural heritage, to be preserved for future generations. As they valued the building to carry not just national values, but also pan european ones, they took the initiative to apply in 2019, to Europa Nostra call for the programme "7th most endareged sites in Europe, 2020", by accomplishing with success its nomination in spring 2020¹².

Just few of them, had previous contact and knowledge of how to maintain a theater. The building needed to be revived and its technical documentation began to be prepared. Architects and engineers, were organized voluntary to design and measure all physical information of the architectonic complex. 3D scanner FARO, captured all information data of all interior and exterior façades. By occupying the building, civil actors, with the aim to revitalize the building, designed and organized a festival, which was named "The Festival for the protection of the Theater". This social group, organized in just 10 months 64 cultural activities, shows, concerts, theater plays, artistic exhibitions etc.

Fojut emphasize that in Faro convention *"heritage was seen as a vital asset in promoting the concept of inclusion, of allowing everyone within a community to participate in every aspect of social and economic life" by bringing into notice that the council of Europe's vision is "Europe bonded by culture and heritage offers an alternative, more human scale approach"*.

Cultural values

All cultural institutions that were created after the second World War, had their headquarters inside the Skanderbeg complex. Albanian spectator has known "closely" - even fallen in love with - the great actors of the cinematographic art, such as Greta Garbo, Alida Valli, Anna Magnani, Lorenz Oliver, Amadeo Nazzari, Vittorio de Sica, and many others. Apart from that, it was in this cultural and artistic environment in the capital of Albania where the

10. Alliance for the protection of the theater', is the group of citizens part of the protest in protection of the national theatre from demolishment formed in 2018.

11. Cinema Kosova- according to the archive, was the name of the National Theater, after the WWII, at its opening it was called The Cinema-Theater SAVOJA

12. <http://7mostendangered.eu/sites/national-theatre-of-albania-tirana-albania/>

organization of a series of classical music concerts, such as Scarlatti, Cherubini, Corelli, Vivaldi, Boccherini, Cimarosa, Paganini, Rameau, Schumann, De Gallot, Chopin, etc. The 80 years of life, the theater troop created hundreds of theater plays. The costumography Contribution to European culture

It was in this Cinema-Theater, considered as of "first class" in Albania, that the Albanian spectator has known "closely" - even fallen in love with - the great actors of the cinematographic art. It is in this place that concerts by the stars of the Albanian lyrical music. The historic building in question has also witnessed many political ceremonies, of which the most were carried out under occupation, by the then Prime Ministers and Ministers of Albania, including His Excellency Francesco Jacomoni di San Savino, Viceroy of Albania.

Holtorf states in his paper that, "*Contemporary society must address issues and challenges that have not previously been linked to cultural heritage but where it has the potential to be useful. For this to become possible we need to rethink thoroughly what cultural heritage can mean and do in contemporary society.*" by arguing the ways to address the contribution of cultural heritage in society in the new century.

Identity place

The complex of buildings of the National Theater, in its lifetime, survived by adapting its space and form into different functions, creating in this way its memory and making it undoubtedly a worthy representative of the cultural, artistic, educational, social, albanological and political history of the Albanian state; that is, a national heritage, which in this view is the property of all and precisely for these reasons enjoys direct protection by the Constitution of Albania. The protest that began in early 2018, created an agora to the city, as at the meantime a place to gather and meet to commute, creating a placemaking.

8. Conclusions

After interviews with targeted population of citizens, and the desk research conducted, regarding the theme in question, the results showed that there are enough historical, architectonic and socio-cultural values for the National Theater to be considered a cultural heritage. To the target group in focus of this research, the complex of the National Theater carries all architectonic, historic and social values as to be considered an important landmark of Albania. By cultural values the cultural complex includes also the cultural, educational activity, the archive of all the activity created over the years, the events, the human and institutional activity, the artistic wealth that it has created during its lifetime. The object is considered in accordance to FARO convention's new approach to what cultural heritage should represent today. Beside its intrinsic values, the building represents institutional and instrumental values, as served as focus and catalyst for the communal action of the 'Alliance' group of people. The national Theater complex was seen as a vital asset in promoting the concept of inclusion, of allowing everyone within a community, or individuals to participate actively in every aspect of social and cultural life of the city. Serving as a contributor to social objectives as a means of conveying general education and developing the public spaces. The whole complex was a public space, and a focal point to the city, and as such, according to citizens interviewed, the Theater should be rebuilt with the principle 'Where it was! As it was!'

9. Recommendations

"Heritage can built bridges, but also it can also emphasize gulfs." Fojut, 2009

Due to the results of this research, the reconstruction of a cultural heritage, when it serves to society, and have historical, architectonic, social and cultural values should be put always into discussion. The people should have the possibility to chose where it was, as it was, beside its causes of demolishment.

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Tekhla

The production of space in a transurban city

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What if the material and the social production of space were to coincide? Tekhla is a (fictional) transurban city in which the cognitive augmentations of citizens allow them to continuously reshape the morphology of the urban spaces. This paper builds on the ideas of Lefebvre (concerning the production of space) and Lotman (the isomorphism between urban organization and semiosphere) to explore how a transurban future might affect the relationship between citizens and technoscience in the urban environment. To do so, we created Tekhla a pastiche scenario envisioning the possible futures (a utopian and a dystopian one) of bottom-up 3D printed cities. Using this scenario as a starting point, we then outlined some principles for design and planning ever-changing self-fabricating cities, and, in the conclusions, some implications for the present.

keywords transurbanism, production of space, semiosphere, design fiction, pastiche scenario, urban planning, urban design, additive manufacturing, transhumanism.

1. Introduction

With *La production de l'espace* (1974), Marxist philosopher Henri Lefebvre introduced in urban theory the idea of a social production of space. While the urban spaces can be designed and produced by a combination of labor, technology and institutional direction, the meaning of that space - and hence the space itself - is determined by the perception and use of the social actors that inhabit and occupy it (Kirsch 1995). According to Lefebvre, then, space is an amalgam of the material space and the conceptual space (how it is conceived, perceived and lived), one that is not free of struggle for meaning and lived experience (ibid.).

This paper aims at delineating the possible future of the social and material production of space according to current technoscientific developments. While it has been observed since a long time that much of urban space is becoming "machine space" devoted to hosting mechanical actors instead of human ones (Horvath 1974) and that the ubiquity of software in the cities is somewhat automating parts of the production of space (Thrift & French 2002), we imagine that, by the (symbolic) year of 2077, the social and material productions of space could coincide completely thanks to transhuman technologies. To investigate this possibility, we will first propose a systematization of the relationship between technology, urban spaces and the perception and experience of the latter. Second, we will illustrate the novel concept of transurbanism, as a framework to account for the interaction between smart city environments and transhuman citizens. We will then propose a pastiche scenario (a narrative form of design fiction)(Blythe & Wright 2006), informed by the background of the authors (namely semiotics, industrial design and urban design), dedicated to the fictional transurban city of Tekhla. This will allow us to define some design guidelines for future cities, to reimagine the relationship between social and material production of space and to draw some implications for the present

2. City, technology and semiosphere

Science and technology have a determinant effect on the material production of city spaces, on how cities are designed and built. Opportunities offered by scientific development (materials, logistics, architectonic techniques, projecting and designing capacities) as well as requirements deriving from them (need for energy grids and infrastructures in general) determine much of the shape of a city, of its buildings and infrastructures, but also of its aesthetics. Neon lights, chimneys, phone booths, antennas: many architectural elements are symptomatic of the use of a specific technology. These elements end up becoming an integral part of the atmosphere of a city, they give it identity and grant it the impression of being a coherent whole, despite its irredeemable structural heterogeneity. Cities enshrine technology, sometimes showcase it, it is part of their identity. If technology is necessary to “make” the city, the opposite is also often true. Technoscience – meaning technology and science viewed as mutually interacting practices and discourses – is often “made” in and by the city. Since the dawn of civilization, urban areas have played a cardinal role in the production of science and technology. A role that, despite some contenders (such as medieval monasteries, and scientific expeditions into the wilderness) has always been primary. These relationships between city and technoscience, one of necessity (as technoscience allows us to build cities) and one of production (as cities produce science and technology) are not the only meaningful ones. Technoscience and cities in fact, also influence each other throughout semiosis. That is, via the ways in which they give rise to meaning. After all, our perception and understanding of the urban world depends also by the technologies we possess. We understand, think, imagine and conceptualize the city – we make sense of it – thanks to the media and sensory technologies that allow us to capture and portray it. In the past, motorized vehicles, aerial photography, and satellites, for example, have deeply influenced our relationship with the urban spaces. Today GPS and digital mapping are, again, changing the way in which we interact with the city and approach it. The semiotic link between city and technoscience, however, is more complex than mere mediatization and has to do with the semiosphere.

Semiotician Jurij Lotman conceptualized the semiosphere as a counterpart of Vernadsky's biosphere (Lotman 1990). The main idea is that, as a living being cannot be understood on its own, but must be considered within its environment, similarly a single semiotic object cannot be analyzed in isolation: it has to be contextualized in a semiosphere. The latter, therefore, consist of the semiotic space of a society, and includes all its signs and texts (artworks, advertisement, clothes, everyday objects etc.), its practices (rituals, uses, habits, etc.) and its modelling systems (Lotman 1974). The latter can be understood as “languages”, including both natural languages (or primary modelling systems) and other forms of structured communication (secondary modeling systems with various degrees of complexity, ranging from street signs to poetry). As they are our lens to look at the world, modelling systems are both tools to describe reality, and “instructions” on how to look at it and make sense of it.

The content of a semiosphere, however, has a clear structural organization, based on a hierarchy and a differentiation between central and peripheral regions (Lotman 1990). Simply put, at the center of the semiosphere we can find all those cultural traits that are recognized by most as fundamental: constitutions, sacred texts, traditions, institutions etc. These are generally long standing, powerful and resistant to change. In the peripheries, instead, we have minoritarian and/or marginal cultural traits: youth culture, subcultures and similar. They are limited in power, but often flexible and creative.

Going back to cities, Lotman claims that the urban spaces are often isomorphic with one culture's semiosphere (ibid., Lotman 1998). This means that the work of decision makers and simple inhabitants tend to structure the city in a way that reflects their symbolic universes, their systems of values. In this way, urban spaces encompass and reflect the cultural hierarchies and relationships of the semiosphere.

If at the center of the semiosphere we have religious texts, in the city center we have cathedrals. In the center we have constitutions and parliaments. Capitalistic values and skyscrapers. Similarly, in the peripheries of the semiosphere we have youth and countercultures and in the peripheries of the cities' banlieues, refunctionalized factories, creative settlements and so on. This view further complicates the relationship between citizens and space described by Lefebvre. If the production of social space deals with the material space *a posteriori* - through its appropriations and uses - the influence of the semiosphere precedes and directs the material production of space. It is through this relationship between the semiosphere and the city that technoscience can also influence semiotically the urban spaces. After all, the hierarchies and contents of a semiosphere depend also on the technological advancement and scientific attitude of a society. The city enshrines not only the technological artifacts, but also the attitude towards technology, showcasing, for example, the sleek design of an Apple store and hiding the industrial production in faraway peripheries.

Technoscience creates the artifacts through which we mediate, record and map reality, but also influences the modelling systems that we use to conceptualize and understand it. In other words, then, technoscience on the one hand determines much of the physical properties of cities, and on the other hand plays a major role in defining its semiotic properties.

If the city is isomorphic with the semiosphere, to understand how the cities of tomorrow will look, we also need to imagine the future semiospheres. In order to do so, we have to think about how technology will go further than modifying our habits and everyday life but will reshape the ways we look at the world. These could be radically mutated from our current ones with the development of transhuman technologies.

3. Principles of Transurbanism

Transhumanists believe that the next step of technoscience will be the radical integration of technologies in the human body. The implicit potential of these technologies is that of going beyond our current understanding of humanity and, hence, become transhuman. In this new state our subjectivity will be altered via bodily, cognitive, and/or emotional augmentations. New abilities will allow transhuman to behave differently, new perspective organs will make their perception of reality quite different from the current one, and so on.

The dawn of transhumanism also promises a complete restructuring of cities. The anthropic environment par excellence, the urban space will reflect the new state of its citizens, and will adapt to new ways of inhabiting, crossing it and live in it. It will go beyond the Smart City and envision an integration with transhuman inhabitants. We call this new horizon for cities transurbanism (Thibault et al. 2020). This novel concept is based on the

1. Both geographical (the outskirts of the city) and symbolic (lofts, cellars, halls).

belief that transhuman augmentations will dramatically change how we live in, experience, and make sense of the city. Cities and citizens, in fact, make each other: cities make people “polite” and “civil” (from Greek and Latin words for “city”); and citizens, in turn, shape their cities around them and, as we have said, around their own semiosphere. Thibault et al. 2020 investigates the possible future of transurban cities according to six layers. Three layers are related to different dimensions of transhuman augmentations: bodily cognitive and emotional. Three other layers are, instead, dedicated to Smart City dimensions, and in particular to the design, management, and social aspects. The transhuman and Smart City dimension, once crossed, create nine intersections (bodily augmentations and design, emotional augmentations and management, and so on) that are as much privileged entering points for reflecting and speculating on future transurban cities. Starting from three of these intersections the paper proposes some pastiche scenarios (Blythe & Wright 2006): short narratives, declined in a utopian and a dystopian way, set in three fictional transurban cities: Zembrude, Euphemia and Phyllis. Each of these cities, whose names are inspired by Calvino’s *Le città invisibili* (1978), is characterized by a specific transhuman technology or set of technologies (emotional mapping, transurban mobility, Internet of Citizens) whose challenges and potential are explored in the scenarios. Similar to this approach, here we will put forth a new pastiche scenario addressing the complex relationship between technoscience, city and semiosphere described above. This scenario will imagine a transurban city in which the slow and stratified work of building and re-building city spaces is enormously accelerated by technological development so as to reflect its citizens’ desires almost in real time. Situated at the intersection between the dimensions of design and cognitive augmentations, this scenario serves as an opportunity of reflection on how transurban cities might be perceived distinctly disparate in terms of their design and design process compared to the cities of today. In this section, we first briefly describe the city of Tekhla, and then, in order to account for the many possible implementations of such technologies, we will adopt the perspectives of two transhuman citizens who live in the utopian and the dystopian version of the Tekhla.

4. The ever-changing city of Tekhla

The Fab City initiative predicts that by 2054 cities will be able to produce everything they need thanks to advancements in additive manufacturing and recycling². While today the first sustainable, 3D printed houses require around 24 hours to be ready³, it is not difficult to imagine that future cities might be constantly fabrication and fabricated. It is the case of Tekhla, an ever-changing city whose structure and design are dynamically altered and shaped by its citizen’s desires. In the *Invisible Cities* Calvino describes Tekhla as a city that is continuously being built and that, instead of a blueprint, it is constructed using as model a starry night sky. Similarly, our Tekhla continuously rebuilds itself through the improved reconstruction and manufacturing technologies, and its physical organization and morphology is different every day, or even every hour. To direct the demiurgic power of the city, urban designers connected it to the cognitive network of transhuman citizens. Thanks to their cognitive augmentations citizens are able, on the one hand, to navigate seamlessly an ever changing city and, on the other hand, to express their desires about the city, which is then affected by the thought and experiences of every city dweller: an immense amount of knowledge processed by the city and used to transform it.

“I remember learning about **Utopian Tekhla** when it was still at an experimental stage. They were looking for volunteers to move in and participate in this gigantic experiment for understanding how it would be to live in a city that rebuilds itself continuously and how our thoughts could help the city transform for the better. I immediately volunteered.

I moved to Tekhla a few weeks later, eager to see if the city could really be the perfect place for transhumans to live in, as advertised. I got more than I could even imagine! Tekhla proposes an unexplainable experience to its citizens, a whole different way of living and exploring the space of the city. Every time I go outside, in my street something new has grown there overnight. It is impossible to get bored: the city changes around you and with you. I also have to say that the municipality is doing a great job in terms of managing the reconstruction frequency of certain areas. For example, they have programmed this specific area, not too far from my place, to slowly change cumulatively and over a long period of time. With some friends we started spending there much of our leisure time, to see if we could somehow leave a trace there. And we did! After a couple of months the small square has been shaped by the collection of our thoughts, memories and habits. It feels truly “ours” and we can find, in the abstract pieces of the landscape, traces that show the times we were happy, depressed, drunk or relaxed...

I love living here, in this neighborhood experimentation possibilities are endless. It’s also nice that every tenant can adjust the reconstruction settings of their household. It is quite fun to overhaul all my house every couple of months.”

“The other day something happened that made me realize that I don’t want to live here anymore. When I moved to Dystopian Tekhla the prices were quite affordable. They were looking for volunteers and made moving in pretty easy, cheap and convenient, so here I am. But the situation is becoming unbearable. First came the advertisements. If you reshape a city with your thoughts, what better way to control the city than controlling its citizens minds? We are constantly bombarded by aggressive ads, so that we inadvertently reorient the urban spaces towards profit and consumption and away from the actual needs of the citizens. Then came the hackers. I have been once taken hostage by a street, unable to do anything other than driving in circles until I finally gave up and paid the hacker for letting me go outside. I have a friend who found out that a wall had been built around her house for no apparent reason. Someone just thought it was funny.

But I could have accepted all this. Security is improving and you get used to the ads, one way or another. What I can’t accept any more is my apartment continuing to move. The other day I was going back home from the city center. When I moved here, that would take around 20 minutes. The commuting time has been continuously increasing since: people imagine a city center full of parks, monuments, lakes, nice houses with gardens, bars and theatres. Nobody wants to see apartment buildings, and so we get gradually pushed out, the city continuously rebuilding our homes a bit further. Well, after months in which, with my neighbors, we did our best to embellish our building, to think of the most charming and appealing aesthetics for it in the hope of not being pushed further, the other day I found in its place and entire Stadium. Now my commuting time is over two hours, and the whole neighborhood is being reshaped by the thoughts of supporters and hooligans. I can’t take it anymore.”

2. See: <https://fab.city/>

3. See: <https://www.iconbuild.com/>

5. Planning and designing Tekhla

Our pastiche scenarios have illustrated some of the challenges, but also of the possibilities of a transurban city able to regenerate itself continuously with additive manufacturing and in constant dialogue with its citizens thanks to their cognitive augmentations. While such a city does not exist (yet), the fictional scenario that we have depicted illustrates some of the possible questions that urban planners, designers and architects will have to confront in the future. To develop further these ideas, here we will elaborate some of the possible design practices for planning a city such as Tekhla. We speculate that the cities will evolve to be drastically different than what we are used to, with the involvement of transhuman citizens. But, how will the urban planning practices evolve to meet new needs, to face new issues and to exploit new potentials? To answer such a question, we propose a third and last pastiche scenario, so the let an urban planner in Tekhla tell us their experience designing for this city:

"When we first took on the Tekhla's Urban Design Project we were thrilled. We knew that it would be an unprecedented experiment and a unique experience. We prepared for several months, and when the volunteers finally settled in we realized that the size of the challenge was also unprecedented. The first thing that hit us was the density of the endless stream of data that we were collecting from the citizens' minds. In order to use this data to feed the design of the city, our experimentation team needed to find a way to categorize it and turn it into meaningful information. We knew the quantity of information would have been difficult to handle, but the density of information was far beyond what we expected.

And it was incredibly dynamic. Even when we were able to effectively categorize the data, after we activated the connection with the citizen's minds we quickly realized that the pace of the transformation in the content of the data was not compatible with the dynamics of urban design and planning.

We had to reinvent our practices on the spot and we decided to try another method: instead of trying to design the city ourselves through the data collected by the citizens, we instead designed an urban organism that would design itself automatically, by acting as an extension of the citizens' minds.

Needless to say, this decision meant a huge paradigm change in the urban design practice and at the same time gave rise to a new set of challenges. Creating a direct connection between the citizens' cognitive input and the automated regeneration of the city could as well give rise to the most novel city ever built or lead to an unspeakable catastrophe. We would either get a Utopia or a Dystopia. In the end, I believe we got a bit of both!

Briefly after starting the experimentation, we realized that neither the composition of our team nor our knowledge were adequate to handle such concepts. Yet, after five years of development, we are finally able to deal with the unique dynamics of Tekhla. In this development phase we realized that three specific points were drastically different from the classic urban design practices and needed to be reimagined completely: 1) the Temporality of the Design Actions, 2) the Regulation of the Production of Space, and 3) the need for New Areas of Expertise.

1) Temporality of the Design Actions

City planning has always been a process whose effects can be observed only after many years. This changed radically after the minds of citizens were added to the city's information network. When it became possible to access the first-person experiences of every citizen there was a new need to interpret this incredible amount of data and put it into use. The dynamism of the data needed a city changing unceasingly. Previously, city planning practices included many consecutive layers such as landscape analysis, research on inhabitants, and communication with municipalities, industry and citizens to put plans into action. And then starting to plan for the next 10 years while observing the effects of our plans. Now, as the designer team, we are only responsible for the strategic planning. We connect to the planning network, closely monitor the overall physical change, examine their effects on the citizens' in real time and try to keep the balance of optimum outcome in terms of citizen happiness and resource management. Before, it was a process that needed to be followed step-by-step, now it's a single process in which we need to take care of every step at once.

2) Regulating the Production of Space

The constant change of the urban space has been quite problematic to manage. While it brings many opportunities to improve citizens' lives, it also had detrimental effects. The main negative effect was that people had sometimes found it difficult to accumulate memories and acquire a sense of belonging in their neighborhood. Citizens had a hard time to pursue a stable life in the city and our design decisions led to a city without identity. While some people enjoy re-discovering renewed city spaces, others felt it was impossible to develop a routine. Therefore, we direly needed to regulate the amount and rate of changes, also according to the amount of data and to the preferences of the citizens. In some places we established thresholds: the changes were only possible when the data rate hit a certain point. In other places, we simply changed the data behavior. For example, we adjusted some places to accumulate data and perform changes over a long period of time, while in some other places we made the city overwrite the data everyday and feature the changes every hour. These regulations contribute to the development of the space, while making the change more meaningful in the planning of the city of Tekhla.

3) New Areas of Expertise

When the city became a living organism in which everyone living in it has a voice and directly participates in the formation process, the importance of the consciousness and cognitive contribution of the people living there had increased. Our design team, composed by urban designers, architects, data scientists, strategic planners, anthropologists and system engineers, soon proved itself inadequate. We therefore had to recruit computer scientists to dynamically change the city building algorithms. Similarly, we needed to include in our team, semioticians, psychologists and cognitive scientists. Since the city was shaped through thoughts, it was critical to understand the factors that would alter the citizens' cognitive states, and to devise ways to direct efficiently their cognitive labor. Tekhla did not only define a new paradigm for the construction of cities, but also reshaped our idea of urban planning, which now requires a whole new set of competences.

6. Conclusions

We imagined the fictional city of Tekhla for two reasons. The first one was to imagine how technologies of 3D printing could participate in a radical change of paradigm in urbanism. The second one was to picture a city in which the relationship between urban spaces and the semiosphere is almost indistinguishable. If cities, as we have claimed, tend to be isomorphic to the semiosphere, the slow times of construction and reconstruction of urban spaces create a sort of lag. What the city represents is always a picture of a previous stage of the semiosphere, continuously updated, be it with slow works of construction, or with the quick action of protesters tearing down a monument related to an old system of values. In Tekhla this lag is absent: as the city

rebuilt itself continuously, the culture, the desires and the habits of its citizens today are overwriting those of yesterday. This dynamism, on the one hand, allows each citizen to write the urban spaces, to make them their own and hence to acquire their right to the city (Lefebvre 1968). On the other hand, however, the unbearable lightness of the city spaces makes it easy to hijack the city, to manipulate it with advertisements or submit it to the caprices of tourists and consumers. The city would be unable to offer any resistance. The design and planning practices behind a city like Tekhla, therefore, should be able to take into consideration also the semiotic dimension of the city. When the physical and social production of space come to coincide, the way in which citizens make sense of the city becomes irremediably the way in which the city is made.

What makes a city a transformative entity are the bonds people establish with the space while living and the meanings they attach to those spaces. Flexible spaces allow people to contribute to the production of the space while helping to develop the bonds established. In this sense, the inclusion of the city dwellers in the design helps to create the diversity that adds to the meaning of the space. Urban planning practices have already begun to change in the direction of researching the ways of planning cities together with citizens. One of the approaches that support this point of view is the Spontaneous City (Urhahn 2010), which is an approach that aims to design spaces open to random formations while designing the city. In this context, the city must act as an organism that is constantly changing and developing. We believe that the speculated design process of Tekhla can also shed light on the possible challenges, requirements and advantages of adopting bottom-up and citizen-centred planning practices such as the Spontaneous City. Tekhla is an extreme example where urban design concepts such as DIY, Guerilla or Tactical Urbanism (Lydon & Garcia 2015) are integrated in the planning of the whole city. Tekhla puts forth that with the direct involvement of citizens, we need to develop new approaches for the temporal understanding of planning practices, we need to comprehend that the flexibility of the space needs to be adjusted during the planning process and we need enhanced multidisciplinary environments to implement these practices into reality. We believe that Tekhla provides a good example for planners and designers to envision a city-wide application of bottom-up and citizen-centered implementations with the great risks and potential that come with it.

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Dwelling and Liminal spaces

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Rethinking dwelling in the 21st century, at the time of the information paradigm in the frame of global threat. As human beings since very beginning, in the primitive area we had two crucial instinct-base reactions, we looked for a shelter and gathered in communities to be safer and more protected. In a short period, Albania has experienced two emergent situations like November 2019 Earthquake and the COVID_19 Pandemic of 2020. Both of these situations affected the relationship man-housing. Housing is an essential part of the whole dwelling phenomenology. Dwelling as a verb include several repeated behaviors in everyday life the consistency of which turns them in attitudes. The pandemic situation has impacted our sense of touch, the contact behaviors are deprived. Now the housing seems to be the place to perform all the vital activities of an individual, working, eating, playing, socializing, education. Different is the perception from the natural threat of the earthquake where peoples prime secure space, is putted in question. Now more than ever we have to discuss about liminal spaces in housing and quartier. This paper investigates the possible roles of intermediate spaces in the housing per se and around which, gain an importance and are able to be adopted in specific situations. In this perspective the research is focused on how can the house nowadays be a resilient space, how should we design a house to answer to the new reality but on the other hand also the urban design should get the utmost importance as far as it has to ensure people to exploit more safe space, physical and real spaces than the virtual spaces.

keywords housing, liminal spaces, dwelling, pandemic

1. Introduction

This paper tries to understand the possible roles of intermediate spaces in housing per se and around. It starts from the relation of man with his living space, the threats of this relation during emergency situation, how is the dwelling relationship shaped in each case? What might be the role of the liminal spaces in both situations. The collective dwelling is the object of research as far as the individual here is limited within the homogeneity offered by apartment building solution design

2. Dwelling and the relationship man-home

The background in which this paper is referred to, are the emergent situations and their impact in the dwelling space. The impact starts with the closest connection of belonging and safety with the living environment.

Albania had the misfortune to experience a 6.4 magnitude earthquake in November 2019. It resulted to be fatal in victims, in several collapsed buildings and many other damaged. One of the encountered problems during the evacuation and after hours was the lack of safe open area in many quarters. Spaces among buildings, mostly high buildings, failed to provide the needed safety and it made it feel like a distance rather than a qualitative space.

Deeply what the quakes truly impacted was the reliability to your home, as the safest place. The detachment from an ancient, primitive feeling and believe. During the Enlightenment period the monk Marc Antoine Laugier, in his work "Essai sur l'Architecture, studied the origin of architecture, which according to this research has its genesis in primitive hut, thus supporting Vitruvian theories. He defines that architecture arises from the primary need of man to be protected from climatic conditions.

The concept of the primitive hut explains the anthropological relationship between natural environment and the human being. It explores the basis of architecture creation.

It is the nature which led the man to the cave and saved it from the atmospheric changes, animals and other possible threats, as a catalyst of man-home relationship and again it is, the nature, that pull out the man from the modern caves.

Very soon after the first emergent situation Albania, as the rest of the world, witnessed difficult conditions forced by the pandemic. For safety reasons people were asked to stay home. Again, the situation confronted the man with his dwelling, but in a different way. The house turned to emphasize its importance, its existence and its role, differently from the first situation of quakes where it was putted in question.

At this point it is relevant to stop to the phenomenology of the dwelling. There are several authors who deal with it. Heidegger relates dwelling to building. Further he studied the German etymological roots of the word relating it to the verb being, to the existents of man in this world «...the manner in which we humans are on the earth is Buan, dwelling.» (Heidegger, 1971:147) Dwelling is in a way something other than simple safe house. Peter King investigates the duality of Dwelling, comparison with Housing, their primary meaning, their cross points and diversities. The relation with housing and its containment is multi-dimensional and complex. «Once a dwelling has been built it remains a mere thing. Only when it is occupied does it take on a meaning and significance beyond this physical structure: only then, so to speak, does the house become meaningfully a home.» (King, 2004: p19)

One of the two aspects of dwelling for Schulz is identification «experience a "total" environment as meaningful.» (Schulz, 1985: p15) Also for him, dwelling is more than just a roof, it is being oneself, a place of retreat and flourish, the sense of belonging to a place and accepting a set of common values from the surroundings. As described above there is an essential difference in how the two emergent cases taken in consideration has impacted the human-dwelling relationship. In the first one, where the structure failed to ensure the stability what was produced was disconnection from home and the strengthening of a sense of community. In the second case on the contrary the result was the distancing from the community and the strengthening of home-connection. The purpose of the houses as shelter has changed in the time frame of history based in people's life basic activities like helping to survive bad weather and predatory animals, later satisfying primary needs and then fulfilling desires and raising standards. During the pandemic the house once again reinstated its primordial function as a refuge, predominated by the instinct of survival.

Consequences of natural disasters or emergency situations have brought reflection and changes in the built environment. History has shown that big changes in housing and the cities have come from the need for improved hygienic and sanitary conditions. Recalling here the period of modernity as a response to the overloaded, unhygienic industrial city. Housing crisis was qualitative as much as quantitative. Architecture in its modern period more than ever reflected the eagerness to cleanliness through the sterile minimalism. Apotheosizing air and light not only made the turning point in history for architecture but also for the urban design. The building won the missing objectivity in space which ended to be infertile.

At a time when hygiene and health are again the main focus, is it possible to rethink dwelling in the 21st century, at the time of the information paradigm in the context of the global threat? If our relationship with dwelling has changed, should we review the design to suit our new needs? While the situation of earthquake slapped to our face the negligence and mistakes in urban design¹ and raised the awareness for qualitative space within quarters, on the other hand pandemic remind as about flexible spaces within the built environment.

3. Liminal spaces in collective buildings

The pandemic is not only a health crisis, it is also a design problem. Houses in both emergencies turned out to be the most successful cases. Closed into apartment boxes, which sometime lack the balcony what we mostly wished was to have a house. Many are the reasons why single-family house is treated as more agreeable and higher quality typology than collective housing. Such as the ability to answer to much more demands of the inhabitants, the immediate relation with the terrain and nature. «Living comfort, offered by multistory apartment buildings, is expected to approximate to the living conditions in family houses. In multifamily housing design one should search for an analogy with a single-family house.» (Stoiljkovic et al., 2015)

This kind of approach today is getting more attention, mentioning here on of the project like the Eight House building by BIG, which combines suburban yard with urban life and density. A special element of this building is a continuous ramp that extends along the side of the building and providing an open-air entrance for the penthouses giving them the feeling of a country house along with their small front yards. In their architecture terraces and balconies are a dominant component. But it must be said that such an effort dates early in 1967 with Safdie complex project Habitat 67 in Montreal.

The isolation within the physical boundaries of the house call the epistemological question raised by King «First, how do we respond to the physical box we call the dwelling?» (King, 2004: p17) Just as he expresses himself, each one in his own way, separately, though the dwelling is general and inclusive in itself.

Forced to shrink and reorganize all the activities in a defined space all our spatial routines fundamentally changed during the self-isolation. There was not only the issue of bringing work inside home but also the number of people being exposed to different activities at the same time in the same place. Family with many members had their difficulties in finding the comfort and privacy needed.

Long staying home might affect a person's health mentally and physically. So, researchers stated that main negative effects reported were anxiety, post-traumatic stress symptoms depression, poor sleep quality and physical inactivity.

Performing different activities within the same home brought the need for additional space. This is not always possible especially in collective housing. However, some spaces got more value in the lock down period like balconies, verandas, small courtyards. Apparently private open areas. This kind of spaces separates two different entities indoor spaces and outdoor nature, they help the transition from previous state to the coming one. The in-between condition defines the liminality state and also by definition the temporary too. The first to study cultural rites of passage was Arnold van Gennep who stated the phases of it, which follows the same order in all cultures. Followed by Turner whom transition itself was more relevant than the scale in which it occurs.

Liminality is understood in different contexts, from cultural to social and also spatial. The threshold we can find into a collective building are balconies and verandas, corridors and entrances with the perimetrical area around the building. They are mostly common spaces we share with others. In history balconies have had their practical and symbolic functions. Their design became more elaborated. Re-appreciation of this element as a social space during quarantine reevoke it as a place of communication. Across the world, balconies and terraces were converted in device for public interaction

1. Relevant to our topic, meanwhile the problems linked with earthquake damage stretch in various fields.

with the community, gateways between public and private domain.

Balconies in Albania have been an indicator of the insufficiency of interior space and the increasing demands of modern families, as they have undergone fundamental changes in time. Many are closed to provide expansion of interior space or have replaced the missing storage. In this way the threshold is eliminated. Outdoor surroundings area are resilient spaces to accommodate distancing relationships and evacuation fluxes. Such liminal spaces with no specific design, but free to improvise regarding the case, act like mediator between man and nature. Slightly more particular is the situation with the corridors which are liminal spaces between semi-public and private property. Usually they gain attention because their composition influences social cohesion. Although social distancing is one of the measures taken, what is the challenge today is to maintain a sense of community regardless of the circumstances. In this consideration corridors should be treated as a continuation of non-enclosed spaces with the open environment, both physically and visually, thus to provide the necessary ventilation and contact with what happens outside. Re-dimensioning them and enriching them with pockets spaces is a well-known practice in the world, but not easily applicable in the Albanian reality until now due to investor – client financial agreement.

So far talking these are thresholds on the borders of the home-box, but confronting the limits within our own home we could find or create thresholds inside. Creating pocket spaces to ensure hygiene at the entrance to the apartment, ensuring privacy and acoustic insulation through space subdivisions could be one kind of practice that would increase comfort in such conditions. All this might lead to the revision of open spaces, better to new more experimental findings. Japanese construction culture has much to teach us about flexibility, like movable walls method which dates back before the 13th century. It can be an inspiration for a new interior design. However, this requires an in-depth search that is not part of this paper.

4. Conclusion

This paper tries to understand the effect of pandemics and earthquakes, as a shock experience, to the physical relation and not only, between man and his dwelling. As Heidegger let to know, dwelling for us is existential and housing must also take its importance in every moment. The house is a sub-part of the dwelling, this last includes even more all the sociological, psychological, physical and emotional experience that takes place in the space of the house. «Housing is important because of how we use it.» (King, 2004: p174)

The quarantine experience made us realize how we could adapt and which spaces were important. Prevalence of liminal spaces happen because they enabled safe outdoor contact and provides functional appropriateness. It was a bottom up process of domestic space evaluation and design.

Our need for shelter is very primordial but providing a physically and mentally healthy home is the need of modern man.

Human exchange and interaction within the community is important because man thus fulfills an aspect of dwellings as Schulz defines it with a mode of collective dwelling. Today's challenge is to continue to design hygienic spaces that promote social cohesion.

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Evolution of the hotel Typology in Albania. Investigating the possible use of precedents design principles in new typologies of hotels

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Hotels and other forms of hospitality are considered as one of the main contributors in tourism growth of a country, as well as an indicator of the social and economic development. The architectural forms and its manifestation, mold not only of the urban structure of a city or the landscape, but also refines to a certain extent also the local identity with attempts to follow contemporary or modern features during the design phase.

Albania, is a western Balkan country, who has experienced drastic political and socio-economic changes, associated with significant problematic, but in the meantime with great potentials. These preliminary aspects, have grown tourism as one of the main pillars of the Albanian economy, while the construction of hotels have been evolving unceasingly to meet the presented needs. This paper aims to give an overview of the hotel typology evolution in Albania, by highlighting significant political developments, while endeavoring to identify the prevalent typologies of accommodation structures during these historic shifts. The typologies are investigated in the historical context, by focusing on the typology of tourism where they are sustained, architectural representations, capacities and other complementary peculiarities. Exploring these typologies also in terms of reusing inherited local characteristics is a useful and organic part of this research, which can lead to a comprehension of the continuity in the design process or the actual disregard of them and the following of a total distinct design path.

keywords typology, touristic model, historical development, inherited peculiarity

1. Historical Overview and Timeline of the Architectural Typologies of Accommodation in Albania

The first traces of the accommodation structures in the territory of Albania are related to the ottoman conquest with the representation of Hans (Inns or Caravansera) mainly for commercial functions. While the concept of the hotel was first represented during the period of Monarchy under the Italian assistance as a beginning of modern concept for tourism in the context of external affairs relations, dedicated for diplomatic affairs.

The beginning of Communism in Albania has emerged the type of tourism based in the political ideology of the socialist state. In this period the foreign tourists had dedicated lodging facilities and treatment as an approach to display the achievements of the socialist state, meanwhile the inputs of a socialist state and the changes of the society created the second branch of the internal tourism related with the right and paid vacation for the citizens.

The fall of the communist regime, as in every aspect of the new democratic state has been producing constant challenges in tourism with the raising demand, capacities for accommodation and the typologies of hosting facilities which during the first 15 years have been generated in an uncontrollable path, followed by a more plan-based way, but lacking in managing in regional or national scale.

Considering the evolution of the typologies in the accommodation structures in the last two centuries also in the political and socio-economic conditions; in this research there are identified four main periods where tourist accommodation structures are reflected:

- Accommodation Typologies Previous 1912 (prior Independence)
- Accommodation Typologies during the Monarchy in Albania (1922-1939)
- Accommodation Typologies during Communism (1944 – 1990)
- Accommodation Typologies during the transition phase which is divided in 2 periods:
 - a) Mass / Informal Tourism

HISTORICAL TIMELINE FOR ACCOMMODATION STRUCTURES TYPOLOGIES

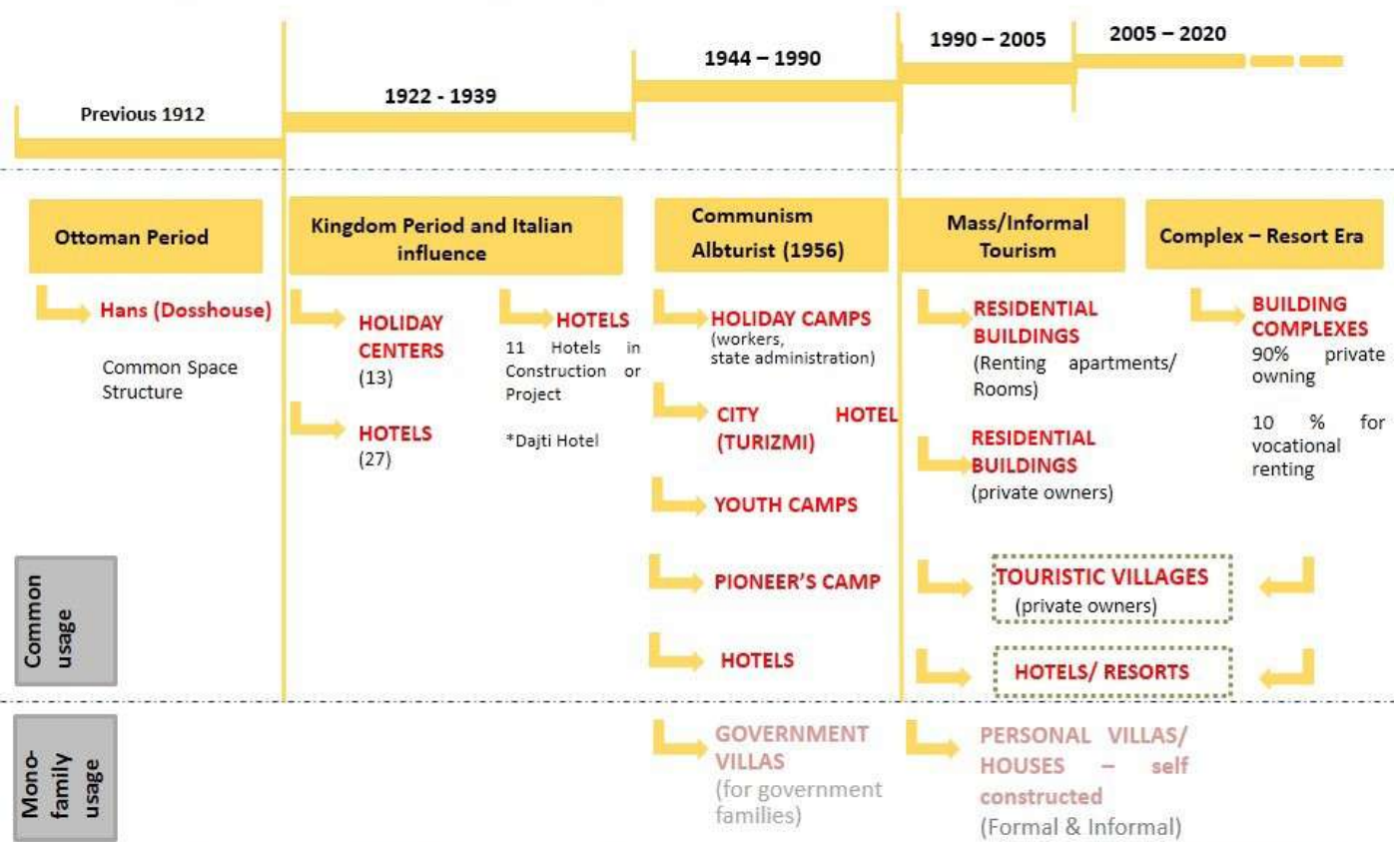


Fig. 1: Historical Timeline for Accommodation Structures Typologies in Albania

- b) Complex / Resort Era

2. First Accommodation Establishments in Albania (till 1912)

From the XIV-th Century, till the beginning of th XX-th century, the major part of the Balkan territories including Albania, were established under the Ottoman Empire, guided by the Sultan. From the beginning of this empire, the whole territory under it, served as nucleus of the centralized ottoman state, which also proclaimed a network of traveling combined with urban nodes, to articulate the power of this form of state, the meet the empire needs and develop the commercial trade. Sustained in this network, the economic potential was expanded, the craftsmen were positioned where they were needed and the goods and ideas of every territory were brought in the core of the empire.

The core of the ottoman city which has also been displayed in Albanian cities are organized in between 3 main components:

Religion – represented by the mosque, the main building typology of ottomans.

Hans (Inns) – which consisted on the 2nd main typology to provide accommodation for the merchants and travelers.

Bazar – the commercial heart of the city which is the initiating point for the whole ensemble.

Water presence – is an extensive urban elements like fountains or public bath which served not just for the functional reason but also as a part of religious practice.

Generally the urban core of an ottoman city was also actualized with the scenery of the clock tower which also satisfied the intension of the cities landmark.

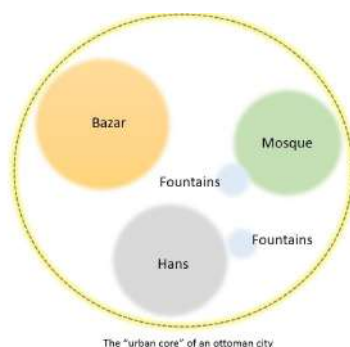


Fig. 2: Urban Core of the ottoman city

The Albanian Territories being in the western Balkan, has been since roman times, in the crossroads of important trade routes, whilst during the ottoman period, the old routes which served the merchants for centuries were reconstructed by expanding the spatial distribution of the accommodation structures. The basic functions of Caravansarai or later called Seljuks Hans, were to provide:

- Safety which was ensured by the massive thick walls, a single entrance and small windows
- Shelter for the traveller reserved on the first floor as well as for animals in the ground level.
- Service areas located alongside the courtyard including food supplies, bathing area, storage and religious area

These buildings differ in size from 500m² to 4800m² and even though they didn't have an exact execution plan the main architectural characteristics are disclosed in a rectangular shape, build in local limestone, with only one entrance consisting also the most decorated element of the building with the Islamic feature called muqarnas. These buildings always provided an area for praying, sometimes even a separate own mosque in the interior, fireplaces, natural lighting reinforced by the oculi opening in the ceiling and ventilation system ensured by small holes in the structure. The water system supply was achieved by drainage and sewer which provided enough waters for the baths and fountains of the caravanserai.

The main configuration of architectural plans of this typology are categorized¹ in 4 types: **The covered plan Han², The covered with courtyard plan, The open courtyard plan, Concentric plan.** One of the main cities of this period, Korca, in the southeaster part of Albania still preserves traces for 18 Hans³ while recently have been returning to the restoration strategy and re-adapting the 3 remaining structures to the market. The Hans of the city are mainly related to an individual owner's name or related to the travelers which it hosted.

Han of Elbasan in Korca, is a comprehensive examples of the typology of Hans in Albania, located in the main entrance of Korca's Bazar, which according to Ashimi, G (2012) was a commercial heart for Albania, with almost 1000 shops during its peak life at the end of XIX-th century and beginning of XX-th century.

The building belongs to type 4 of the Hans. A triangle shaped courtyard cantering the fountain is the main nucleus. The ground floor is divided in spaces for shops, whilst the first floor, oriented through an open arcade gallery provides the rooms for accommodation with windows facing the courtyard. The cover is realized with vaults as a structure and roof as mantle. The typology of Hans, basically represents a replication of the traditional house, regarding its materials used (stone, wood, roof tiling) as well as by its architectural elements (presence of the courtyard, fireplace, small windows, gallery and water source). Regarding its functional and relevance, it introduces a common space for accommodation related mainly with commercial aspects or craftsmen and artist travellers, displaying an architecture with Islamic and Ottoman influences.

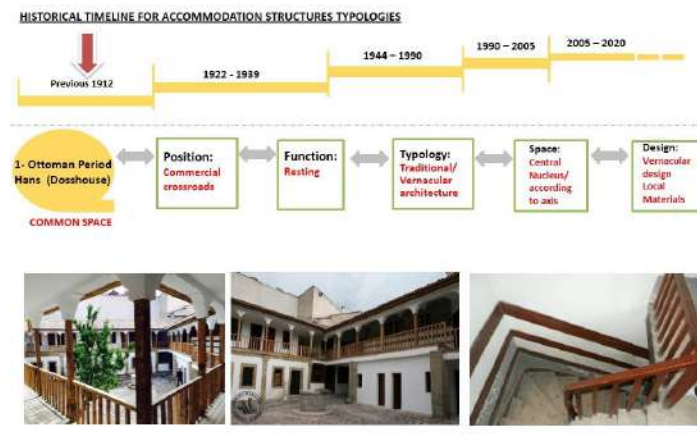


Fig. 3: Architecture of Inns (Khans)

3. Typologies of Accommodation during Reign Zog of Albania and under the Italian influence (1922 – 1939)

The origins of Tourism as an industry in Albania are first traced during the period of the Monarchy. The first establishment of tourism settlements have taken place during the Reigning of King Zog (1922-1939). With the orientation of King Zog towards Italian collaboration, especially after 1925, the organic structure of cities like Tirana and Durres, were gradually subject of mapping urban structures and developing urban plans⁴. The policy of the King for establishing Cities with well-formed urban structure was implicated also the architectural characteristics, which stated by several researches "architecture in Albania, during 1912 – 1944, even though has tried to find composing elements in the traditional architecture, still she was not capable to establish original features, which resulted in mechanical union of borrowed architectural characteristics from neo classicism, eclectic and modern architecture⁵.

1. <http://www.turkishhan.org/plantypes.htm>

2. Source: <http://www.turkishhan.org/>

3. Ashimi G. (20.08.2012), <http://gazeta-shqip.com/lajme/2012/08/20/hanet-ne-pazarin-e-vjeter-te-korces-dhe-degradimi-i-tyre/>

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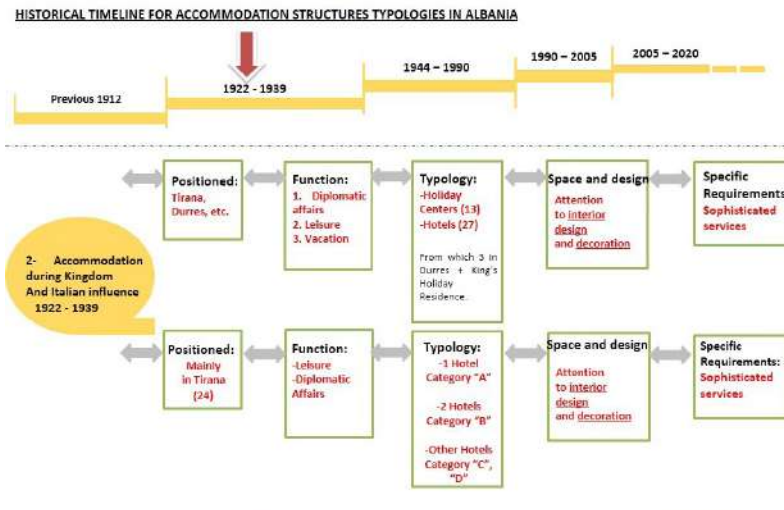


Fig. 4: Architecture of Hotels during the Kingdom of Zog.

It is quite understandable that the institutional relations of King, with diplomatic on other states, required the specific spaces and the adequate services that could match the royalty standard. It is recognized that it was not the quantity of touristic residencies that took the Major Attention, but mostly the requirements of the monarchy for sophisticated services and the first international promotions of the Touristic Albania. The typology of the “hotel” takes place during this period by positioning this typology in key parts of the cities in the same line with other important constructions. Overall, during the Monarchy existence, it is thought to have been 13 holiday centres and 27 hotels in 14 cities of Albania⁶, (from which Durres, also the King’s Residence⁷). The Italian influences during the years 1939-1943 were most notable since Albania was under occupation of fascist Italian state. This regime, understands the promotion of the territory and the infrastructure investments as an expression of authority which indicates the creation of “a touristic system”, Entity of Albanian Tourist Hotels accompanied by a clear vision for the tourism development for this land on the other side of Adriatic. Hotel Dajti is one of the most representative examples of this period. Located in the main Boulevard of Tirana “Deshmoret e Kombit”, called by the Gherardo Bosio, “Viale dell’Impero”.

The hotel facing the boulevard is harmonically positioned near other important institutional and cultural buildings by also restraining to the design criteria’s of this ensemble, respecting the volumes, height, proportions and relation with the boulevard. The hotel was one of the biggest in Balkan for the time and modernist compared to the European Buildings⁸ and its long façade complemented the concept of the entire boulevard. The project itself transmits the pure “L” shaped volume, with elegant lines which would be serving 125 beds, in 91 rooms in 2000m² interior surface and 12000 m² parks and green. The difference between the ground floor is visible and others, is visible since, in this floor are allocated the services. This elements is internally evidenced by the height of the ground floor and in the façade, is also treated with a dedicated volume. Construction technique, elevator, heating system and illumination were realized with the most developed technologies of time.

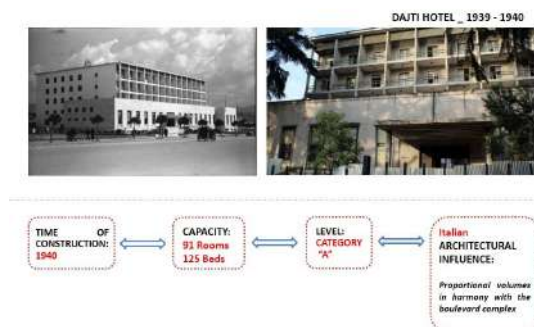


Fig. 5: Hotel Dajti, Tirana

6. <https://opinion.al/histori-hotelet-e-famshem-shqiptare-te-shekullit-xx/>

7. Tourism and holidays in Albania, from King Zog to dictator Enver Hoxha, <https://javanews.al/turizmi-dhe-pushimet-ne-shqiperi-nga-mbreti-zog-ne-dikatorin-enver-hoxha/>

8. Tirana Architettura e Città, 1925-1943, Giusti, M.A, Maschietto Editore

4. The Typologies of Accommodation Structures during communism

In communist Albania, tourism was represented by three main accommodation structures:

- Holiday Camps (dedicated to workers, state administration or specific groups of population positioned in the seaside)
- Pioneer's Camp (Youth Camps for spending holidays)
- Hotel "Tourism" (an accommodation structure within the city which generally expected administrative or diplomatic staff but do not comply standards)
- Mountainous or Curative Hotels (related to thermal waters and the
- Hotels for Foreign Tourists
- Government Villas (Holiday Houses, designed for the government families and not open for the public) acquirement

In controversial approach with the architecture during the monarchy, which was influenced by Italian and Austrian architecture, during communism it is the eastern Russian and Bulgarian impact dominant in design, especially till 1960⁹.



Fig. 6: Architecture of Hotels during Communism

The architecture of these structures were generally influenced by the overbearing influence of the ideology, by resulting in standardized architectural configurations, explicit simple volumes, mere concepts which were also directed by the economic factor seeking to construct with affordable cost. Attempts for manifesting audacious architectural premises were not accepted and in some cases punished to be in line with the rules of the socialist state. It would have been after 1985 when the architects would outmatch the visualization of the Albanian simple modernism, to surpass the ideological obstacles in order to give space more European influences.

The main region who contributed in the domestic tourism communism was the city of Durres, which represented almost 40% of the accommodation facilities for vacations followed by waterside of Pogradec, the capital Tirana, Saranda, Vlora and Korca; as well as curative sites of Kruja, Elbasan and Peshkopia.

Hotel Adriatik inaugurated in 1958 was one of the most articulated modernist architecture, positioned in the Adriatik coastline of Durres, even though after the 60' the concept of Tourism, and its form of management was entirely changed and controlled by the communist state.

5. The Typologies of Accommodation structures evolved after the 1990's

The typologies of Accommodation structures in Albania after 1990's in concordance with the conditions of development are categorized in two main periods:

- a) The period of Mass Tourism. Informal Phase 1990 – 2005
- b) Planning and Design Based Phase (2005 – 2020)

The main typologies dominating the period of Mass Tourism in the construction of accommodation structures during this period were represented by:

1. Residential Buildings
2. Touristic Villages
3. Resorts and Hotels
4. Self-constructed houses and villas

Residential Buildings

During the first decade after the fall of the Regime in Albania, the construction sector experienced an eventual high raise. This change has been also followed by the inability of the state to control the territory, especially in the housing sector, since the free movement in the democracy was stimulating the citizens or villagers to move to bigger urban centers for greater possibilities in employment, education, healthcare, services etc.

The informality in the coastal areas was mainly displayed in the forms of 4-10 stories residential buildings constructed by first constructing enterprises with two destinations:

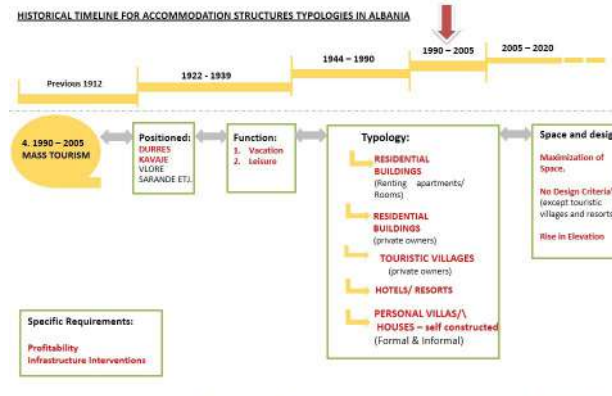


Fig. 7: Typologies of hotels during Mass Tourism period

a) Selling the apartment to private owners which would have a second house, a vacation house in disposal. This form was the one dominating the market in the coastline

b) Building High Rise Residencies for Rent purposes, possible and achievable only for those entrepreneurs who were investing in the tourism sector. Despite the fact that the first typology was intended for personal use, the curve of the tourism development in Albania, harbored the need for accommodation which could be combined with potential use of these buildings. This is the reason why most of the owners have let their apartments during the season period.

This typology of the buildings in this context have these general characteristics:

- Single Building unit
- The rise in elevation (at least 4-5 stories till 8-10 stories high)
- Built with poor or no architectural plan
- Concrete Construction
- Simple design with the cheapest materials used
- Maximal use of space in favor of internal used space
- Completely informal or partially informal (by adding stores in elevation or occupying ground floor space)
- No integration with the context, infrastructure and very near the sea



Fig. 8-9: Residential Touristic Properties in Durres Beach; Residential Touristic Properties in Golem

- Function: Leisure, vacation

This typology dominates the coastline near the main seaside cities like Durres, Kavaja, Lezha, Shkodra, Vlora and especially Saranda.

Touristic Villages

This category of accommodation structures have been emerging after the year 2000, where the economy have been having steps of recovery and a new growth curve, after the civil war and the pyramidal schemes of 1997.

The actual growth comply with a raise of expectations also in the tourism sector regarding the quality of construction in accommodation structures, the use of space, presence of open spaces, green areas and other facilities, which resulted in the first attempts for touristic villages.

Even in this case, the developer's interest (usually coincide with the construction company) was the fast-profitability. The touristic villages ended being private villas of apartments for the part of society who can afford them. This of course generated big occupied surfaces for private use, sold once and not entering the tourism market at all



Fig. 10-11: Touristic villages in Qerret; Touristic Villages in Golem

The typology of the tourist village's buildings represent these general characteristics:

- Low rise building
- Single or shared Villa
- More qualitative design and construction
- The project is Design Based (since it considers also the urban design of the whole complex)
- Individual open space (Green Space, Parking place Services)
- Private Beaches
- Function: Leisure/Vacation

Small Resorts and Hotel

The Hotel as a typology and the Small Resorts have been the last to develop during this phase, mostly in the years 2000 – 2005. The passing 10 years have offered the basic experience in the tourism sector and the raise in the number of tourists visiting Albania, raised the requirements for standards in accommodation facilities and service.

Now the accommodation facilities would have to reach not just the leisure needs mostly in the vacation season, but also fulfill other requests like: space for business, restaurants and cafe's, SPA or sport activities.

On the other hand, this typology is the main profitable in the market of tourism, since it is densely constructed.

In most cases, their architectural language is experimental, oriented toward architectural elements borrowed from modernism, classicism and baroque as a form of manifestation and connection with the European architectonic heritage.

- The typology the "Hotel" represent these general characteristics:
- Single Building unit
- The rise in elevation (till 6-7 stories high)
- Built with a design project with permission according to the actual laws of construction
- Concrete Construction or combined with steel
- Use of new materials in construction and façade
- Offers beside accommodation; a variety of leisure functions, business, services like cafes and restaurants.
- Private beach

The typology the "Resorts" represent these general characteristics:

- Complex Design with more than one unit
- Maximization of space (interior or outside)
- The rise in elevation (till 6-7 stories high)
- Built with a design project with permission according to the actual laws of construction
- Concrete Construction or combined with steel
- Use of new materials in construction and façade
- Exaggerated use of architectural styles
- Offers beside accommodation; a variety of leisure functions, business, services like cafes and restaurants.
- Private beach
- Function: Leisure, vacation, recreational, food service, health care, sports, swimming pools and other health facilities.

Self-constructed houses and villas

The self – constructed villas were private executions generally by families who has migrated from other cities of Albania or from the local who had seek to secede from the big traditional family by using the extra income especially from the remittances. These buildings at first for housing purposes by changing their destination eventually for profit purposes. In this process there is no project and the construction itself is conducted by the family, sometimes with external help. The seaside of Durres and Kavaja have the major number of these constructions.

This typology possess the following characteristics:

- Single unit, 1-4 stories height
- Informal building and informal function change
- No project or design
- Adapted for vacation lease
- Cheap construction materials

During the **Second Phase of Planning and Design Based Phase**, there are two main typologies emerging in the general panorama of tourism with more concentration along the coastline, the typology of resorts and hotels.

Resorts

These structures are mainly located in large surfaces occupying much land or in beautiful intact beaches along the coastline. The main localization is focused in the the Adriatic Coastline (Lalzi Bay and Rodon Bay) in northern part of Durres, as well as in Ionian Coastline (Palasa Beach, Drimadhes and Dhermi Beach)

The linking economic reason behind the construction of resorts is strictly related to fast profitability. Among these facilities, almost 90% of the accommodation units (villas or apartments) are built for immediate sale whiles approximately 10% are destined for leasing during the season. This formula, raises quickly the income of the construction company but as in the third category (small resorts and hotels), there is a small surface generally dedicated for a hotel, within these complexes which is actually an active component of profitability in tourism.

The new Resorts concepts are widely spread in the terrain, formulated with low rise units, which try to merge with the terrain. The design is highly considered in the case of the resorts, focusing in the exterior for unification of the complex and merging with the landscape, which seems like a continuation of the concept "Terraced Hotel Type", formulated in 1960's in Europe (Example: Hotel do Mar in Sesimbra, Portugal 1960-1963).

Every unit is associated with its personal space for sunbathing, including personal pools, exclusive sea view with large windows to experience the whole view. The construction materials are chosen carefully in line with the whole design of the complexes.

This typology possess the following characteristics:

- Massive Investments
- Massive Occupation of land
- Extension to the landscape
- Complex structures
- Accentuation of the architecture (exterior and interior)
- Variety of services
- Private pools and beaches.

Hotels

The typology of hotels in Albania, has had further difficulties in manifesting its architectural language in a more contemporary – oriented architecture, even though some buildings have managed to achieve it successfully. In the coastline of Durres, as the dominating region not only with the number of accommodation facilities but also expecting annually almost half of the tourists, during the years 2005 – 2020, we can find the Typology of Tower again as well as the "Y" shaped, "U" shaped and "L" shaped. Regarding the architectural language, these typologies of hotel are the continuation of the architecture forms, of the typologies presented in Europe in the middle of the XX-th century.

Meantime, the usage of mixed architectural styles of the last centuries is still present in some newly projects, by giving its grandiose image through the lack of the originality and repetition of some elements, in a constraint way.

In terms of space and services, the quality of spaces addressing the customer's need more adequately and the extension of services comparing to the previous 15 years, are quite noticeable.

The hotel typology of these years presents the following characteristics:

- Tower Hotels Typology, "U" shaped, "Y" shaped, "L" shaped
- Project – Based, In conformity with the legislation
- Qualitative construction and materials
- Height variation from 5 to 8 floors generally
- Extension to the landscape
- Variety of services
- Private pools and beaches.

Conclusions

In 2018, 1326 accommodation facilities (hotels, motels, camps, guesthouses, mountain shelters and other structures for short-term stays) were functioning throughout the country with 17.000 rooms and 38.000 beds. However, real figures should be much higher due to high informality in the sector and to Airbnb operation in Albania recently. Informality is a general feature that Albanian tourism businesses face, especially in the coastal area but also in other areas.

The “Hans” Structure (Khan/inns) have been identified as the first accommodation structures in Albania. The most common type is the Concentric Plan Type, represented by a polygonal shaped courtyard centering the fountain as the main nucleus (prior 1912). This typology might be considered also as an incentive of the “U” shaped hotel Typology, one of the representative typologies of hotels presented in Europe in the middle of XX-th century, which was brought in the Albanian coastline during the Planning Based Design Phase (2005-2020).

During the Period of the Monarchy and the phase of the Italian influence (1929-1944), the projects for hotels was sustained in the policy of the King for establishing a defined urban structure, but unable to establish original features, the architectural language resulted in a mechanical union of several architectural characteristics, based in neo-classicism, eclectic and modern architecture. This combination of styles is a concept brought also in the period of the mass tourism Planning Based Design Phase (2005-2020), by enhancing the features in a product called “Turbo Architecture”. This concept is a creation in the context of a lack of style and identity, in attempt to borrow from the established international styles and aristocratic manifestations.

During Communism (1945-1990), the design was not an important feature itself. Serving the power of the communist state, the category of hotels was limited, based on the simplest manifestation of modernism with functional aims only, thus with few architectural language indicators. These characteristics, are seen also in the period of Mass Tourism (1990-2005), where the need for accommodation is the only prevalent factor concluding in “limited in function” projects, with modernist approach.

The Plan Based Design Phase is the one which has offered a variety in the transmitting architectural elements in design and decoration. Having fulfilled the primary principle of accommodation, the last decade projects, have put the focus in the “form” discussion, the space, landscape integration; mostly being influenced by the models of resort – oriented areas and economic reasons. This way not relying in prior concepts or influences, but trying to offer a new typology and architectural features.

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Investigation on combined failure mechanisms of RC structures after the last earthquake in Durres

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The Mw 6.4 earthquake that occurred a few kilometers north of Durres, November 26, 2019, located in the western part of Albania, can be considered the strongest in the last 40 years. It also caused significant damage to buildings (structural and non-structural). Approximately 3,500 were injured during the event and 52 people lost their lives. In Durres region, in the last 20 years, building stock is formed from reinforced concrete frame structures and during last earthquakes, some of these buildings in the epicenter regions were collapsed leading to widespread destruction and loss of life. In this paper combined failure mechanisms of reinforced concrete structures will be investigated and construction rules will be suggested. The objective of this paper is to provide a brief overview of damage as observed following the earthquakes. The failure modes consist of soft stories, strong beams and weak columns, lack of column confinement, poor detailing practice and non-structural damages. To limit the failure of RC frame systems, design and construction requirements should be included in the Albanian seismic code by adopting suitable solutions. Regarding the methodology, nonlinear static analysis will be performed to obtain the collapse mechanisms and their seismic performance. Here we will try to elaborate on some of the causes that lead to damage these structures. Also, the architectural point of view of structural configuration will be considered on this paper. This study will be a reference for future studies that investigate RC frame structures damage. Also, our findings will be used to provide practical solutions for interventions in damaged objects.

keywords recent earthquakes, RC frame structures, combined failure mechanisms, structural configuration, nonlinear static analysis

1. Introduction

The Mw 6.4 earthquake that occurred a few kilometres north of Durres, November 26, 2019, located in the western part of Albania, can be considered the strongest in the last 40 years. It also caused significant damage to buildings (structural and non-structural). Approximately 3,500 were injured during the event and 52 people lost their lives. In Durres region, in the last 20 years, building stock is formed from reinforced concrete frame structures and during last earthquakes, some of these buildings in the epicentre regions were collapsed leading to widespread destruction and loss of life.

The earthquake affected area is sufficient proof that earthquakes release a tremendous amount of energy. This energy propagates in all directions and enters a structure as ground motion which has displacement, velocity, and ground acceleration components. The seismic energy which is introduced into the building must be dissipated within the structure. Energy dissipation shows itself mainly as inelastic behaviour of the structural system.

An earthquake resistant RC structure should dissipate seismic energy as damage in the structural system, but collapse should not occur and after the earthquake, damage should be economically feasible to repair. Technical Design codes specify criteria for the design and configuration of new structures subjected to earthquake ground motions with some criteria: 1) to increase the expected performance of structures having a substantial public hazard due to occupancy and use; 2) to minimize the hazard to life for all buildings; and 3) to improve the capability of essential facilities to function after an earthquake. Ductility is the capacity of building materials, systems, or structures to absorb seismic energy by deforming into the inelastic stage. Materials, focusing on Concrete, a brittle material, must be properly reinforced with steel to provide the ductility necessary to resist seismic forces.

Many parameters may share with different degrees in forming the overall seismic behaviour of a frame structure. In this paper combined failure mechanisms of reinforced concrete structures will be investigated and construction rules will be suggested, through employing the Static Non-linear Analysis "Pushover" technique. The objective of this paper is to provide a brief overview of damage as observed following the earthquakes.

2. Methodology

Regarding the methodology, nonlinear static analysis will be performed to obtain the collapse mechanisms and their seismic performance. Here we will try to elaborate on some of the causes that lead to damage these structures. Also, the architectural point of view of structural configuration will be considered on this paper.

The failure modes consist of soft stories, strong beams and weak columns, lack of column confinement, poor detailing practice and non-structural damages. To limit the failure of RC frame systems, design and construction requirements should be included in the Albanian seismic code by adopting suitable solutions.

3. CASE STUDY

The case study is a RC frame in Durres with ten stories were examined where have three bays with fixed bay width of 5 meters, fixed typical height of 3 meters and a first storey height of 4 meters as shown in Fig.1 in both stories. The Building is located on the center of Durres.

- Concrete and steel characteristics: Variable grades of concrete (cube strength) (250 and 300) kg /cm² are used while steel grade is S500. Concrete and steel Poisson's ratios were taken as 0.2 & 0.24 respectively.
- Loading: A uniformly distributed vertical load of 3.5 t/m' on every story was used for both cases representing a combination of full dead load plus 50% of live load as stated in many building codes.

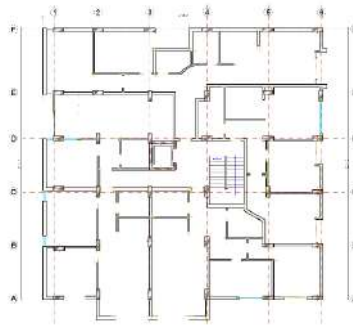


Fig. 1: Case study floor plans (10-storey building)

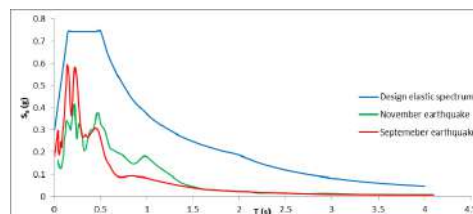


Fig. 2: Two response spectra from Tirana compared to the current design code elastic spectrum

Structural type: The most common method of design, is reinforced concrete frames accompanied by infill walls. Popular since the 1980s to the present time, this construction typology is used for single- and double-storey detached houses through to apartments 12 storeys high. In these frame and infill buildings the frames and the entire concrete skeletons are constructed first and then infilled with hollow clay bricks which are then plastered. Interior walls are of the same material and construction type.

According to local code requirements, a mid-height horizontal reinforced concrete band is required in each infill to resist face-loads, but this member was not seen in any damaged building.

Since the infills and partitions are constructed after the completion of the concrete frame and the only connection between infill and frame members is mortar. Walls are therefore very vulnerable to out-of-plane collapse and this was a very frequent occurrence. This lack of reliable connection between infill and frame contrasts distinctly with Confined Masonry construction. In this technique, masonry walls are constructed first, and only then are reinforced concrete tie-columns and beams cast. This construction sequence ensures the masonry is confined and therefore can resist lateral loads more reliably than infilled frames (Carlevaro 2018).

The floors of reinforced concrete infill frame buildings consist of both precast and cast-in-place concrete. Although no precast floors were observed in the buildings visited, (Lekkas et al 2019) report that some multi-storey buildings with these floors collapsed. The hollow-core slabs were not tied together at all and so floor diaphragm action was completely absent. Cast-in-place floors typically take the form of concrete ribs and topping between and over hollow clay brick infills.

Spectral data: Regarding the characteristics of the earthquake shaking, so far only two response spectra are available (Figure 2), (Geo.edu.al, 2020). THEY are obtained from two accelerograms recorded in Tirana, 30 km from Durres. Unfortunately, an accelerometer in Durres stopped recording after 15 seconds of shaking but 'reconstituted' spectra may be available in the future. Due its lesser epicentral distance and greater amplification from soft

soils, the Durres spectra are likely to exhibit higher spectral accelerations and over a longer period range. The duration of strong shaking in Tirana was approximately 40 seconds, about four times longer than the smaller Mw 5.6 September earthquake.

4. ANALYSIS AND RESULTS

Dealing with seismic problems, we can recognize four different methods for structural analysis as mentioned in (ATC-40 (1996), FEMA-350 (2000), FEMA-356 (2000) and Eurocode-8.

1. Linear Static procedure (LSP).
2. Nonlinear static procedure (NSP) or (pushover analysis).

Load cases: For the pushover analysis, three load cases were considered: a) PUSH+X (Applying lateral loads in the X-X direction). b) PUSH+Y (Applying lateral loads in the Y-Y direction).

The pushover analysis is a static non-linear analysis under permanent gravity loads and gradually increasing lateral loads. Static pushover analysis is an attempt by the structural engineering profession to evaluate the real strength of the structure and it promises to be a useful and effective tool for performance-based design

ETABS v18.1 offers significant characteristics for the nonlinear static pushover analysis. Both 2D and 3D structures can be analyzed as pushover analysis on ETABS. The nonlinear behavior of the frame members is determined by particular hinges and the structural capacity drop occurs for the said hinges.

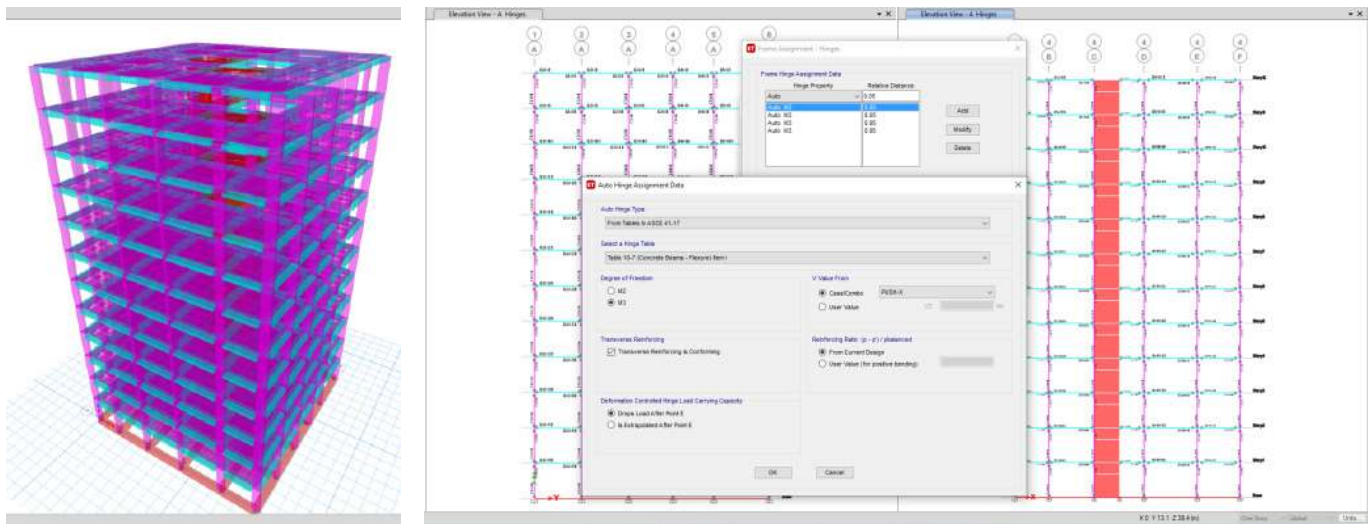


Fig. 3-4: 3d model on ETABS elastic spectrum; Plastic hinges model on frame elements

5. DISCUSSIONS

Pushover analysis was carried out separately in the X and Y directions. The resulting pushover curves, in terms of Base Shear – Roof Displacement ($V-\Delta$), are given in Figures below for X and Y directions respectively. The slope of the pushover curves is gradually changed with increase of the lateral displacement of the building. This is due to the progressive formation of plastic hinges in beams and columns throughout the structure.

What is most striking about the damaged buildings still standing, and often uninhabited, is the non-structural damage. Extensive damage has occurred to infills and partition walls at the lower half of the building only. It was investigated by different groups of experts that while non-structural walls on lower floors had suffered extreme damage due to in-plane deformations and out-of-plane failure, upper floors were virtually undamaged. All elastic and inelastic deformation has concentrated at lower levels. There was very limited evidence of inelastic behavior in structural members.

This observed damage in the lower floor of buildings is not entirely expected in earthquake engineering practice. According to theory, lateral interstorey deflections of frame buildings are greater near the base, but certainly present at the top of buildings, especially when higher modes are induced. Also, maximum horizontal accelerations increase with height. From a simplified perspective then, one expects greater in-plane damage due to interstorey deflection at lower floors of a building, but greater out-of-plane damage at higher levels. It appears therefore that in-plane deflection and damage has made infills and partitions more vulnerable to out-of-plane failure, and that the softening of the lower infills has created several soft-storeys that have effectively isolated the upper floors. Stiffened by their undamaged walls, these upper storeys have then acted as a rigid body above very flexible and long-period frames beneath. We hope that researchers using push-over and dynamic analyses, and modelling all brick walls can confirm what is now only a theory.

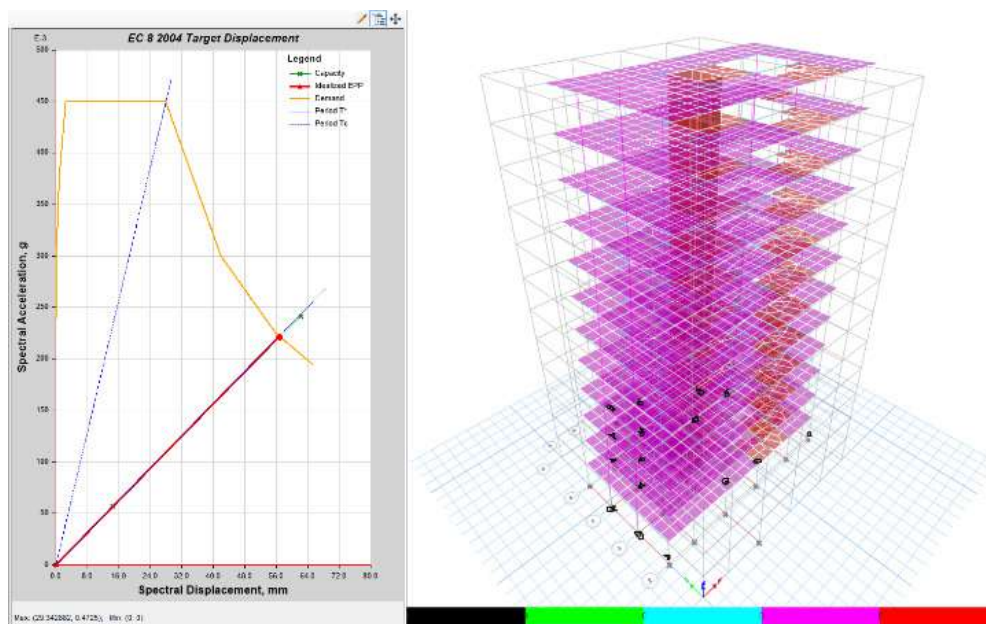


Fig. 5: collapse mechanisms and capacity curve (push-x), different steps investigated to analyze damages

6. CONCLUSIONS

Most of the damage to the buildings observed was either to non-structural elements or caused by non-structural elements, namely infill and partition walls of plastered hollow brick masonry. The degree of damage was intensified by the flexibility of medium-to-high rise frame buildings caused by a lack of reasonably deep beams and irregular plan orientation of reinforced concrete frame columns. These deficiencies need to be remedied in new Albanian construction.

Brick walls represent a hazard to life, and when damaged, the hazard they pose forces inhabitants out of the buildings until repairs are made. As repairs are made to the damaged buildings, care is required to ensure that the same damage will not reoccur during the next significant earthquake. There is an urgent need for research and development to provide culturally appropriate solutions to overcome the reported problems with brick walls in frame buildings. A concerted effort is required by both engineers and architects.

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Theoretical background on video game narrative structure and techniques

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This paper intends to give an overview on the conception and design of video games, based on a narrative structure and techniques, as fundamental step in game design process. In traditional media such as literature and cinema, the concept of narrative and the narrative structure has been widely discussed. Nevertheless, this traditional theories of narratology do not encompass the additional components of video games such as interactivity and gameplay characteristics, which should be integrated in the narrative structure. Thus, this paper intends to structure a methodology for convening story, interactivity and gameplay creating a narrative structure that is specific for this new medium. In this regard, the debate between ludologists and narratologists will be outlined with the intend to understand the specific characteristics of this new medium compared to traditional communication media.

In addition, this paper will present a theoretical overview on player's behavior within the game space and their role in shaping the narrative process. This can offer a lot of freedom and the possibility for the player, to change or recreate the story, by having the narrative control. Finally, research will present a classification of narrative models and techniques considering different game types.

This paper concluded that video games as a contemporary narrative media resemble to the traditional media in many aspects, but their narrative structure is highly influenced by the present of interactivity and game rules.

keywords game narrative, gameplay, interactivity, narrative structure, narrative techniques

1. Stories and video games

Stories are part of our culture. They determine our life since childhood affecting us emotionally and influencing our thoughts, education, values and behavior. We grow up and learn through stories. The story is the telling of an event, either true or fictional, transferring information, experience or emotion in such a way that the receiver experience or learn from the story (Rebrović 2014). According to online Dictionary "a story" is defined as "a narration that raises interest, amuses, or instructs the reader", enriching since the childhood human experience. People learn better through stories.

Storytelling methods have changed throughout human history and especially in the last decades with the advent of digitalization. The evolving interactive media has enriched storytelling methods (Murray 1997) with a new dimension of creativity, connection and immersion. In contrast to books or movies, in which stories are read or seen visually, in video games stories are experienced in various dimensions and senses: spatial, audio-visual, physical etc., thanks to the advanced technology. Although the methods of storytelling have changed, we are still attached to stories because of the extended experience they offer

In video games, stories are used for various intends: as didactic tools, to make the game more attractive or to help the player feel more involved and immersed in the game and in some cases allowing them to participate, decide and write by themselves the stories.

However, games are not per definition a narrative media. In fact, the primary aim of the game is gameplay. Thus, usually the story assumes a complementary role in video game, although in some cases there are so called narrative games, that are based primarily on stories. In both cases, the elements of the story in video games are incorporated based on a series models and techniques of narration. According to Kelly (2011) the story is the structure of all story elements and the way they are narrated. Thus it's important to understand the concept of narration and the various models and techniques of designing stories in video games.

In traditional media, narrative is presented as a series of written or spoken words or moving images. In cinematography, for example, the

narrator does not explain all events, but considers separately the plot and the story. Starting from the story is created the plot, by selecting interrelated sequence of events explicitly planned by the narrator to be presented to the audience. The plot can be presented to the audience in a chronological sequence, casually or in another order decided by the author to create meaning. Events in movies are dictated by the nature of characters' interaction: collaborating or conflicting etc. and the resulting events they cause (fig. 1). According to Jacobs (2007, 26) the plot is an "arrangement of incidents" which make up a story; it is what holds a story together. This is an interpretative process. Thus, narrative is not the story itself, but the way it is told.

Todorov explained that "an ideal narrative begins with a stable situation which is disturbed by some power or force. There results a state of disequilibrium; by the action of a force directed in the opposite direction, the equilibrium is re-established". (Todorov 1977: 111)

Narratology in video game investigates on plot structure similarly as in the field of literature or cinema, but while in literature and in the cinema the reader/ spectators is excluded from the production process, in computer games they take part in the game by acting. (fig.2)

Hereupon, video games, although are based on traditional storytelling techniques, have changed the way stories are told. In video games, players are turned from passive observers to active participants and influencers in the way the story is told. Player's performance is crucial in video games (Frasca 2003). Without player's performance, the game cannot progress and reveal itself, be it narrative or non-narrative.

In this sense, game narration is not singular and rigidly defined as books or cinema, but as conceptualised by Montfort (2003), is considered as a an

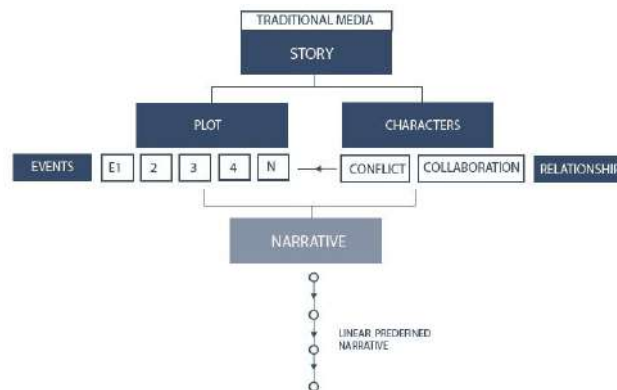


Fig. 1: Traditional media narrative (ex. literature, cinema)(by authors)

open structure or a hypertext. Because of the freedom of actions and choices, game can have a hypertext narrative, based on different railroads and destinations. According to Aarseth, these text is more challenging than the structure of traditional media narrative: "The cybertext reader is a player, a gambler; the cybertext is a game-world or world-game; it is possible to explore, get lost and discover secret paths in these texts, not metaphorically, but through the topological structures of the textual machinery." Game scholar, Janet Murray(1997) argues that the transformation of the digital texts is assigned to the player through the freedom of action and interaction that is given to him. In conclusion, while narrative is traditionally defined in a linear and chronological way based on the classical three act structure, with a beginning, a middle and an end, narrative in video games is considered as a

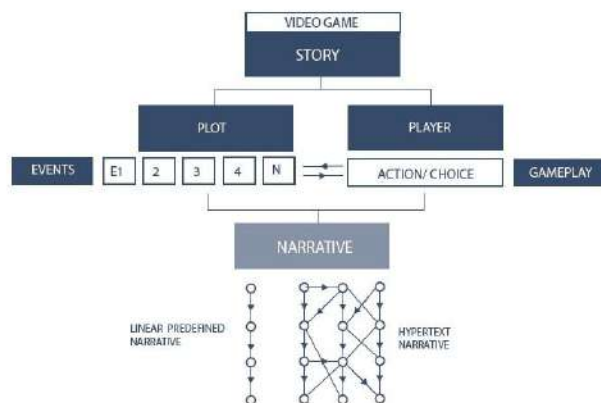


Fig. 2: Narrative in Video game (by author)

hypertext defined by the actions carried out by the player.

2. Ludology approach in video game

The term, Ludology, coined by Espen Aarseth (2004), is defined as a discipline focused on the study of game play. Ludology approach considers a game primarily as a competitive activity, goal oriented and conducted under certain rules. Game designer and academic researcher Gonzalo Frasca in 1999, introduced the term ludology from "ludus", the Latin word for game, referring to the game and play activities". Ludologist considers games as a play activity, which has nothing to do with the narrative, fictional content in games or games as a visual medium.

Firstly, they discard completely narrative analyses—essentially denying the existence of a connection between narrative and game—and focus on a

formal analysis of the game and its mechanics. The same Aarseth (2004) considered interactivity as a key component in video games, ignoring narrative and visual representation aspects or considering them as secondary. Other scholars (Kelly 2011, Juul 1998) sustained that stories and games contradict each other and Eskelinen (2001) sustain that games shouldn't have narrative at all. Mateas and Stern in "Interaction and Narrative" (2004) defined ludology as the result of gameplay and interactivity, while narrative is considered as something related to a defined path.

Secondly, ignoring the games as a visual medium, the pure ludological approach neglects the role of the spatial environment in video game as a visual narrator and as space for interactivity.

Thirdly, this approach is based primarily on establishing rules and defining what a player can or cannot do, and predicting the consequences of his actions in the game world.

To sum up, ludological scholars, considers as the main aim of video games players the pleasure derived by action/ interaction which permit to continue the game and face the challenges it offers. Frasca suggested that the ludological approach in game studies "focus[es] on the understanding of game structure and elements—particularly [their] rules—as well as creating typologies and models for explaining the mechanics of the games" (Frasca 2003, p. 222). However, it cannot be strictly separated from narration. According to Frasca, narrative representation includes a model of behaviour which "reacts to certain stimuli (input data, pushing buttons, joystick movements), according to a set of conditions" (Frasca, 2003b).

In conclusion, the pure ludological approach limits its scope of study to the game mechanics and to the ludological elements (such as rules, objectives, items, gameplay), highlighting the role of a model of behaviour based on the given stimuli of the game, and ignoring the representational elements, although games encompass "narration" and its representation which in this approach was considered as a secondary and in some cases a conflicting element.

3. From traditional narrative to video game interactive storytelling

In the last decades, narrative was considered as a secondary component of video game. Some video games even lack a narrative structure, although many scholars sustain that a lot of games have a prominence of storyline. The traditional linear narrative that was typical in literature and cinema, is being shifted to interactive storytelling.

In video game design discipline, there have been a long lasting debate between the narrativist and ludological approaches who sought to dominate game design field. Narrativist approach supporter, Janet Murray (1999) claim that games are based on a story and envisioned new ways of storytelling, while ludologists supporter Jesper Juul have questioned the notion of narrative in games, suggesting that narrative and gameplay are conflicting things and that the computer game is not a narrative medium, although it includes narrative elements (Juul, 1998).

However, many authors (Aarseth, Jesper Juul, J. 1998, Eskelinen, M. 2001) who sustain the overcome, in certain games, of narration over interactivity and game rules admit that they are both part of the games.

Considering the dual nature of videogames, Marie-Laure Ryan (2006) proposed a "functional ludo-narrativism" model, defining video games as a combination of "the imaginative experience in a fictional world" and "the dimension of gameplay".

So, video games, unlike traditional media which rely on textual and audio-visual description and representation methods, use also action/ interaction as techniques to involve the player in the storytelling process. In this sense, interactivity in video games has encouraged the evolution of narrative (FIG. 3). Rather than description and representation, game narration is based on Interactive narrative as defined by Meadows (2003) is "a time-based representation

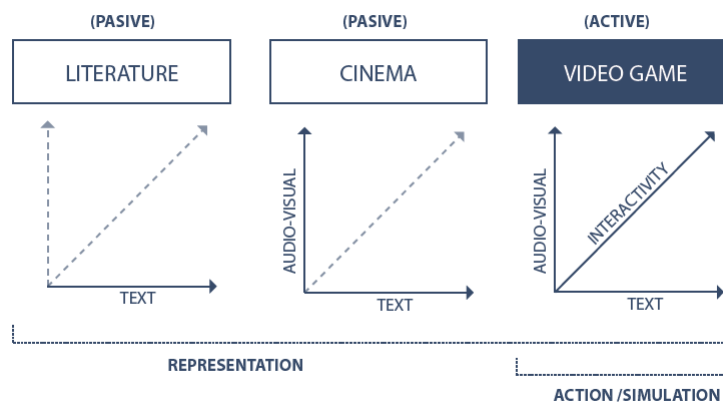


Fig. 3: Evolving types of narratives (source: authors interpretation based on <https://hitboxteam.com/designing-game-narrative>)

is "a time-based representation of character and action in which a reader can affect, choose, or change the plot". In video games, as entertaining media, the reader (the user/player in this case) is intentionally allowed to influence the narrative as he has the freedom to act and choose in order to enjoy the game. Part of the enjoyment is also the feeling that his action trigger events, and the things that happen inside the game are the result of his actions. Nevertheless, players are not set totally free to manipulate the game. They are posed under certain limits and restrictions, but also possibilities and choices are offered to them in the framework of gameplay. This particular behaviour of the system is enabled through simulation, which enable a dynamic response as result of a certain behaviour of the user.

Simulation enables agency (action or reaction) which produces, through interaction, changes and transformations in reality. Thus, the actor can be the player, an abstract entity, a person or an object part of the game. Everything inside the game can be mobile and transformable.

Lindley (2005) offers a classification plane of ludic systems based on three components:

1. Narrative. In narrative based game, players experience is highly defined. Adventure sport games, for example, are mainly narrative games, being non-competitive. They have limited rules, primary defining the limits of the game.
2. Gameplay (ludic). Pure games have a weak narrative structure and are based mainly on rules. Game genres such as matches (ex. football, chess), and competitions have a defined structure based on interconnected rules. In case lack any kind of fiction.
3. Simulation. In simulation games, narrative and gameplay are set together in a dynamic process. Narrative integrates to game play offering simulation.

Nowadays, video games are highly based upon simulation, particularly the representation of game space, objects inside and their behavior or interaction with the player or other game elements. A rich ludic content in video games is the synonym of a simulation that has the capacity to include player's will. In this sense according to the classification plane of ludic systems (Lindley 2005), there are various levels of simulation depending on the game category:

1. Action/adventure games rely less on simulation. In each mission simulation can include physics, weapon effects, opponent movements, etc. However, the player is constraint to experience a defined /almost defined narrative path because of the game story.
2. Role playing games assign to the participant a role and let him free to explore in a spontaneous way the environment.
3. Strategy games, which initially were used for military training, are based on combat simulation.
4. In gaming-simulations (ex. The Sim, SimCity), the role assigned to the player is not definitively assigned, but is the result of an interacting systems. Thus, in this case, simulation model constitutes the terrain for dynamic interaction

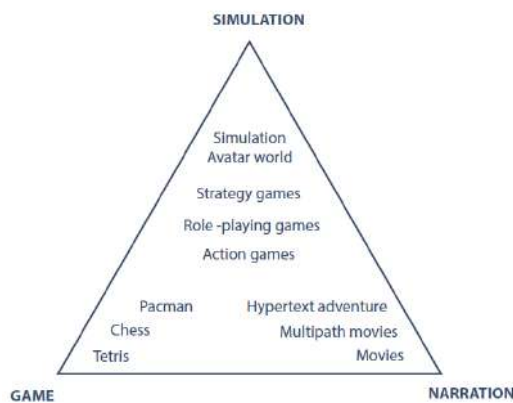


Fig. 4: A classification plane of ludic systems (Lindley 2005)

4. Video games from player perspective

There are a lot of theories regarding player's behaviour within the game spaces. Richard Bartle has categorized play styles based on four player's personality types:

- Socializers use the virtual world to interact with other game players.
- Killers are driven by the desire to hurt other players, inflicting pain in the virtual environment.
- Achievers. Achievers are driven by goals to accomplish such as gathering points, complete levels, or earn money and rewards). They are always in a competitive position, and want their achievements to be measured and shown in the game.
- Explorers. Explorers are driven to understand and learn from the virtual environment, including space features and game mechanics. They look at the game more as a journey, than as an achievement or final destination



Fig. 5: Bartle's (1996) categories of play types

5. Narrative Structural models

The narrative components in video game are organized based on a structure. There are four narrative structures: Pre-established, Discovery, Sandbox and Computer-based. In each of these categories there are sub-categories.

5.1 Pre-established narratives

Linear Narratives

The linear narrative is the most common, simple and easy to design storytelling architecture. The story is revealed step by step as the main plot is divided in predefined stages. This type of structure offering a pre-established sequence of events result as highly controlled. The interactive parts of this narrative are the user's actions following the completion of game quest. When the player reaches certain checkpoints, a new step is triggered and all the game is built as a chain of events from start to end. In this straight line of events there is no possibility to insert side-events. This succession of fixed predefined pieces inflicts a low degree of freedom for the player, who is not able to choose which event to explore and be part, but is obliged to discover stories as ordered and offered by the narrator. Player progress the story without exercising control over it.

(Ex. Call of Duty (Infinity Ward/Treyarch, 2003-2013)/ Battlefield (DICE, 2002-2013)/ Killzone (Guerrilla Games, 2004-2013).

The string of pearls model (Pseudo-Linear)

The string of pearls model is the simplest form of interactive video game narrative. It is similar to the pure linear narrative, but it embodies the illusion of interactivity. This model is still pre-established, but the player perceives more interactivity, due to possibilities to explore parallel events that are offered in different stages. The players are given a wider amount of freedom within one level or stage. The narrative sequences, that define their progression towards the outcome and the end built from one level to the other through cut scenes and is strictly controlled. In this model, in fact, there is only one ending. Players have no alternative conclusion and the along the play they have just one way to proceed. This does not mean that games with this kind of structure are less interesting. Indeed, interactive games with a poor narrative operate well with this kind of structure. The string of pearls model is well suited for adventure games, where the emphasis is on the storyline. (Ex. Adventure game Indiana Jones and the Last Crusade (1990)).

The branching narrative model

The branching narrative aim to give more freedom to the player compared to a linear or string of pearl model, by allowing the player occasionally to influence the flow of the story. In branch narrative model, the story rather than remaining linear, unfold in different predesigned narrative paths, but still return to one single ending. The trunk constitutes the spine of the story, while events can happen in different direction along the journey. Dissecting the plot in several directions and offering the possibility of multiple endings create more variation for the player.

Branching can be achieved through cut scene and gameplay sequences. Choice and option provided to the player can bring him in various paths and solution that lead him towards the single end of the game. The choice of a path instead of another can make the game easier or harder, or can affect the story, by allowing the player in some cases also different ends (in which one is the best option). Other options can lead player to failure, which orient him toward the main conclusion line. Currently, the branching narrative model is rarely used by game developers, due to high development costs increased by the extensive branching structure. Therefore, when adopted for certain video games, this narrative model is limited few branches. Nevertheless, this model developing a more complex narrative can offer to the player more power and is perceived as consequence as more interactive.

(Ex. Prince of Persia (1989); Maniac Mansion (1987).

The amusement park model or web narrative

The amusement park model unfolds narrative complexity in space and creates spatial branches allowing the player to explore different places and to progress in multiple directions doing choices that can lead him do different ends. Lacking linearity and developing in different directions this model is largely elaborated by game designers. Designer creates multiple challenges and various options. Player have the possibility to explore new places, but also to come back to previously visited places. The amusement park model is a complex narrative model, which contrary to the branching model, allows the player to select by himself the path to pursue. The amusement park model is very expensive compare to linear games. Therefore, this model is sometimes simplified by using textual sources rather than building graphically the scene. (Ex. Odyssey: The Legend of Nemesis (1995), The Elder Scrolls III: Morrowind)

5.2 Discovery narratives

Discovery narration offer huge freedom to the player to explore the game world and to discover information on it. The narration structure is open to be explored by the player and therefore it results as less linear, and present branching stories. These model are based on multiple options to access side story information. Moreover, the player has the control to choose and define side stories order.

Modular narrative - The building blocks model

The modular or the building blocks narrative model is based on episodic events that constitute a system of parts. Every event becomes a story module and users are not forced to follow a certain direction. Thus, in this model the player freedom is almost total and he becomes the creator of the story, having control over it. Moreover, on multi-player games, it's difficult to tell the real actor, as both player contribute in the creation of the story. The game designer

provides to the player “an open map” made of different stories. The player is free to reconstruct the narrative as he wishes, choosing depending on his interest and desire to explore deeply the game world and without time or space restrictions. Hence, the storytelling is an act of narrative reconstruction assigned to the player and what happens its entirely in his hands.

(Ex. Civilization, The Sims (2000); Tomb Raider (2012) Assassin's Creed (2007-2014))

Sandbox narrative

Sandbox narratives are discovery narratives with a higher level of interactivity. Designer provide the players with an open map of the world filled with elements to interact with. During the exploration can occur various random events, which increase the level of interactivity of the player. According to Ryan, in this model of narrative “players write through their actions...within the range of possibilities offered by the built-in script” (2006: 201). Ex. Red Dead Redemption (2010).

Computer-generated narrative

Computer generated narrative is a deterministic narrative based on AI techniques. This type of narrative is typical in simulation game genre. Similarly, to the sand box narrative, it is based on a high level of interactivity with an increased level of randomness and computer-generated events. The computer-generated narrative is the result of players' choice as well as a large number of variables related to the simulation of real life events. (Ex. The Sims 2000-2013)

Emergent narrative

Emergent narrative allows stories to emerge spontaneously, so that each player create his only story by his experience. This stories are not predefined by the designer. They are only made possible, through non-predictable game AI technique. Ex. Creatures, (Grand, 1996-2001)

6. Conclusions

Interactive storytelling in videogames is designed considering three main steps:

1. Create and translate visually the game concept. From game story to environmental storytelling.
2. Define the interaction mode. Incorporate player's actions in the story/ Incorporate rules and game mechanics. This process is set by considering player's behaviour and the level of freedom to conferee to the player.
3. Define events and level design by merging the first two categories based on a selected typology of narrative structure.

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Cost optimality and nearly-zero energy in building renovation Multi-residential building in Albania case study

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In order to comply with the climate change mitigation, the EU has introduced the European Directive on Energy Efficiency in Buildings. The two most important concepts of these directives are cost optimality and nearly-zero energy buildings. Cost optimality is focused on costs, and nearly-zero energy buildings is focused on low energy consumption and renewable energy sources. In EU, building sector is the major responsible for energy consumption and the existing buildings represents a major share of it. To meet EU energy and climate targets, it is necessary to take actions for large scale energy renovation of the existing building stock. There is a huge potential for energy and emissions saving in existing building, but still it isn't fully exploit since studies are focused mainly on new buildings. Most of project are focused on costs, and because of the long payback periods, often there are missed opportunities on improving further the energy performance of an existing buildings. The methodology used in this study takes into account several energy measures scenarios and compare them to a reference scenario, which does not improve the energy performance of the building, but only restore its functionality. It was explored a full range of cost-effective scenarios to find the best solution depending on the country targets such as economically, energy consumption or carbon emissions. Using a multi-family building located in Tirana, one the most common building in Albania, this study investigates the range of cost-effective packages of energy retrofit measures. Adopted approach can provide insights for analogous researches and outcomes can be considered for similar retrofit cases in Albania.

keywords cost-optimal; nearly-zero energy buildings; energy savings; building renovation; carbon emissions reduction

1. Introduction

Energy is an essential factor for the prospective of the society and will be such also for the near future. Considerable development is ongoing regarding the type and the quantity of energy consumed. Some of the main strategies are the transformation of the energy system to renewable energy sources, reduction of energy use and increase of energy efficiency.

In developed countries, the building sector plays an important role in the reduction of energy use (European Commission, 2011).

The main part of the energy policies of these countries is focused in new buildings, but the poor energy performance of some existing buildings made is necessary to retrofit these buildings in energy terms. By reducing the energy use in existing buildings or increasing the share of renewable energy, we can reduce carbon emissions and air pollution. By renovating a building instead of building a new one, the usage of resources is reduced and the amount of waste is minimized.

Existing buildings have a significant potential in saving energy (BPIE, 2011), but it has been hard to fully exploit this potential.

Energy consumption in buildings in Europe

The residential sector in Europe is responsible for 40% of the final energy consumption. (BPIE, 2013). Not only that, but only the only 20% of the existing European Building stock is expected to be replaced by new buildings in 2050. As we can see, it is important to improve the energy performance of the existing building stock in order to achieve the financial and environmental goals of EU (BPIE, 2011). Improving the energy performance of existing buildings may lead to reductions of the energy consumption in the range of 30% to 80%.

The EU Energy Performance of Buildings Directive (EPBD) is the main policy framework regarding the energy use in new and existing buildings. It was

made known first in 2002 and gives recommendations for the implementation of the energy performance in buildings. It sets common target for the energy performance in EU states. In 2010 and 2018 the Directive was recast with more recommendations, including the implementation of the “Nearly Zero Energy Building” and “cost-optimal solutions.”

The National Action Plan for Energy Efficiency 2011-2018 envisages a series of measures to reduce energy consumption in dwellings such as: thermal insulation of housing stock, recognition and use of central and local heating schemes, use of solar systems for water heating, sanitary, use of labeled electrical equipment and use of efficient lamps. Assessing the problem in the European context, Albania faces challenges that need to be addressed in the short term on the issue of energy performance in buildings. To date (2020) these measures still remain in their infancy. It remains to be seen whether the effectiveness of the General Consumption Plan in housing will be achieved, while the result of the application of these measures may not exceed the growing need for energy. As a candidate country for membership in the European Union, Albania must pursue a general European policy orientation by adapting legislation and other development orientation instruments

Change of mind-set towards building renovation

When doing energy retrofit in existing buildings, there are quite a few obstacles such as high investments costs, lack of information of the real condition of building and long payback periods. Also, in some occasions, the ones that pay for the retrofit are not those who benefit from it. (Mørck, O. et al., 2017) Sometimes, when retrofitting, the most cost-effective solution is a combination of measures that reduce the energy use and measures that take in account the renewable energy. So it is important to know how much can we go with efficiency measures, starting from the least expensive, and how far can we use the renewable energy sources, taking in account the local context.

In the case of existing buildings, because of the high costs and long payback period, it can be observed that measures that improve in large amount the energy performance are often missed (Holl M., 2011). Therefore, it is important to know the range of efficiency measures and the disposition of renewable sources to achieve the best building energy performance at the lowest effort (less investment, less life cycle costs, less intervention on the building, less users' disturbance).

2. Methodology

The methodology, which is able to serve as basis for future standards, enabling cost effective renovation of existing buildings while optimizing energy consumption and carbon emissions reduction. In this frame, a Work Package deals with the assessment of cost effective combinations of renovation measures, which optimize energy and carbon emissions savings. For this goal, data on geometrical, thermo-physical, systems/equipment characteristics and energy needs have been assessed, as well as a set of renovation measures with related costs. Concerning renovations, different levels of interventions have been considered, starting from the conventional maintenances as base cases implementable with energy improving measures widely adoptable. These ones foresaw two increasing levels of insulation for the envelope, the adoption of new HVAC systems, solar thermal and PV systems.

Through the methodology developed in IEA EBC Annex 56, this work focused on the cost-effective energy in a residential building energy related renovation. The methodological approach aims at finding the optimal balance between energy efficiency measures and the use of renewable energy to achieve cost-effective solutions yielding maximum energy and carbon emissions reductions (Fig. 1).

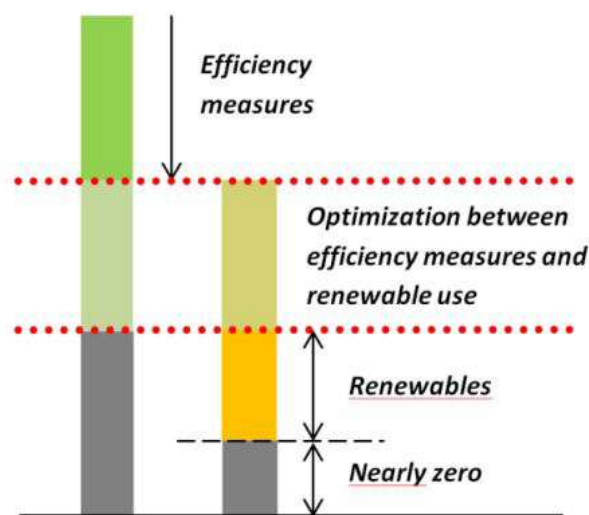


Fig. 1: Concept for an optimized combination of energy efficiency measures and renewable energy measures (Geier S., Ott W., 2017)

Cost-optimality vs cost-effectiveness

It is important to know the difference between cost effectiveness and cost-optimality. Taking in consideration the energy measures that are cost-effective (with respect to a reference case), the cost optimal solution is the one with the least life cycle costs. The reference case are the taken measures that would be necessary “anyway”, just to restore the functionality of the building for another life cycle without improving its energy performance. The benefits of energy retrofits show off in the long-term perspective so we must not focus on measures with short payback time (they can be less effective for the building

life cycle) and not compare only the investment costs.

When renovating the existing buildings, the cost optimal measures do not achieve the highest level of energy performance. So in order to achieve the local related targets, the cost of energy retrofit measures has to go beyond the cost optimal level but still be cost effective. Figure 2 illustrates these concepts.

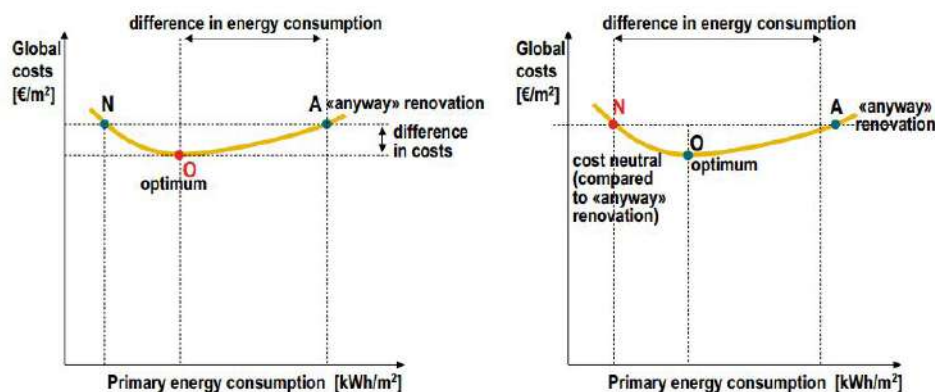


Fig. 2: Global cost curve after renovation (yearly costs for interest, energy, operation and maintenance), starting from the reference situation "A" («anyway renovation») towards renovation options yielding less primary energy use than in the case of the anyway renovation. "O" represents the cost optimal renovation option. "N" represents the cost neutral renovation option with the highest reduction of primary energy (BPIE 2010, p. 15, supplemented by Ott, W. et al., 2014))

“Anyway” renovation

This term is used for renovation scenarios that are used to restore or maintain the building functionality. These kind of intervention don't intend to improve the energy performance of the building. Anyway measures can be defined as “a set of actions, products and services necessary to guarantee the regular, safe and legal functioning of buildings, as well as aesthetics, technological and modernizing evolutions that societal changes require of them” (Ott, W. and Bolliger, R., 2014).



Fig. 3: «Anyway renovation» vs. «energy related renovation» in the case of an anyway necessary building renovation due to functional reasons or due to building elements at the end of their service life (Ott, et al., 2017).

How far to renovate

Reducing the energy use in building and switching to renewable sources had proven to be very cost-effective not only in improving the energy performance of a buildings, but also helping in achieving the carbon emission reduction goals (80% to 95% in 2050, when compared to the levels of 1990 according to European Commission, 2011).

It is advisable, when renovating a buildings, to take into account the buildings are long lasting structures. By such, it is important to do a life cycles analysis, which can show measures that are cost-effective, instead of the traditional analysis that are focused in measures with the shortest payback time, which may be more attractive at first.

Which building elements should be renovated

The building elements that contribute to the energy performance of the building can be divided in three main categories:

- passive element; are the elements of the building enveloper like wall, roofs, windows that influence the energy needs of the building.

- technical systems; are the systems that cover the energy demand of the building and its inhabitants. Such systems can be for heating, cooling, ventilation or domestic hot water.

- energy source; is used by the technical systems in order to work. It can be from fossil fuels or from renewable sources.

In the existing buildings case, a huge number of factors can influence in choosing the measures that technically and economically feasible for a specific building. The identification of the cost-effective measures to achieve the energy consumption targets for existing building is far more complex than for the new ones.

To achieve in more effective way large reductions of energy use in existing buildings, it is important that relevant synergies between the three above mentioned approaches must be achieved. Flexibility is needed to give renovation strategies a chance to enable the transformation of the building stock towards low energy use and nearly zero emissions. For example, increasing the insulation thickness of a wall from 12 cm to 30 cm has usually less impact on energy savings than limiting the insulation of the wall to 12 cm and adding a 10 cm layer of insulation to the roof.

3. Conclusions

Today's buildings in Albania, in almost over half of them were built in the years 1945 -1990 (INSTAT, 2014). These buildings, which are designed to a different standard from today, really have problems, especially in relation to energy performance and comfort conditions. The apartment stock today, for the most part, does not meet the modern construction criteria for quality of life. An important role is played by the part of the stock that has been built by the state, in emergency conditions, for the solution of housing problems during the period 1945-1990. In this period, the priority was to build quickly and at a low cost to enable housing and to solve the problem from a quantitative point of view. It is these buildings that today are the real problem for living standards as well as for the impact they have on the health of their residents. Today, the problem is a problem where in 22% of the apartments the heating is insufficient, in 13% the presence of moisture appears and in about 10% they have doors and windows in bad conditions (INSTAT, 2014).

The most usable exterior wall constructions in Tirana and Albania are with full brick wall, full silicate brick wall, perforated brick wall, prefabricated concrete wall, block wall as well as an earlier part with adobe and stone wall. According to Census 2001 data, brick and stone buildings occupied 88% of the total of all buildings, prefabricated buildings occupied only 5%, while those with wood only 1%. While in the 2011 Census, instead of being further detailed, no information was collected on this data.

Energy Performance on Albanian Buildings

The stock of apartments in our country have a series of problems that are directly related to the quality of life of residents in them. Partly due to the low design and construction standards and partly due to the lack of maintenance, this stock is presented to us today with critical living conditions. Among the collective housing typologies, dwellings offer the lowest standards of comfort and the lowest performance in relation to energy consumption. This situation affects living standards and the health of residents. For this reason, the possibility of integrative reintegration intervention in these structures should be seen as a priority. Since these structures have not yet met their life cycle and the costs of their demolition and reconstruction would be unaffordable for the local economy, the rehabilitation scenario is seen as the most realistic opportunity that could affect the solution of the prefabricated problem, as well as on the overall improvement of the minimum housing standards in the country. In general, in these dwellings that show problems in relation to the conditions of comfort and the general standard of living, their inhabitants are mainly from the social strata with medium and low incomes. This makes it more difficult for interventions to be reinstated if financial contribution from the residents themselves is needed to perform these interventions. Another barrier to performing rehabilitation interventions in buildings is co-ownership. From the construction point of view, the typology of dwellings presents a high level of energy losses due to poor thermal insulation, infiltration, depreciation and lack of maintenance of buildings. In some of them, moisture appears due to direct penetration, capillary or condensation. As a result of this poor thermal performance, comfort levels in dwellings are problematic and the energy required to create comfort conditions is quite high. Due to the economic impossibility for most residents to cope with the necessary energy consumption to create comfort conditions, they are faced with temperatures and / or humidity levels outside the comfort band during the hot and cold periods of the year.

Description of the case-study

The case-study consists of a building built 1970 and it belongs to a social neighborhood located in Tirana, capital of Albania. The building presented signs of significant degradation and the living areas were not adjusted to current living standards. The building had no insulation on the envelope and there were no building integrated technical systems (BITS) for heating and cooling. There are only a few individual air conditioning units and no energy saving system for lighting or common appliances. The domestic hot water was provided by an electric heater with a storage tank. This building lacked of any kind of insulation and the scope of the renovation included the improvement of the performance of façade, roof, ground floor ceiling (in contact with unheated locals) and windows. All the decisions were based on technical and economic criteria, being one of the constraints that occupants stayed in their dwellings during the works. The specific heating energy demand is 436 kWh/(m²a). Concerning the building envelope, the exterior walls consisted of hollow brick walls with plaster on one side and the roof was composed of a concrete slab. The floor consists of a solid ground floor and the windows are wood framed with single glazing. Table 1 presents the U-values for the building elements before the renovation. The exterior walls present two different U-values because the wall has different thicknesses.

4. Application of the methodology

Today's buildings in Albania, in almost over half of them were built in the years 1945 -1990 (INSTAT, 2014). These buildings, which are designed to a different standard from today



Fig. 4: The reference building

Element	U values before renovation [W/m ² K)
Exterior Wall	1.4/1.58
Roof	2.7
Window	4.5
Ground floor	2.3

Table 1: Thermal characteristics before renovation

Renovation measures

- Costs assessment

Consistently with the real building practice, each work cost has been composed comprising all the additional charges that are necessary for the supply and installation of the completed intervention, including removal of old components and management of waste materials, work safety equipments, auxiliary temporary structures (e.g. construction site equipments, scaffolds rental, etc.), overhead and profit for the construction company.

- Envelope renovation measures

Common maintenance envelope measures, whose costs are shown in Table 2, can be summarized as follows:

- external insulation of walls through EPS layer/s equipped with cement plaster
- insulation of the ceiling of the basement and the one of the roof through XPS layer/s finished with cement plaster
- substitution of existing windows with new ones equipped with: double and simple glazing in the standard case of PVC or wood

Element	Material
Exterior Wall	Expanded Polystyrene (EPS) with thickness from 60 mm to 120 mm
Roof	Extruded Polystyrene (XPS) with thickness from 60 mm to 120 mm
Window	Wood or PVC window frames with simple or double glazing
Ground floor	Extruded Polystyrene (XPS) with thickness from 60 mm to 120 mm

Table 2: Renovation Solution for the building envelope

- Building Integrated Technical Systems (BITS) measures

Several options of HVAC systems substitutions, which are shown in Table 3, have been provided and can be summarized as follows:

- condensing boiler, with three-pass smoke furnace stainless steel and two-stage or modulating gas burners;
 - reversible air-to-water heat pump with centrifugal fans (the cost includes adaptation of heating room needed for the air issue);
- For DHW, the options of individual water heaters, wall-mounted with 100 l tank, are: electric, gas-based and, as an advanced alternative, air-to-water heat. Solar thermal system for contributing in 50% of DHW production has been included as a diffusible renovation measure. The considered solution is a forced circulation system, with storey tank, expansion vessels, etc

BITS	Heating	Cooling	DHW
Comb. A	HVAC	HVAC	Solar panels
Comb. B	Heat pump	Heat pump	Heat pump
Comb. C	Gas Boiler	HVAC	Gas Boiler

Table 3: Combinations of BITS

Renovation process

To start, the energy performance of the building for the reference scenario (without improvement of its energy performance) was calculated. For the energy calculations, it was used an Excel-based tool that after introducing the geometric characteristics of the elements of the building and also the information on the BITS performance, calculates the primary energy.

Using the same Excel-based tool, each of the renovation packages described in Table 4 was analyzed in terms of primary energy use and global cost.

Combinations of BITS	Building renovation scenario	Wall	Roof	Ground floor	Window	Glass
Anyway renovation Comb. A	S0	EPS 6 cm	XPS 6 cm	XPS 6 cm	wood	simple
	S1	EPS 8 cm	XPS 8 cm	XPS 8 cm	wood	simple
	S2	EPS 10 cm	XPS 10 cm	XPS 10 cm	PVC	double
	S3	EPS 12 cm	XPS 12 cm	XPS 12 cm	PVC	double
Comb. B	S4	EPS 8 cm	XPS 8 cm	XPS 8 cm	wood	simple
	S5	EPS 10 cm	XPS 10 cm	XPS 10 cm	PVC	double
	S6	EPS 12 cm	XPS 12 cm	XPS 12 cm	PVC	double
Comb. C	S7	EPS 8 cm	XPS 8 cm	XPS 8 cm	wood	simple
	S8	EPS 10 cm	XPS 10 cm	XPS 10 cm	PVC	double
	S9	EPS 12 cm	XPS 12 cm	XPS 12 cm	PVC	double

Table 4: Summary of different renovation measures considered in the study

Cost-optimal results for the reference building

Analysing the different renovation packages, those with the lowest global costs within each group of building systems for heating, cooling and DHW preparation (BITS) have been identified. Figure 5 shows the global costs and the primary energy associated with each renovation scenario. In Figure 5, each marker represents a different renovation scenario. This figure demonstrates that the package of measures with the lowest global costs is associated with the use of a gas boiler for heating and DHW preparation, in renovation variants that do not require a technical system for cooling. The renovation variants with the use of heat pumps and biomass boiler lead to low non-renewable primary energy use, but their initial costs compromise their economic performance even considering the entire life cycle of the building.

Regarding the results of the cost effectiveness of measures on the building envelope, Figure 5 presents all packages of measures to improve the building envelope in which the heat pump has been used for heating and DHW preparation. The cost-optimal package of measures, identified as S5 includes outer walls with a 100 mm thick layer of EPS; a 100 mm thick layer of XPS on the ceiling; a 100 mm thick layer of XPS in the basement ceiling; and PVC frames with double glazing in windows.

Scenario	Cost (€/m ²)	Primary energy (kWh/m ² a)
S0	87	130
S1	77	119
S2	77.5	115
S3	79	110
S4	82	83
S5	67	80
S6	70	75
S7	85	117
S8	72	100
S9	75	95

Table 5: The different scenarios with the global cost and the primary energy

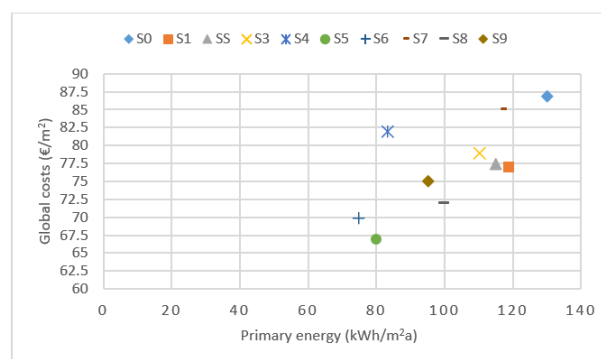


Fig. 5: the diagram with the global cost and the primary energy

5. Conclusions and recommendations

In order to achieve the European standards regarding the energy efficiency in Albania, it is necessary to intervene in the existing buildings, which represent the majority of the Albanian building stock. For these typology of buildings it is important to explore a wide range of energy retrofit solutions, to find the cost-optimal solution. The use of IEA EBC Annex 56 methodology for this purpose allows concluding the following:

- All the scenarios that have lower costs than “anyway renovation” are considered cost-effective solution and can be used.
- The cost-optimal solution isn’t always the scenario with the least zero energy needs, so it is necessary to explore a wide range of energy retrofit solutions to fully exploit the potential for zero energy housing.
- The investigation on the trade-offs between both energy related measures and BITS is relevant to achieve a smooth transition from cost-optimal levels to nearly-zero energy buildings.
- When doing the energy retrofit it is more effective doing the improvement of the whole elements of building envelope than to costly maximize the performance of just one.
- In order to not miss opportunities it is important to choose ambitious energy efficiency levels within building renovation

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Vernacular architecture and the cultural landscape of Shkodra Region

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Before describing the building typologies present in Shkodra region, it is necessary to have a common understanding of the definition of "typology". It has been a persistent theme in architectural research with periods characterised by excessive debate about the typology and others when the question was secondary. In the case of the present work, dealing with vernacular and historical buildings, typology becomes a useful tool for understanding and describing architecture

keywords vernacular architecture, cultural landscape, Shkodra, albanian architecture, traditional materials

1. Introduction

Before describing the building typologies present in Shkodra region, it is necessary to have a common understanding of the definition of "typology". It has been a persistent theme in architectural research with periods characterised by excessive debate about the typology and others when the question was secondary. In the case of the present work, dealing with vernacular and historical buildings, typology becomes a useful tool for understanding and describing architecture. As a design tool, it is useful also in creating variations, variants, and combinations of historical typologies. Especially in the particular historical conditions of the northern region of Shkodra, the architectural typology should not be understood as a rigid and crystallised solid rule for creating space.

The same root of the word comes from the Greek typos and Latin typus, which means the visible imprint made by hitting or stamp. So, the architectural typology can be considered the physical presence of the idea of that space. The idea of the space is in this case the collective memory of the culture living and evolving in a territory. Memory is the stratification of the technical building knowledge, which is transmitted through generations, adapting, improving, and evolving. This kind of ideal space, because of its spontaneous origin and the fact that it exists on the level of the ideas, allows multiplicities and interpretations. It is very important to understand that the products of the typological idea are not exact copies of themselves but physical spaces that have in common an idea.

In this work, vernacular architecture is investigated and described through its idea. In this way imperfections, variations and novelty are allowed. Through this approach, typology becomes a tool for preserving historical memory not as an immovable dogma but as an ideal that can manifest its physical presence even in contemporary conditions, allowing new design variations and the emergence of new types. Even though this approach might seem at first look as trivial and common sense, our landscape is constructed nowadays by building that tries to imitate the outer appearance of historical buildings without understanding the ideal form that stands in the shared memory of a particular typology. For this reason, the present work is to be understood

as an investigation of the historical landscape of the northern region of Shkodra, not interested in reproducing its “prettiness” but intending to explore contemporary ways of dwelling in the region, based on historical and shared experience. Understanding that the relation between landscape, culture, and architecture is an interacting system of complex feedback mechanisms means taking into account the fact that a large number of interdependent elements need to be analysed in order to have a clearer picture of the way space is perceived and conceived in the territory of Shkodra region. The process of analysing the vernacular architecture of this region is meant to understand the reasons behind the emergence of similar ways of dwelling in different areas of the region without the need for a central authority to decide on an official architectural “style” to be followed when building a house. The behavioral and spatial patterns observable in the region are closely related so to cultural and territorial phenomena, proper to Shkodra.

A further excursus on traditional house typologies in Albania will be undertaken focusing on specific features of the vernacular architecture of the Shkodra region. This analysis is however limited to the scope of this research and cannot be exhaustive for the cultural reaches and diversity of one of the most important Albanian regions.

To dwell, to be set at peace means to remain at peace within the free sphere that safeguards each thing in its nature. The fundamental character of dwelling is this sparing and preserving. It pervades dwelling in its whole range. That range reveals itself to us as soon as we reflect that human being consists of dwelling and, indeed, dwelling in the sense of the stay of mortals on the earth¹.

The typological approach in architectural design is a tool that should be used with adequate awareness. When used carelessly it can become a rigid prison that freezes architecture and doesn't allow novelty, or in worse cases, it can create monstrous copies of the past that wear only the physical appearance of historical buildings forgetting the deeper meaning that architecture brought in each historical period. The following design proposals are based on an operative approach towards typology, building on the work of architecture scholars like Aldo Rossi and Peter Eisenman. The base housing typologies are the ones present in the northern Albania territories and the ones organized and cataloged by Emin Riza in *Qyteti dhe Banesa Qytetare Shqiptare Shek. XV-XIX*, Published by “Dita 2000”, Tirana in 2009.

The historical typologies are considered as the idea that a community shares on dwelling. It is the common knowledge that generation after generation has evolved. So, the present work will try build upon this knowledge believing that the meaning of historical typologies is not related to the mere appearance of the building rather than on the idea of space organisation. The House of Fire typology is the most archaic and simple housing typology present in the Albanian territory. It is based on the presence of the fireplace as the centre of the dwelling activity. The historical variation to this typology has been the addition of a guest room and a haur or space for the cattle in one or two levels. Contemporary interpretations propose the fireplace as the centre of a simple hut-like building usable as a mountain cabin suitable for tourism. Successive iterations introduce each time a chimney, guest rooms and workshops in one or two levels. At the most advanced stage, the building can be a small guesthouse with an attached mini market. Alternatively, a small hostel with reception can be organised through this typology. The House with Hajat is characterised by the presence of three parallel functional “strips”.

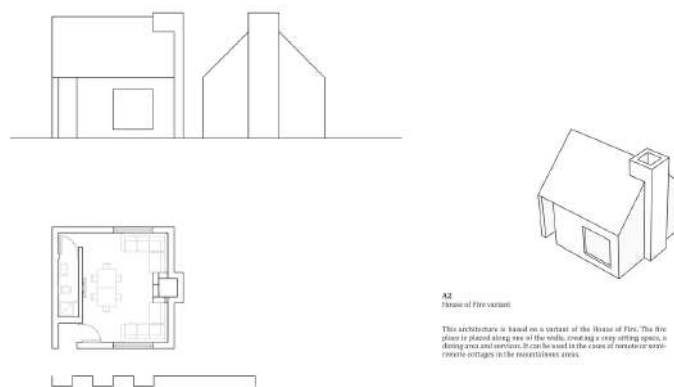
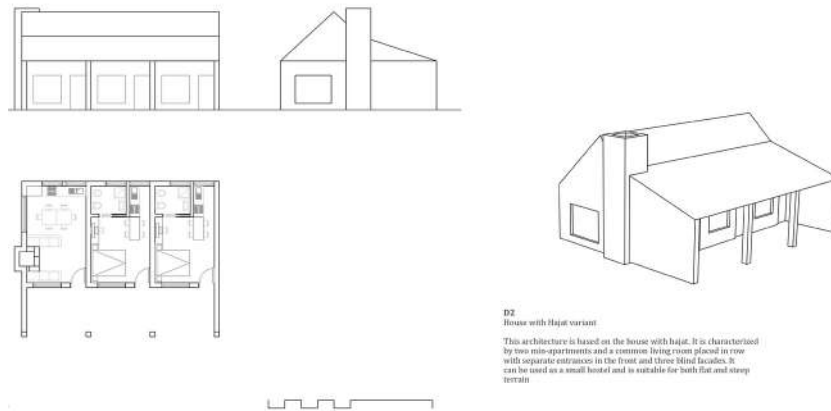


Fig. 1: House of Fire variant

The most inner one is where the house's servicing area is located. The middle strip hosts the served spaces as the main rooms. The different rooms are not connected to each other but are accessed directly from the hajat. The outermost strip called the hajat is covered but open from one side. The hajat was historically used as a mediation space between the garden and the house. It was used as a working and living space during the hot season. The three-stripe organisation brings a series of interesting potentials which are the possibility of having adjacent but independent units that are accessed all from the same side allowing to have a backside where to locate the service areas. This organisation allows a potentially countless repetition of the units in the transversal direction. Early stage and unaware exploration of this potentials are noticeable in low-rise service buildings located along the main roads of the region. The potentials offered by the tree stripe organisation are explored by proposing small motel-like structures with independent rooms that can be incrementally added in the future following the possible increase of the demand for extra space. The tower is one of the most recognisable housing typologies of the northern region of Albania. It can be considered an evolution of the house of fire typology. As in the house of fire and in its consecutive additions and variations, three main types of rooms can be noticed. The house of fire itself where the main daily activities like cooking were conducted; the guests' room that was the most representative and curated part of the house; the haur The tower is one of the most recognisable housing typologies

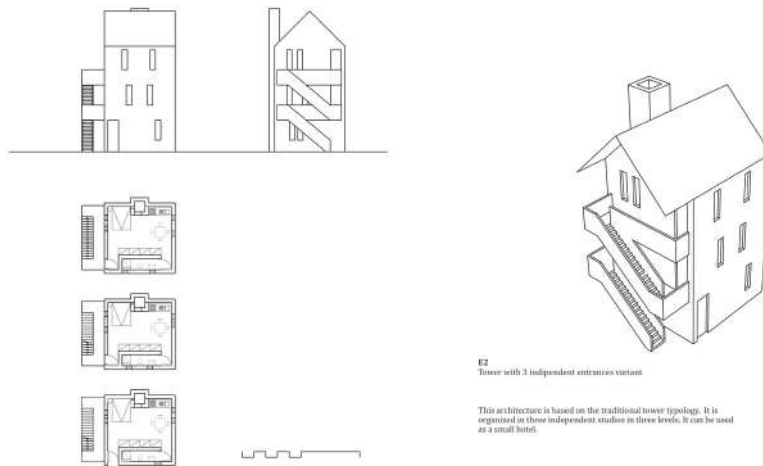
1. *Building Dwelling Thinking* by Martin Heidegger from *Poetry, Language, Thought*, translated by Albert Hofstadter, Harper Colophon Books, New York, 1971.



E2
House with Hajat variant
This architecture is based on the house with hajat. It is characterized by two mini-apartments and a common living room placed in row with separate entrances in the front and three blind facades. It can be used as a small hotel and is suitable for both flat and steep terrain.

Fig. 2: House with Hajat variant

of the northern region of Albania. It can be considered an evolution of the house of fire typology. As in the house of fire and in its consecutive additions and variations, three main types of rooms can be noticed. The house of fire itself where the main daily activities like cooking were conducted; the guests' room that was the most representative and curated part of the house; the haur that was used as a storage space or as the space where to retain the cattle during the cold season. Differently from the house of fire that foresees a horizontal organisation of the spaces, the tower is characterised by the stacking of the three spaces one over the other starting with the haur which has a direct continuity with the ground and continuing upwards with the house of fire and the guests' room. The contemporary variations to this typology propose a more conventional organisation of a guests house structure which has on a ground floor the kitchen than on the upper floor hosts a living room and is concluded on the top floor with a bedroom. Other variants propose three independent studios stacked on three levels and different combinations of two mini apartments organised on one or two floors each. Even though the



E3
Tower with 3 independent entrances variant
This architecture is based on the traditional tower typology. It is organized in three independent studios in three levels. It can be used as a small hotel.

Fig. 3: Tower variant

Double Height House of Fire is not a very common typology in the Albanian northern region, it is present in other areas of the country and allows a number of very interesting variations that can be useful in cases of constructing larger hotel facilities. It is based on a fulcrum represented by a double-height house of fire on the sides of which can be added bedrooms and other functions. Most of the activity of the house is organised in this common space while the rooms can be added in one, two, three or even on the four sides turning the house of fire into an inner patio-like space. These characteristics can be explored by proposing small to mid-size hotels in a number of possible configurations.

The House with Çardak represents a more refined and sophisticated housing typology. It was the representation of a wealthy family that has the possibility to have spare time to spend in company on an open and elevated loggia. This spatial organisation allows architectures showing by an open and more public side where most of the common activities happen. It allows having on the ground level to have a hajat type like organisation with independent entrances studios. This typology allows also a very interesting hybridisation with the double-height house of fire. This hybrid is shaped around a central patio and opens on one side to the surrounding environment through a çardak. The task of designing in a strong cultural landscape context is not trivial and if traditional typologies are to be respected, the role of the architect gains particular importance. The self-awareness of the architect becomes essential when facing design choices. Often the designers, pretending to reuse historical typologies, fall into the error of copying some parts of the superficial skin of the building, missing the real reasons behind the physical features of a historical house. So, not rarely, do we witness very generic space configurations dressed up as historical buildings. These mistakes can be categorized into two main groups: the unaware organization of the different spaces that miss the opportunity to explore and evolve historical typologies; the imitation of the external appearance of historical buildings missing the relation to the historical construction techniques, downgrading the façade to a mere decoration.

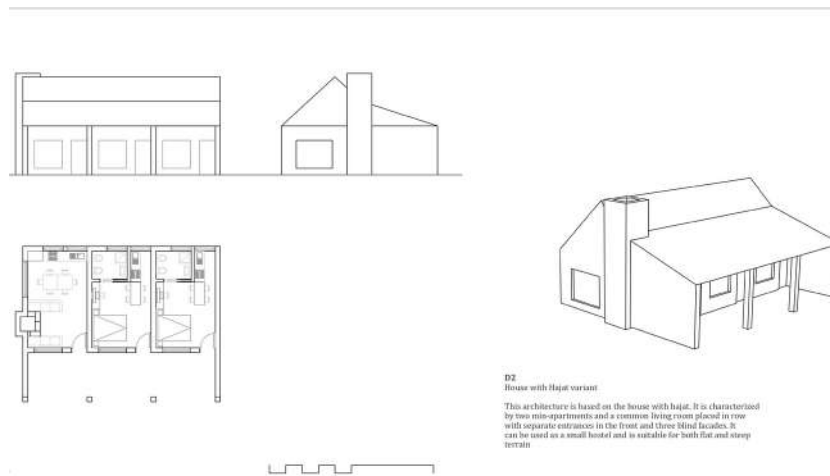


Fig. 4: Double height House of Fire variant

When approaching the architectural expression of a precise territory, particular attention is to be devoted to the interweaving relation between culture, landscape, and spatial production. These three aspects influence one another in ways that go beyond the univocal cause-effect relationship. In this way, the vernacular architecture is influenced by the culture of the inhabitants of a territory and the culture is influenced by the physicality of the landscape of that same territory. The other way around correlation is also true since the way in which a house is dwelled influences the structure of the society and the culture that emerges from this society. And since the landscape is a cultural interpretation and representation of the physical features of a territory, it can be considered as influenced by the way that territory is dwelled.

It can be useful at this point to describe the morphology of the settlements and its relation to the housing typologies. Shkodra city is the largest urban settlement in the region. The urban morphology of the city is quite complex and it is the result of historical, cultural, climatic, and geographical reasons. In the city, there can be found neighborhoods constructed during the last 50 years following modernism and functionalist principles. At the same time and close to these neighborhoods there can be found urban tissues historically built following self-organizing principles resulting in organic settlements. Going north, the terrain becomes steeper and agricultural land scarcer. In these conditions, urban settlements are smaller, less dense, and more dispersed. Due to these conditions, the morphology of these settlements is mainly influenced by the terrain and the infrastructure. The settlements generally develop along the main roads penetrating the valleys. These settlements show linear characteristics with a lack of centralities. In other cases, the settlements develop in terraces following the terrain and the small arable land plots.

It is important to understand that there is a direct relation between the landscape, the economic activities in a territory, the social structure, and the settlement's morphology. The steep terrain of the region north of the city of Shkodra allows very small-scale agricultural activity so, historically, the main economic activity of this region has been related to cattle breeding. For this reason, seasonal movement between mountain pastures during winter and field, summer pastures, has been a common way of settling in the territory. The small-scale economic activity also affects the culture of the families and the nascent settlements. Cattle breeding, different from large-scale agriculture, doesn't allow the sustainment of large families and clans. The new couples were very often obliged to move away from their parents, looking for new arable plots of land and pastures. This economic organization model allowed only small-scale settlements, mainly being part of the same family or small clan. These factors have unquestionably influenced also housing typologies. If we do not consider the ridge settlements, a later stage of settling the territory, especially in the cases of valleys, is the hillside settlement. Once the territory is explored and controlled through the ridges, a more convenient location can be chosen for a larger and denser settlement. The location on the hillside is selected because of the morphology of the terrain, the proximity and availability of water sources, and the presence and access to agricultural land. It is common to have in these cases an orthogonal and ancestral connection of the hillside settlement with the crest route. In this way, the hillside settlement lying in a horizontal strip develops between the bottom of the valley and the top of the ridge. In this position, the inhabitants can avoid the direct proximity of the river with the dangers of the unpredictability of the alpine water and the unhealthy wetlands but still be close to commerce routes and arable land. As in the case of the Valleys of Kiri and Shala Rivers, the settlements are constantly located and connected at nearly the same level between the river level and crest height. The morphology of such settlements is characterized by the flattening of small plots creating terraces organized linearly along the main route running on the contour of the land and supported by dry-stone walls. The building typologies mostly found in hillside settlements are still the most archaic ones. The tower, the house of fire, and more rarely the house with hajut can be found in such settlements even though towers become rarer. In the hillside morphology, the house with *çardak*, as a new building typology begins to appear. This is a sign that the higher densities of these settlements and the more efficient use of agricultural resources allow the intensification of economic activities. In these conditions, more advanced housing typologies start to emerge.

In this perspective, the way the territory is permeated brings direct consequences to the way in which it is settled and so on to the way it is cultivated and dwelled. The landscape can be understood, described, and preserved by describing these sets of actions acting in the territory. The landscape of Shkodra's northern region is a peculiar cultural entity that needs to be valorized with particular attention. It is the result of the historical interaction of geographical conditions, climate agents, and human activity. The overly simplified cause-effect relationship cannot be used for describing the complex reality of this cultural landscape so each future intervention will have to take into consideration not only the physical elements but also the interdependency network of activities happening in the territory. However, this landscape will need to be protected but not romantically crystallized in time so continuous maintenance and upgrading interventions are needed. Due to the large scale of the region, generalizations are hazardous but in this article, the concepts of landscape and typology are understood in their most open sense. As described previously, the landscape is understood as a cultural product of human interaction with the habitat. Building typology is in the same sense not intended as a rigid blueprint but as Aldo Rossi describes it as a logical statement that lies before the form and which constitutes it. Typology is intended as the cultural realizations of a particular society in organizing

space.

The building typologies of the area can be considered part of the cultural landscape to be preserved. As mentioned previously, by typology is not meant the mere appearance of the building but the organizing idea that keeps in unity the different parts of the architecture. For this reason, new architectural designs can be variations of the historical Albanian typologies that can have contemporary interpretations. In this way, historical architectural typologies can be the base for the emergence of unpredictable novelties.

The second element to be considered in future interventions is the materiality of the buildings. Materiality is to be considered the local building materials like natural stone and wood but most importantly the physical presence of the architecture and its mediating presence between the territory and its human dwellers. An example of the traditional relationship between the cultural landscape and housing can be seen in the valleys of the northern region of Shkodra where the agricultural plots are cut out of the sloped terrain of the valley forming terraces. The presence of small and flat arable parcels in the vicinity of the urban settlements is a characteristic of the cultural landscape of the area. These parcels are generally located about ten meters over the river's water level and close to the main access road. They are a visual persistence along the journey through the valley. These terraces are largely used for farming vegetables and crops, mainly corn. The landscape is not only anthropized by the flattening horizontality of the terraces but also by their building technique. The cut terrain in need to be supported is contoured by containment walls. The walls are built from the most abundant building element present in the context. Limestone blocks are largely used in this case. By the force of gravity, stonewalls can contain soil and create a new landscape. The stone material is also used in this area for building stone fences that delimitate land ownership. The stone, being the rawest material taken directly from the context, manages to modify and merge with the landscape from which it is extracted. The use of stone blocks will be one of the persistent construction materials and one of the characterizing elements of the landscape.

An additional natural building material is local wood. In the same way that the stone is used for sustaining the terrain and defining property limits, small tree branches are interweaved for creating supporting structures and walls. The interweaving branches, creating fences and gates, coupled with the stone structure are largely used for controlling and modifying nature. The so-molded landscape results from the recombination of the raw natural elements extracted, worked and combined by the historical stratification of the human culture. In this way, the landscape becomes the common ground and historical testimony of the interaction of natural and anthropic forces. In conclusion, taking adequate attention to the relation between the physical context and building typology, and moreover to the expression potentials of the materiality deriving from the construction techniques will avoid the mere copy, allowing the further development of historical housing typologies.

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Contemporary use of historical building typologies of the Northern Region of Albania

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*The typological approach in architectural design is a tool that should be used with adequate awareness. The following design proposals are based on an operative approach towards typology, building on the work of architecture scholars like Aldo Rossi and Peter Eisenman. The base housing typologies considered in this work are the ones present in the northern Albania territories and the ones organized and cataloged by Emin Riza in *Qyteti dhe Banesa Qytetare Shqiptare Shek. XV-XIX*, Published by "Dita 2000", Tirana in 2009. The historical typologies are recognized as the idea that a community shares on dwelling. It is the common knowledge that generation after generation has evolved. So, the present work will try to build upon this knowledge believing that the meaning of historical typologies is not related to the mere appearance of buildings but rather to the idea of space organization. The following chapter presents a collection of twenty architectural projects, designed as a variation of the historical Albanian housing typologies.*

keywords vernacular architecture, typology, Albania, dwelling, operative approach

1. Introduction

Louis Kahn, one of the most influential architects of the 20th century studied with particular attention the Scottish castles, understanding and adapting a series of design concepts to be later used in his work. His design for the Erdman Hall Dormitories at Bryn Mawr College in Pennsylvania in 1960 can be understood as an interpretation of the "living room" and "living wall" of the historical vernacular architecture of the Scottish castles. The communal area of the dormitories is a double to triple-height space at the center of each section which institutionalizes the community. The structural elements are turned into living walls, which incorporate the service areas of the dormitory, allowing the perimeter area to be dedicated to the privacy of the rooms. The result is a space that celebrates the community and the idea of belonging to that community. What remains from the Scottish castle is not the physical appearance but the evolution of the way communal space becomes the fulcrum of architecture.

2. VARIATIONS OF THE HOUSE OF FIRE

The House of Fire typology is the most archaic and simple housing typology present in the Albanian territory. It is based on the presence of the fireplace as the center of the dwelling activity. The historical variation to this typology has been the addition of a guest room and a haur or space for the cattle in one or two levels.

The following contemporary interpretations propose the fireplace as the center of a simple hut-like building usable as a mountain cabin suitable for tourism. Successive iterations introduce each time a chimney, guest rooms, and workshops in one or two levels. At the most advanced stage, the building can be a small guesthouse with an attached mini-market. Alternatively, a small hostel with reception can be organized through this typology.

The House with Hajat is characterized by the presence of three parallel functional "strips". The innermost one is where the house's servicing area is located.



Fig. 1: Archaic house of fire in Drisht

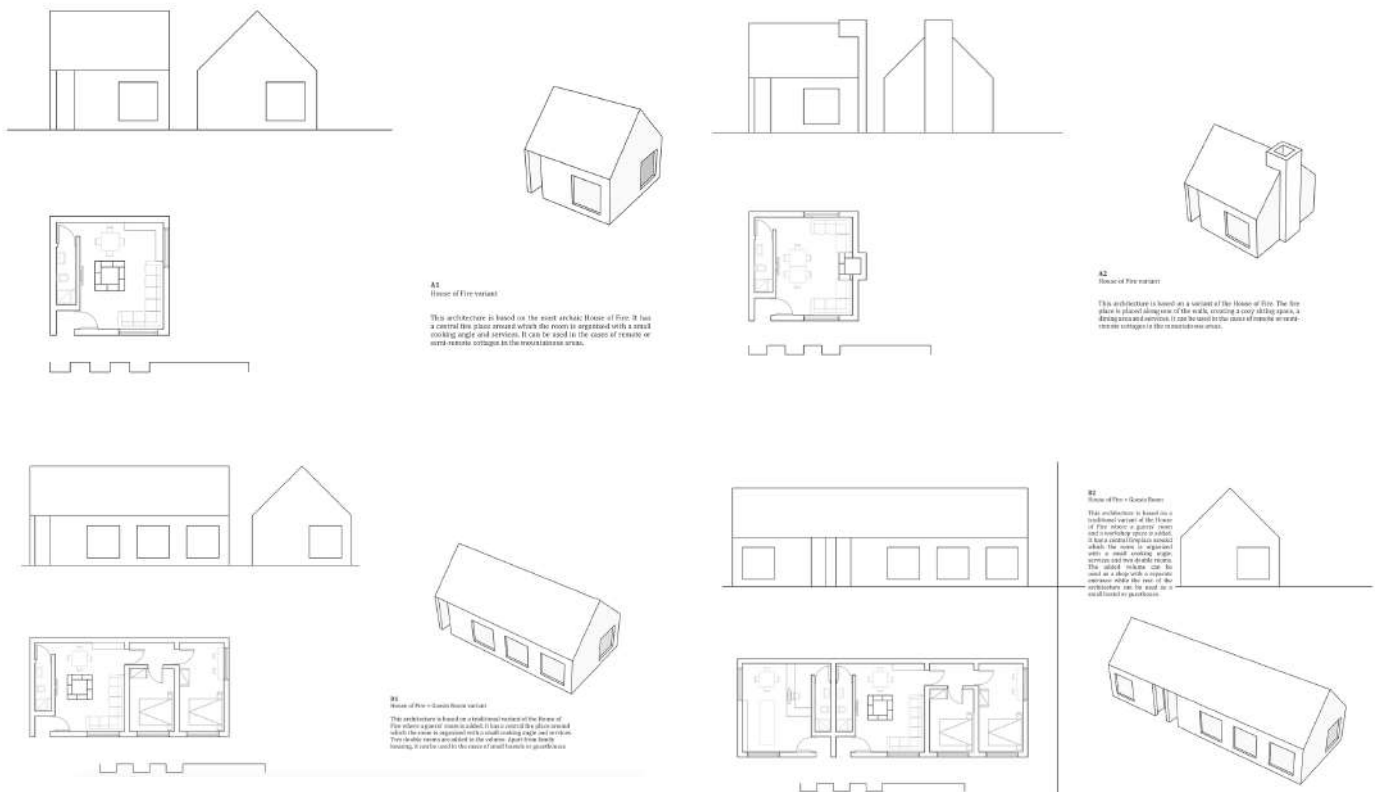
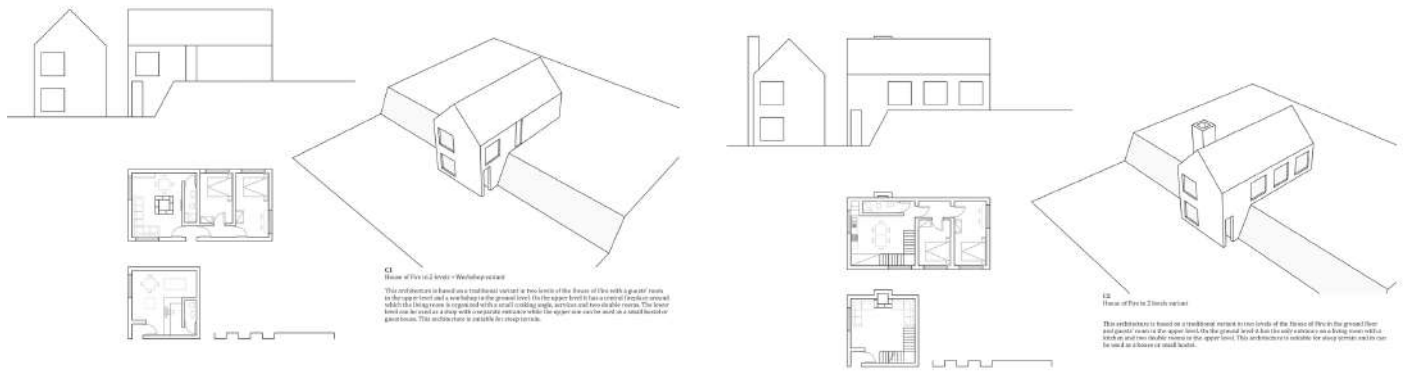


Fig. 2,3,4,5: A1 House of Fire variant; A2, House of Fire variant; B1, House of Fire + Guest Room variant; B2, House of Fire + Guest Room variant

The middle strip hosts the served spaces as the main rooms. The different rooms are not connected to each other but are accessed directly from the hajat. The outermost strip called the hajat is covered but open from one side. Historically, the hajat was a mediation space between the garden and the house. It was used as a working and living space during the hot season.

3.VARIATIONS OF THE HOUSE WITH "HAJAT"

The House with Hajat is characterized by the presence of three parallel functional "strips". The innermost one is where the house's servicing area is located. The middle strip hosts the served spaces as the main rooms. The different rooms are not connected to each other but are accessed directly from the hajat. The outermost strip called the hajat is covered but open from one side. Historically, the hajat was a mediation space between the garden and the house. It was used as a working and living space during the hot season.



The three-stripe organization brings a series of interesting potentials which are the possibility of having adjacent but independent units that are accessed all from the same side allowing to have a backside where to organize the service areas. This organization allows a potentially countless repetition of the units in the transversal direction. Early-stage and unaware exploration of this potential are noticeable in low-rise service buildings located along the region's main roads. The potentials offered by the tree stripe organization are explored in the following examples that propose small motel-like structures with independent rooms which can be incrementally added in the future following the possible increase of the demand for extra space.

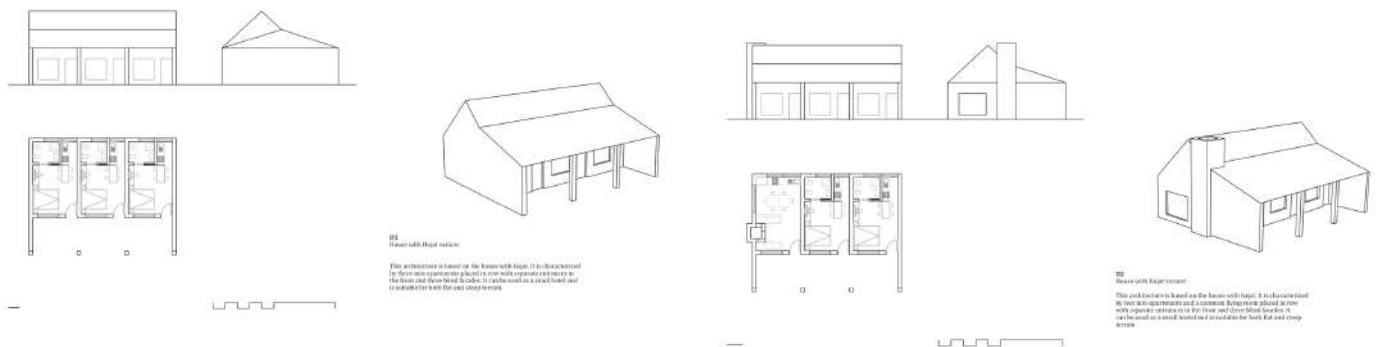


Fig. 8,9: D1, House with Hajat variant; D2, House with Hajat variant

3.VARIATIONS OF THE TOWER HOUSE

The tower is one of the most recognizable housing typologies of the northern region of Albania. It can be considered an evolution of the house of fire typology. As in the house of fire and in its consecutive additions and variations, three main types of rooms can be noticed. The house of fire itself, where the main daily activities like cooking were conducted; the guests' room was the most representative and curated part of the house; the haur was used as a storage space or as the space where to retain the cattle during the cold season. Differently from the house of fire that foresees a horizontal organization of the spaces, the tower is characterized by the stacking of the three spaces one over the other, starting with the haur which has a direct continuity with the ground and continuing upwards with the house of fire and the guests' room.

The proposed contemporary variations to this typology propose a more conventional organization of a guests' house structure which has on



the ground floor the kitchen, on the upper floor hosts a living room and concluded on the top floor with a bedroom. The next variants propose three independent studios stacked on three levels and different combinations of two mini apartments organized on one or two floors each. **3. VARIATIONS OF**

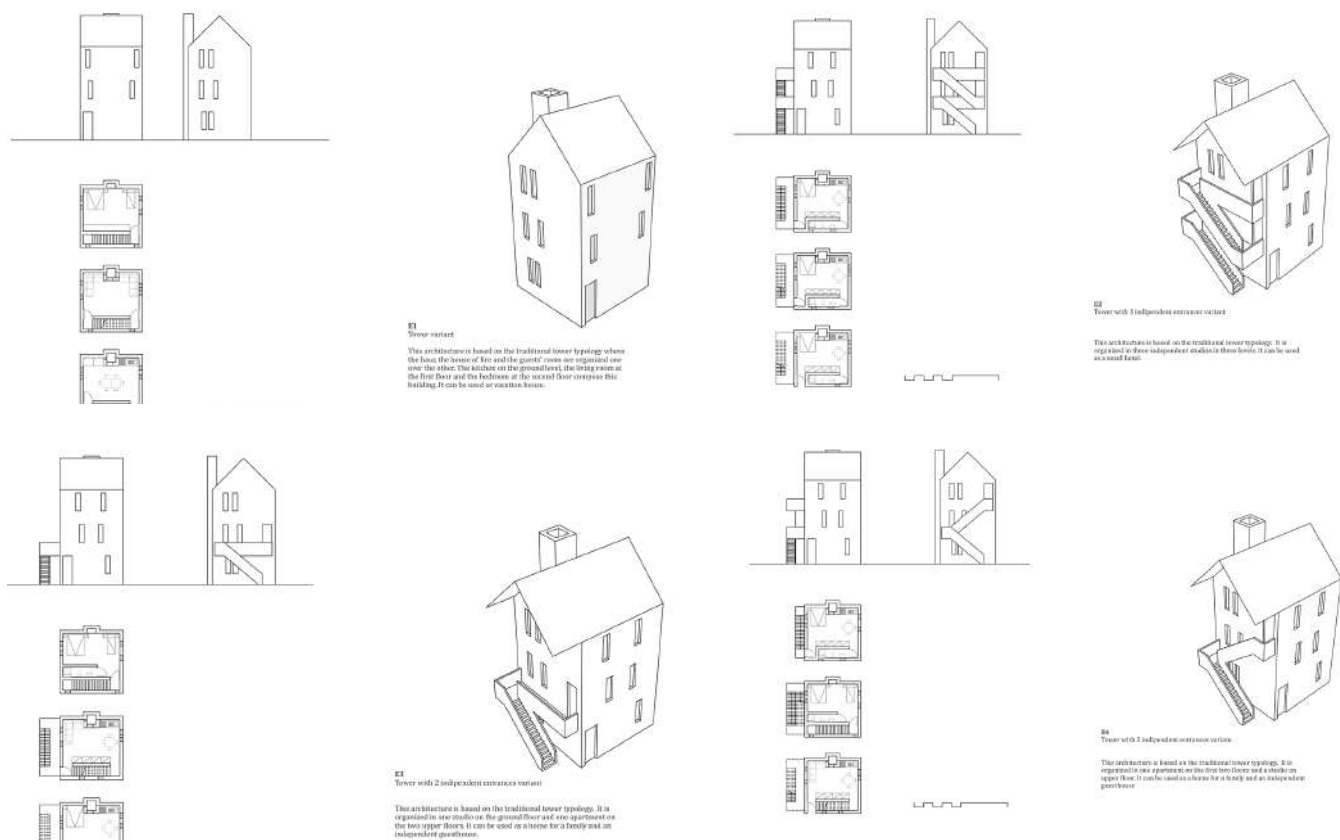


Fig. 10,11,12,13: E1 Tower variant; Tower with three independent entrances variant; Tower with two independent entrances variant; Tower with two independent entrances variant

4. VARIATIONS OF THE DOUBLE-HEIGHT HOUSE OF FIRE

Even though the Double Height House of Fire is not a very common typology in the Albanian northern region, it is present in other areas of the country and allows a number of very interesting variations that can be useful in cases of constructing larger hotel facilities. It is based on a fulcrum represented by a double-height house of fire on the sides of which can be added bedrooms and other functions. Most of the activity of the house is organized in this common space while the rooms can be added on one, two, three, or even four sides turning the house of fire into an inner patio-like space. These characteristics are explored in the following design examples proposing small to mid-size hotels in a number of possible configurations.

5. VARIATIONS OF HOUSE WITH ÇARDAK

Even though the Double Height House of Fire is not a very common The House with Çardak represents a more refined and sophisticated housing typology. It was the representation of a wealthy family that has the possibility to have spare time to spend in company on an open and elevated loggia. This spatial organization allows having in the following examples architectures that are characterized by an open and more public side where most of the

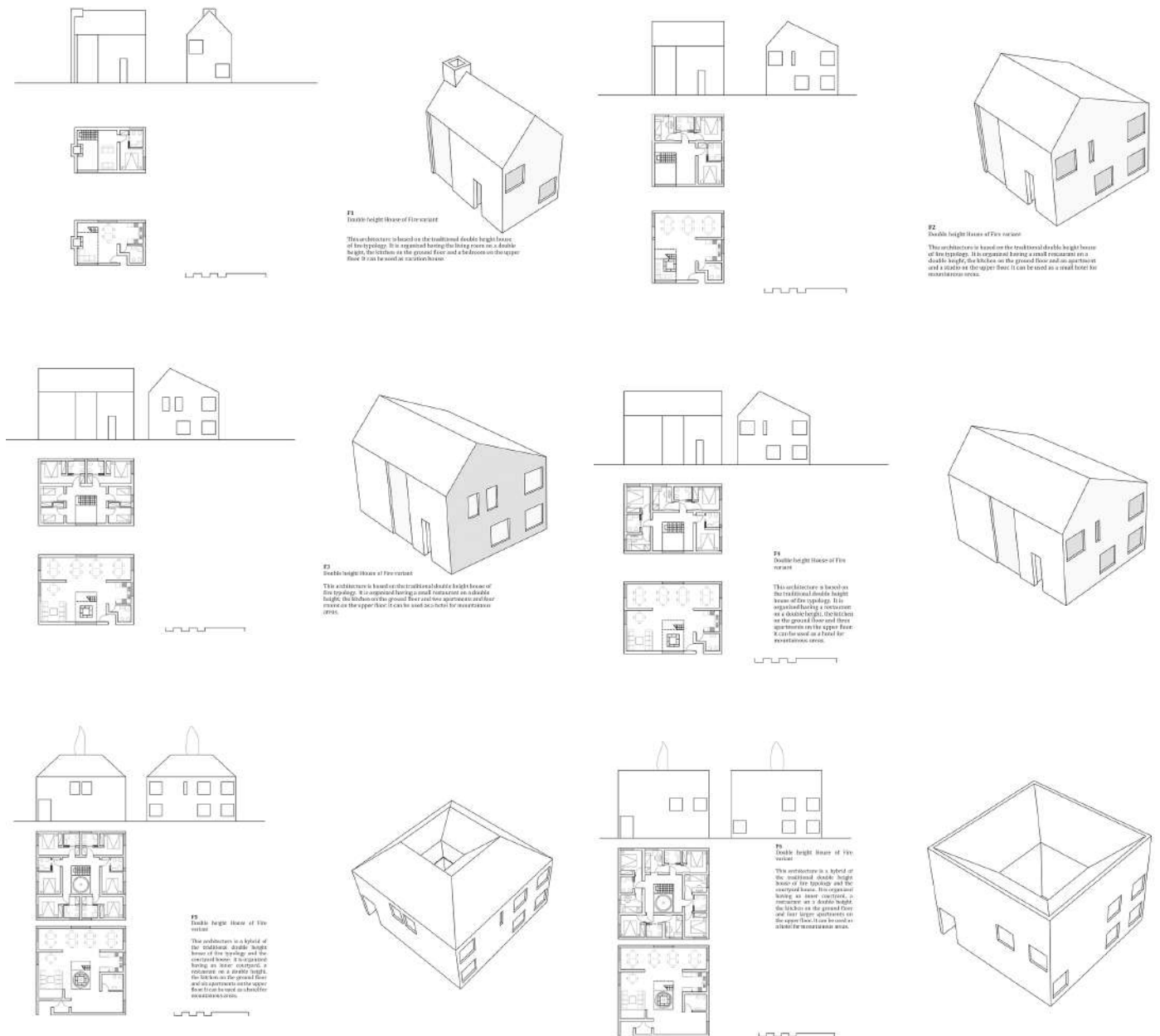
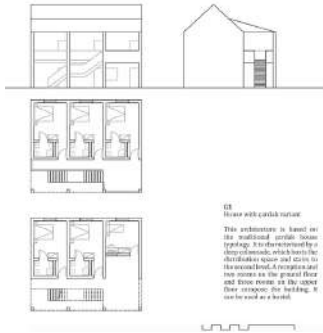


Fig. 14,15,16,17,18,19: F1 Double height House of Fire variant; F2 Double height House of Fire variant; F3 Double height House of Fire variant; F4 Double height House of Fire variant; F5 Double height House of Fire variant; F6 Double height House of Fire variant

common activities are organized. It allows having on the ground level a hayat-type-like organization with independent entrance studios. This typology allows also a very interesting hybridization with the double-height house of fire. This hybrid is organized around a central patio and opens on one side to the surrounding environment through a çardak.

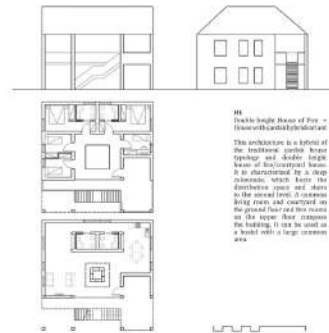
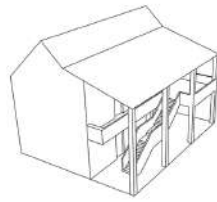
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G1
House with çardak variant

This architecture is based on the traditional çardak house typology. It is characterized by a steep pitched roof which forms the çardak area and acts as the second level. It replaces the two rooms on the ground floor and three rooms on the upper floor (except for kitchen, it can be used as a hotel).



H1
Double height House of Fire + House with çardak hybrid variant

This architecture is a hybrid of the traditional çardak house typology and double height house of contemporary houses. It is characterized by a steep pitched roof which acts as the second level. It replaces the two rooms on the ground floor and three rooms on the upper floor (except for kitchen, it can be used as a hotel with a large common area).

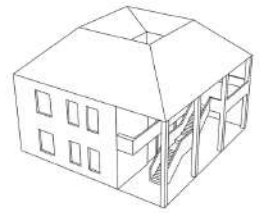


Fig. 20,21: G1 House with çardak variant; H1 Double height House of Fire + House with çardak hybrid variant

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