CONFERENCE PROCEEDINGS

TDW2019 International Scientific Conference

from 19th to 21st September 2019 / POLIS University

Scientific coordinators / Editors
Skënder Luarasi
Valerio Perna

Graphic Design
Valerio Perna
Xhoana Kristo
Asdren Sela
Steisi Vogli
Kristiana Meço

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FORESEEING UNCERTAINTY:

DESIGN & NON-NORMATIVITY

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Dear participant of Tirana Design Week,

Thank you for joining us in TDW 2019. I stronlgy 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 TDW 2019! Enjoy U_POLIS and Tirana!

Prof PhD Besnik Aliaj
Rector of POLIS University

Dear participant of Tirana Design Week,

Tirana Design Week (TDW) this year, in 2019, approaches Tirana's 100th anniversary as the capital of Albania. Comparing photos of a bucolic Tirana in 1920 with what one sees from Polis University's fourth floor today, inevitably raises doubts about the endurance of design, while conspicuously evincing the fluctuating tendency of what constitutes a norm in a world continuously oscillating between what is desired or imagined as an endogenous equilibrium and exogenous menaces. The objective of Tirana Design Week is to draw current research and design practices, as well as theoretical speculations on the topic of uncertainty and non-normativity in multiple scales and contexts, in and from the city of Tirana, with the latter understood as a dis-position, a tendency to change position.

The significance of addressing such topic from Tirana is that this city is a harsh and unmediated example of what is already a global symptom: a strong contrast between an ideology of normativity on the one hand, and its actual impossibility on the other; between the aim for responsible design practices and ethical boundaries impossible to overcome; between education and merciless economic reason, between standardized production and mass-customized desires, between daily ideologies of inclusivity and an increasingly predominant exclusivity, between plain design narratives and irresponsible political decision making; between expensive normativity affordable only by few, and not-so-cheap sub-normativity for the many; between frenzied building development and destruction of urban artifacts; between 'glittery' shapes in the center and chaotic sprawl in the periphery; between style and non-style. What happens in-between is dimmed as 'uncertain'. TDW this year aims precisely to enhance such uncertainty from the perspective of different practices such as design, architecture, sociology, urban and environmental studies, theory and history, innovation, writing, research and pedagogy, among others. Not so much to propose another new agenda - we already have plenty of those, but rather to juxtapose these practices with what is already happening 'out there', and speculate how they can potentially inflect, positively or negatively, this 'out there': the un-reason of non-normativity and the commodification of normativity.

PhD Skënder Luarasi, PhD Valerio Perna
TDW2019 Curators / Scientific Coordinators and Editors of TDW2019 ISC

Scientific Coordinators / TAW2018 Curatorial team

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 Haecceity, 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) is an architect and holds Ph.D. in Architecture ' Theories and Design' at Sapienza, University of Rome.
He is the Coordinator of the INNOVATION_Factory (IF) unit and Head of the Research Center of Architecture, Engineering, and Design, at POLIS University where he also teaches both architecture and design.
His research agenda explores the role of playfulness and ludic processes in contemporary architectural practice using both analog and digital tools. His research goal is developing a multiscale design methodology, based on a strong RtD (Research Through Design) approach - affecting creativity, education and complex urban challenges - and on the application of a ludic design strategy to tackle multiple crises in the contemporary era. Furthermore, he has been working for years on the new possibilities related to the IT Revolution in Architecture.
Parallel fields of interest are:

- Multitasking infrastructures enriched by IT and Interactive Technologies to revitalize the urban environment and activate bottom-up civic engagement processes;
- Computational and Parametric design;
- Studio and Theory of Architecture and Design;
- Design education based on an RtD (Research Through Design) and Learning by Doing approach

Besnik Aliaj
Full Prof PhD - POLIS University (ALB)
Sotir Dhamo
Dr. Doc. - POLIS University (ALB)
Ledian Bregasi
PhD - POLIS University (ALB)
Sonia Jojic
PhD - POLIS University (ALB)
Merita Guri
PhD - POLIS University (ALB)
Llazar Kumaraku
PhD - POLIS University (ALB)
Saimir Kristo
PhD - POLIS University (ALB)
Joana Dhiamandi
PhD - POLIS University (ALB)
Laura Pedata
PhD - POLIS University (ALB)
Rudina Toto
PhD - Co-Plan, Institute for Habitat Development (ALB)
Jim Stevens
Ass Prof PhD - Lawrence Technological University (USA)
John Abell
Ass Prof PhD - Washington State University (USA)
Gary He
PhD Candidate - Yale University (USA)
Jan Fransen
Ass Prof PhD - HIS - Erasmus University, Rotterdam (NLD)
Peter Nientied
PhD - NCOI Rotterdam (NLD)
Hassan Osanloo
Full Prof PhD
Michelangelo Russo
Full Prof PhD - Università Federico II di Napoli (ITA)
Alessandra Battisti
Ass Prof PhD - 'Sapienza', Università di Roma (ITA)
Alessandra De Cesaris
PhD - 'Sapienza', Università di Roma (ITA)
Marco Pietrosante
Prof - ISIA Roma (ITA)
Vincenzo Paolo Bagnato
PhD - Politecnico di Bari (ITA)
Domenico Pastore
Adjunct Professor PhD - Politecnico di Bari (ITA)
Zeila Tesoriere
Ass Prof PhD - Università degli Studi di Palermo (ITA)
Gökçen Firdevs Yücel Caymaz
Ass Prof PhD - Istanbul Ayidin University (Turkey)

International Speakers

POLIS University
14th September 2019

Mario Botta (Switzerland) was born in Mendrisio, Ticino, on April 1, 1943. After an apprenticeship in Lugano, he first attends the Art College in Milan and then studies at the University Institute of Architecture in Venice. Directed by Carlo Scarpa and Giuseppe Mazzariol he receives his professional degree in 1969. While studying in Venice, he has the opportunity to meet and work for Le Corbusier and Louis I. Kahn.Botta's professional career begins in 1970 in Lugano. Known for his single-family houses in Ticino, his work encompasses many other building types including schools, banks, administration buildings, libraries, museums and sacred buildings. Along his work he teaches extensively in giving lectures, seminars and courses in architectural schools in Europe, Asia, North- and South America.
Since the beginning of his career, his work has been recognized internationally and honored with prestigious awards, besides being presented in numerous exhibitions and publications. In 1996, he is one of the founders of the Academy of architecture of the Università della Svizzera Italiana in Mendrisio, where he still teaches and held the directorship.His steady professional and educational commitment, his role as chairman of the award jury of the BSI Architectural Foundation and his current involvement in the realization of the Theatre of architecture, allow him to impart his knowledge of a profession that is, first and foremost, his passion.

POLIS University
16th September 2019

Marcio Sequeira de Oliveira (Brazil) is a Brazilian architect and Master of Science in civil engineering.
His research focuses on finding educational solutions that can help to bridge the gap between architecture and structural engineering.
Since 2004 he has been working on the Mola Structural Model project – an educational physical model designed to simulate real structures behavior. In 2014, after 10 years of design development, he launched Mola'sfirst edition on the internet
(Mola Structural Kit 1). In 11 days Mola became the largest crowdfunding campaign in Brazil.
Today his solution is being used by universities and companies from more than 70 countries
around the world. He has received some important design awards with Mola project, including the winner prize
of "31º Prêmio Design Museu da Casa Brasileira" in 2017 (the most traditional and prestigious design award in Brazil)

POLIS University
17th September 2019

Ben Schouten (Netherlands) holds degrees in arts and mathematics. In 1996 Ben Schouten founded Desk.nl, providing innovative internet related solutions. Together with the Dutch Design Institute (Vormgevings Instituut), Desk was internationally acknowledged with a webby award in gaming. In 2001 he received his PhD for his thesis on content based image retrieval and interfaces that allow browsing & searching for images in an intuitive way, according to human perception.
Ben Schouten founded a research group in Biometrics and Human Behavior Analysis at the Centre for Mathematics and Computer Science (CWI, Amsterdam) and taught at the Utrecht School of Art & Technology (HKU) in Interaction Design and Gaming. In 2010 he was appointed Full Professor Playful Interactions in Smart Environments at Eindhoven University of Technology and in 2013 Lector of Play & Civic Media Research at Amsterdam University of Applied Sciences. His group focuses on play for social innovations, citizen empowerment and culture. He is an advisor for the European Commission on the 'Internet of Things' and has written 100-plus publications at the intersection of play, games, participatory design and citizen empowerment.

POLIS University
18th September 2019

Alireza Taghaboni (Iran) is a practicing architect since 2004, founded Next Office in 2009. Taghaboni is also a painter and holds a Ph.D. in Architecture. A frequent contributor to Iranian architecture and urbanism magazines and periodicals, he is a tutor and partner at the Contemporary Architects Association of Iran (CAAI), a private institute in Tehran that offers an alternative education program to formalized pedagogical frameworks of the country.
Next Office, based in Tehran, aims to provide a contemporary alternative to traditional Iranian architecture, responding to the climate conditions, economic, sociopolitical, and cultural context of each project as well as the peculiarities of each project's site.
The practice's work ranges from single-family houses to residential, commercial, and mixed-use large-scale complexes, to urban master plans. Over the past decade, the practice has won several Memar Awards, a prestigious national award for architecture in Iran held annually, making it one of the top prize-winning practices in the country.
Sharifi-ha house, with its revolving rooms, adapts to a shifting lifestyle and demonstrates a critical take on building regulations and zoning by-laws.
The project was shortlisted at the World Architecture Festival in 2014 and has been acknowledged internationally in professional and public media. In 2018, Taghaboni was awarded the inaugural Royal Academy Dorfman award in recognition of his talent that "represents the future of architecture".

POLIS University
19th September 2019

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.

International Speakers

POLIS University
20th September 2019

Marcos Novak (Venezuela) is the founding Director of the transLAB at the Media Arts and Technology Program at UCSB, where he is also affiliated with the AlloSphere research facility and CNSI (the California NanoSystems Institute).

Marcos Novak is an artist, theorist, and transarchitect, and an internationally recognized pioneer of the study of virtual environments as architectural spaces, and of algorithmic, generative, and responsive approaches to architectural design and the transactive arts. As early as 1990, with his friend Michael Benedikt, he co-organized "CyberConf: The First International Conference on Cyberspace," the first of an eventual eight international conferences on cyberspace. Later, his concept of "transarchitectures" became the focus of yet another series of international conferences, exhibitions, symposia, and publications that helped establish the digital, computational, generative, and virtual in advanced architectural design.
His projects, theoretical essays, and interviews have been translated into over twenty languages and have appeared in over 70 countries, and he lectures, teaches, and exhibits worldwide.

In 2008, "Transmitting Architecture", the title of his seminal 1995 essay, became the theme of the XXIII World Congress of the UIA (Union Internationale Des Architectes), the largest architectural organization in the world (representing 3.2 million architects worldwide).

Deeply interested in worldmaking, the future, and the avant-garde in all modalities, he is also the fortunate recipient of a classical education in Greece, where he grew up. Born into a family of filmmakers, he retains and exercises a fascination for understanding worlds as constructs — in fact, in fiction, in action. In 2000, he was honored to be chosen to represent Greece at the Venice Biennale. His work has been exhibited at the Venice Biennale several times since, and he has participated in numerous other international exhibitions and biennials since.

More recently, Professor Novak has developed the futuristic, humanistic, and design-oriented model of THEMAS for research, practice, and pedagogy. THEMAS stands for the holistic, integrative, and creative fusion of <Technologies, Humanities, Engineering, Mathematics, Arts, Science> and is a framework that contains and extends the familiar approaches of STEM and STEAM, adding the creative humanities as an equal participant, and insisting on a designing/making approach that balances the theoretical and the empirical, the qualitative and the quantitative. More than a mere acronym or framework, THEMAS is a thoroughly developed <model> that draws upon the many traditions of "well-rounded" education that have appeared across cultures through the centuries, learning from the past, respectful of the present, and aiming boldly into the sustainable future.
THEMAS has been positively received in many places including: Taiwan, Qatar, New Zealand, China, Japan, Korea, Scotland, Switzerland, England, France, Greece, the US, and more.

His current research explores worldmaking for social XR (extended reality), media field navigation, selective reality substitution (for autonomous vehicles, for instance), archimusic and habitable cinema, and the symmetries of narrative spaces and spatial narratives, among others.
He is a Fellow of the World Technology Network, a Distinguished Affiliated Scholar of the Alexander Fleming Biomedical Sciences Research Center, and serves on the editorial boards of several journals.

POLIS University
21st September 2019

Franco Purini (Italy) was born in Isola del Liri in 1941. He studied architecture and was a student of Maurizio Sacripanti and Ludovico Quaroni. In 1966 he founded a design studio in Rome, along with Laura Thermes. Since 2015 he is Professor Emeritus in "Architectural and Urban Composition" at Sapienza University in Rome. Purin is a member of the Accademia delle Arti del Disegno in Florence and the Accademia Nazionale di San Luca in Rome. In 2013 he was awarded by the Presidency of the Italian Republic Diploma di Medaglia d'oro di Benemerito della Scuola, della Cultura e della Arte. In 2016 he is honored with a career gold medal by the Milan Triennale. One of his latest builds is the Eurosky tower in Rome.

POLIS University
24th September 2019

Rudolf Lückmann (Germany)
He studied architecture at RWTH Aachen University. Since 1993 he has a professorship at the University of Anhalt.
WRITINGS_ Built pastoral care. The buildings of St. Peter and Paul in Dessau. Edition Anhalt University.

POLIS University
24th September 2019

Gernot Weckherlin (Germany) Rationality and Design Decisions in Architecture: From Bauhaus to BIM
This presentation will offer a critical view upon 'rationality' as a paradigm for design decisions from modernist Bauhaus to today's Building Information Modeling in Architecture.
Concepts of rationality and rationalism had a long lasting effect upon design decisions as they offer a role model for architects and engineers to open the way for 'objective' or even 'scientific' ways of professional action. A closer analysis of rationality in architectural design beyond the history of modernism may open up a new discussion of its relevance today.

International Speakers

POLIS University
25th September 2019

Kiersten Muenchinger (USA) is an Associate Professor in the Department of Product Design at the University of Oregon. Muenchinger researches the intersection of materials and design, and quantitative and qualitative sustainable design strategies. Her experimental sustainable design work has been exhibited with the Green Product Award, Germany; ShowPDX, Portland, Oregon; and Salão Design, Brazil. In 2016, she was a Fulbright scholar in Industrial Systems Engineering at Hong Kong Polytechnic University. She received the Sustainable Impact Practice Award in entrepreneurial education from VentureWell in 2018. Before joining UO, Kiersten was a design engineer with IDEO, Fitch, Sottsass Associatti, and Walt Disney Imagineering.

POLIS University
26th September 2019

Maja Lalic (Serbia) Architect, Founder of Mikser organization, Belgrade

Maja Lalic is the founder and creative director of Belgrade's Mikser organization and creative director of Mikser Festival dedicated to sustainable development and urban culture. As an urban designer by education, Maja advocates for participatory design, community engagement and nature-based solutions in her initiatives. Maja collaborates frequently with UN Women and UNDP on projects connecting social cohesion with actions for positive climate change and circular economy. She is a co-founder of the regional platform Young Balkan Designers dedicated to discovery and development of local design talents and restoration of the creative exchange in the Balkan region. Maja is an activist of the international initiative Blue Green Solutions, a co-founder of Women Architects Association (ŽAD) in Serbia and one of the initiators of Refugee Aid Miksaliste community center for refugees and migrants for which Mikser organization received numerous awards, such as European Citizenship Award 2016 for Social Campaign of the Year, Fulbright Alumni Trailblazer Award and Contribution to Europe Award by European Movement International.

POLIS University
26th September 2019

Jelena Matic (Serbia) Full Professor, University of Belgrade

Jelena teaches Furniture and Interior Design at Department of Wood Technology and Science at University of Belgrade, Serbia and invests large efforts in additional education and practical training of the new generations of Serbian furniture designers. She is also active in promoting works of Balkan fresh design talents in the region and abroad, as well as putting in contact young designers with the local furniture manufacturers.
Since 2008, Jelena merged her activities with the agenda of Mikser organisation dedicated to development and promotion of Balkan creative industries. She contributes as one of the key selectors and the member of the curating team of the annual talent exhibitions Young Balkan Designers and Ghost Project.

POLIS University
27th September 2019

Fernando Menis (Spain) Over the course of 40 years of acclaimed architectural practice, Fernando Menis has materialized a wide range of designs, from congress centers, concert halls, sports facilities to waterfronts, parks, plazas, housing and schools. He is the founder of Menis Arquitectos, an architecture and urban planning office based in Tenerife, the designs of which stand out for their respectful integration of buildings in their context, the innovative use of traditional materials, recycling and a unique expressiveness all of which are accomplished strictly within established budgets.The quality of Menis' s production and research has been recognized worldwide with prestigious awards among which: German Design Award 2018 - "Interior Architecture"; Iconic Award 2017 - "Public Building"; Best Concrete Building at WAN Awards 2016; Gold Award to the Best Public Building at Taipei Intl. Design Awards 2016; Special Award to Accessibility at CEMEX Intl. Awards 2016; Best Cultural Building 2015, awarded by the Polish Architects Association; First Prize at World Architecture Festival 2012 in "New & Old" category and the "Special Director's Award" at the same edition; the Ambuja Cement Foundation Award for Architectural Innovation with Concrete, 2016; Best Future Cultural Project Award at World Architecture Festival 2016; Spanish National Architecture and Decoration Award 2000.
A PhD Architect, he was a Visiting Professor at Hong Kong University, the American University of Sharjah, Universidad Europea de Madrid, Akbild Wien Academy and ESA Paris. He chairs the Laboratory for Innovation in Architecture, Design and Advanced Tourism of Tenerife, a non-profit that aims to promote energy efficiency, new construction systems, creative urban planning and technological innovation in tourist destinations.

Notes

All papers presented at this conference have undergone a process of **single 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 responsability 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.

conference proceedings

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Research and Methods

Moderators: **Sonia Jojic**

Design is not simply a passive instrument but rather an active 'player' that governs, produces and organizes a world of objects, of normativities and non-normativities. It is hard to imagine modernity without design, and design without modernity. From the early world expositions in the nineteenth century, to contemporary practices of mass-customization design acts as a mediator between users and objects, between the designer/author and people, and between ideas and objects. It may be important then to research and speculate on when in the history of modernity design was distinguished as such against the disciplinary grounds of arts and architecture, as well as investigate its relationship with technology and industrial reproduction. Design is also an object. The very notion of teaching design assumes that design is a corpus of knowledge that can be communicated, transmitted and disseminated across places and cultures. How does one teach design? How does one research (about teaching) design? How does one research by design? How does one design research? What does it mean to have a hypothesis, or research question in design? How do new technologies affect design as well as research and methods in design? How do the new design methods foresee and predict uncertain scenario and future paths? The aim of this paper & poster session is to engage with these questions according to five subtopics: Process, Skill, Communication, Technics and Perception and Imagination.
Process: tends to investigates how design comes about; how information about design is processed, evaluated and selected.

***Skill:** will focus on the fundamentals of carrying out a design. What is a "skill"? What are its normativities? Is it a predisposition or knowledge? Is it expertise or competence? What skills are required to design? What skills are required to research about design?*

***Communication:** this session aims to explore and highlight the relationship between design and 'mis-communication. What does it mean to communicate a process and a method, and how the way they are presented at the same time shapes the way they are applied and developed?*

***Technics:** this is a category without which it is hard to imagine or think about design. Technical and technological re-production is fundamental how design is perceived, imagined and disseminated.*

***Perception and Imagination:** the last subtopic focuses on the relationship of how does design mediate between the two?*

[RM/01]

“Brutal Skopje: a present-day photo essay

Besnik Aliaj[1], **Peter Nientied**[12]
1. POLIS University, Albania
2. NCOI University of Applied Sciences

The term ‘brutal’ has different connotations. Scholars of urbanism understand it as an architectural style that emerged in the 1950’s and became popular for a few decades. The term ‘brutalism’ is ascribed to Swedish architect Hans Asplund who described a new modern brick home in Uppsala.
For others outside architecture and urbanism, brutal is associated with words like ruthless, disrespectful and harsh. In this contribution, our aim is to show through pictures and short introductory and concluding texts, how both meanings of brutal have been expressed in Skopje’s urban cultural landscape since 1963.
Skopje is the capital of (now) North Macedonia, a small Balkan country with just over 2 million people, more than half a million of whom live in Skopje. We distinguish three periods of urban development, and an aftermath of a current deadlock in urban development.
- The first period is from 1963 onwards till 1991. In 1963, Skopje was hit by a severe earthquake, ruining some 60% of all buildings and killing over a thousand people. The city was replanned and reconstructed. This period ends in 1991, when the Yugoslavian state fell apart, and Macedonia soon gained independence.
- The second period starts in 1991. The transition from a communist system to a new market economy and a new political system led to typical ‘Wild East’ informal urban development.
- In 2008 a new prime minister came into power, who wanted to create a new identity for Macedonia in space and sought to do that in a neo-classicist style and going back to reinterpretation of pre-communist history, and medieval history even.
- Since 2017, when the prime minister left office, urban development has almost come to a standstill.
Photos illustrate the periods and the results in the city’s cultural landscape. After the section with the pictures, a brief reflection is submitted.

keywords Bengal, Ganges, migration, ecology, climate, India

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1. Rebuilding Skopje after the earthquake

In 1963 an earthquake shocked Skopje with devastating consequences. A new urban plan was made to guide the complete reconstruction of the city. The city planners and architects, under guidance of the Japanese architect and urban planner Kenzo Tange, enabled the creation of a city along modernist spacious designs, mixed with the principles of Yugoslavian modernist-brutal architecture for public buildings. In this period, Skopje was one of 6 main regional centers in the Yugoslavian communist state, and the government decided about urban planning and architecture and controlled the implementation of the reconstruction. By 1980 the reconstruction was over; an enormous amount of works had been done, but the budgets were depleted, and the full reconstruction could not be finished. The urban operations from the mid 1960’s up to the falling apart of Yugoslavia during the 1990’s, erased fundamental layers of historic routes, both Ottoman, and the early industrialization era - end of 19th up to beginning of 20th Century.

2. ‘Wild East’ urban development

In 1991, Macedonia became an independent state (it was one of the six republics in Yugoslavia). Skopje grew rapidly – many people from the countryside choose to live in Macedonia’s capital. Also, many Macedonians left the country. The diaspora sent remittances for investments in an apartment in the city, and a lot of construction in

housing and offices was created. New development can be characterized as chaotic capitalist market expressions through spatial infill, new apartment buildings and office towers with much glass. Architectural quality did not matter much since the economic exploitation of land and buildings was the main driving force. The result was a fierce infill of space, nondescript residential buildings and offices and shopping malls. Taken together, it signifies a brutal urban intervention with generally rather low architectural and urban design quality. It was chaotic and looks uncontrolled, but all developers had acquired official permissions.

3. Skopje's new 'ancient Macedonian roots'

Starting from 2008, the city centre experienced dramatic changes. The nationalist-conservative Prime Minister Nikola Gruevski, who critics say ruled with an increasingly authoritarian bent during his decade in power between 2006 and early 2016, presented plans for a new city centre, called Skopje 2014, referring to the year in which the implementation of the plan should be completed. The plan can be seen in relation to the diplomatic crisis with Greece over the identity of Macedonia, by replacing the FYROM (Former Yugoslav Republic of Macedonia) identity with 'glorious past of Macedonia'. It entailed the clearance of parks and green space, the construction of new government offices, buildings for public functions (museums, etc.) in the open spaces, an eye-catching central square and the construction of many monuments, sculptures and renovated facades covering old buildings. For Gruevski, Skopje expressed through his plan the roots of its 'Macedonian identity'. For opponents, it was a terribly expensive project and it was devastating for the city. Many of the (increasing number of) visitors, see a kind of historic "Disneyfication" of the city. Prime minister Gruevski put in force a new neo-classicist identity in space. Yugoslavian architecture from the communist period was covered with new facades. New buildings and statues were erected. The result was a brutal intervention in the city centre, a new identity (which most North Macedonians did not recognize). In 2017 Gruevski left office after much political turmoil and in 2018 received a resident permit in Hungary from his friend president Viktor Orban. The new government was left with a difficult legacy of all sorts of artefacts on the ground and a serious financial debt.

4. Current times

After prime minster Gruevski was replaced, the new government wondered what to do with the legacy of the previous government. Dismantling facades and destroying statues is expensive. The previous government brought the city in debt with the very expensive Skopje 2014 plan. The present Social-Democrat led government tends to give Skopje 2014 'an amnesty' (Balkan Insight, 2019), but this first decision to refrain from undoing the damage caused by Skopje 2014, will most likely not be the final word said.

There is a banal side too: citizens may dislike the city centre, but it attracts tourism, and daily life goes on. The decision makers in Skopje hesitate about how to continue; because of a lack of funds, urban development has come to an almost standstill.

Fig. 1 The 1963 earthquake
Source: Wiki commons, from Archives of Republic of Macedonia (DARM)

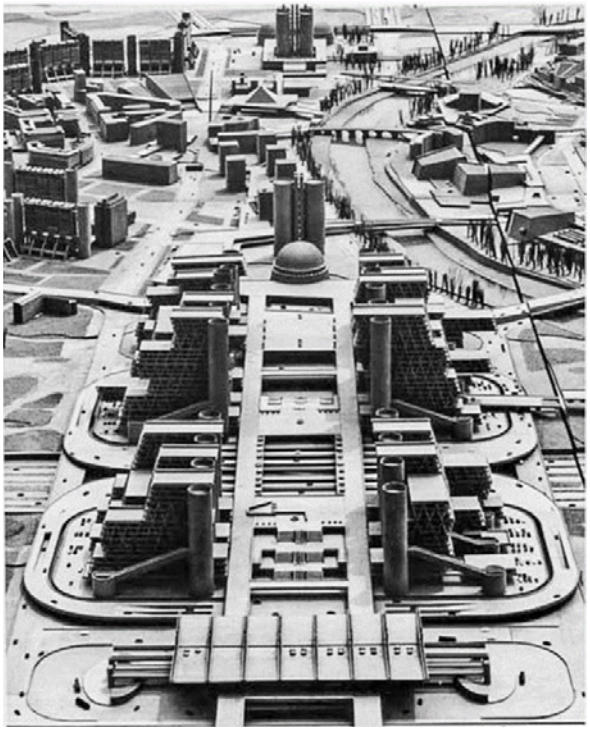

Fig. 2-3 New plan after the earthquake, and Kenzo Tange team
Source: Yomadic, https://yomadic.com/communist-architecture-skopje-kenzo-tange/

Fig. 4 Brutal towers
Source: www.bloglovin.com/blogs/arch-daily-375859/modernist-skopje-map-a-pocket-guide-to-brutalist-6559820547

Fig. 5 Brutal shopping centre
Source: Polis University

Fig. 6 Macedonian National Radio and Television building (1983), Skopje
Source: Peter Nientied, 2019

Fig. 7 Skopje university
Source: photo Peter Nientied, 2017

Fig. 8 Skopje post office
Source: photo Peter Nientied, 2019

Fig. 9 Post office, with modern bill boards .
Source: Photo Peter Nientied, 2019

Fig. 10 Old Railway Station (now: Museum of the city of Skopje)
Source: Wiki commons, Diego Delso

Fig.11 Shopping centre from communist period and modern office building
Source: photo Peter Nientied, 2019

Fig. 12 Modern offices
Source: Wiki Commons, RasoAn

Fig. 13 Modern offices
Source: Wiki Commons, RasoAn

Fig. 14 Soravia Centre (World Trade Center)
Source: Wiki commons, photo Yemc, edit Peter Nientied

Fig. 15 Map with Skopje 2014 structures
Source: http://skopje2014.prizma.birn.eu.com/en

Fig. 16-17 Renovation
Source: Polis University, 2011

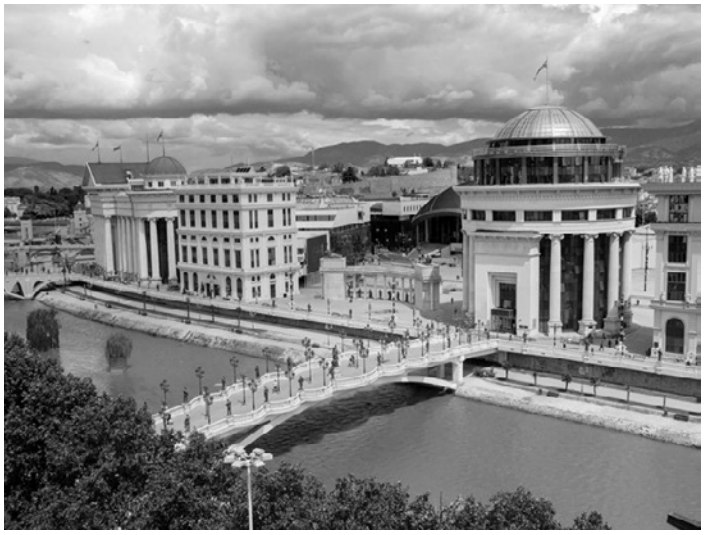

Fig. 18-19 along the river / detail of the bridge
Source: photo Peter Nientied, 2019

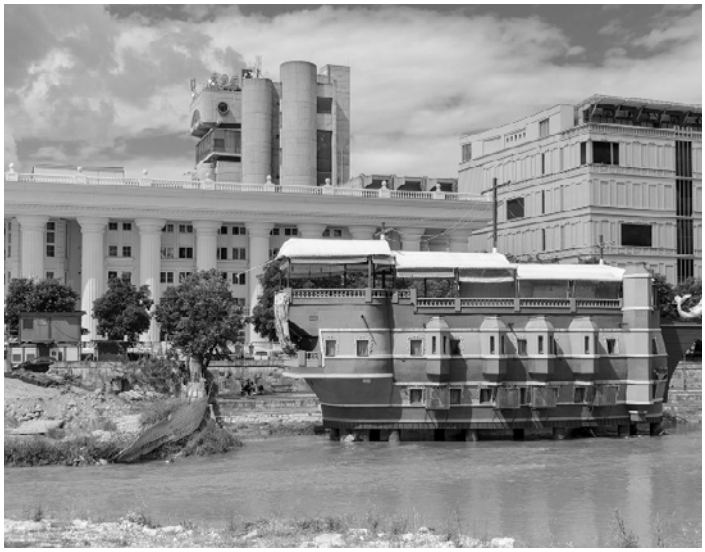

Fig. 20 Boat like structure as hotel
Source: photo Peter Nientied, 2019

Fig. 21 Unfinished project hew facade
Source: photo Peter Nientied, 2019

Fig. 22 Statue Philip II of Macedon at the entrance of the old quarter
Source: photo Peter Nientied, 2019

Fig. 23 Statue Warrior on a horse [not being Peter the Great]
Source: photo Peter Nientied, 2019

How Skopje became Europe's new capital of kitsch

Skopje's new neo-classical splendour is divisive and expensive – not to mention of questionable taste. But one thing's for sure: it's made the Macedonian capital a truly surprising and impressive spectacle

Fig. 24 Newspaper clipping
Source: The Guardian

5. Reflection

Brutal is used in two meanings: as architectural style (the 1963 – 1991 period), and brutal as rude and disrespectful (the period after 1991). During the communist period, the brutal style has been applied as an expression of planning and architecture – it was part of a broader discipline that was widespread during that period. In Brazil, a new capital was built in that fashion, Chandigarh in India was constructed, and in many western countries, brutalist constructions were erected. In Yugoslavia brutal modernist principles were applied in architecture and in numerous big monuments. MoMa devoted in 2018 an exhibition 'Toward a Concrete Utopia - Architecture in Yugoslavia, 1948–1980'. After 1991, the developments are called brutal, but in the sense of disrespectful (with regards to citizens, to history, to urban professionals). Based on all these brutal urban developments, some pointers are submitted that put urban development and architecture in the socio-political realm and show how intertwined ideology and urban development are.

First, brutal is related to the search for identity and to ideology. In 1991 it was declared that Titoism, the Yugoslavian system of communism, was over and that communist expressions were history. After 1991 followed a lot of poor-quality commercial development – a result of the new system and governments seeking new economic development (and personal gains). A 'wild east' capitalist ideology developed, with political and economic elites exploiting urban land for their gains. It was not a deliberate search for identity - which is a collective process - but it was an expression of individualistic values. With the appointment of Gruevski, an intentional construction of a narrative about the Macedonian identity, based on history, was imposed on Skopje. Identity building was not a collective process, but it was Gruevski's personal and party nationalistic story enforced on society. 'Brutal' leads to questions about identity formation – as a deliberate or as a thoughtless process, as a collectively constructed story of as an image of a political elite-imposed on urban society.

A *second* pointer is banal practices, a term used by *Diener and Hagen* (2013). Banal practices follow brutal interventions. Banal, like brutal, has also multiple meanings, is refers to mind-numbing and boring on the one hand, and to ordinary and predictable on the other hand. People get used to new circumstances and go on with their lives. It is common that people forget the significance of for example statues, and do not know who the person presented in the statue is. In Skopje, most citizens get used to the 'classicist' appearance and to the low-quality physical expressions of capitalism, like they got used to the brutal architecture during the communist period. They go to the mall for shopping and not for the architectural (lack of) design. They get used to groups of Asian and European tourists visiting the classicist city centre, and their surprised and amused attitudes, and to be called 'Capital of Kitsch'. It provides a living for many people. 'Brutal' lead to questions about 'banal', in both meanings of the term banal.

Third, 'brutal in the sense of disrespectful in the period after 1991, is related to Macedonian democracy. Under communism, there was a certain respect for urban professions, after communism this respect quickly vanished. After 1991 governments have been elected and developments took place under a new system of democracy. In democratic systems many unwanted things happen (for large segments of the population) and the question emerges what kind of democracy allows for this to happen. In any case it is far from European concepts of democracy based on common values - and not just gaining an electoral majority and display bossdom for the period till the next elections. But acquiring numerical majority of the votes as a legitimacy of almost absolute power till the next elections, has become a common pattern in the Balkans. 'Brutal' leads to questions about the meaning of democracy, a question which is relevant in many CEE countries. Can we speak of 'illiberal democracies', or democratically elected dictatorships?

Fourth, big public-political projects like Skopje 2014, do not come out of the blue. Skopje 2014 can be seen as an outcome of a turbulent neo-liberal capitalist transition period, with its uncontrolled urbanism and architecture, resulting in massive informality schemes. The failure of neo-liberalism paved a wat for the controversial neo-populist and neo-authoritarian models.

Skopje is not a city that many people are proud of. Shared urban pride, that can act like a unifying force, was no politician's and no developer's concern after 1991. Individualistic values prevailed; individual developers' and officials' gains, and the nationalistic ego of Gruevski and his clique benefitting from corrupt practices.

The present period may give the (local) government, professionals and civic communities time to reflect on the wanted identity of the city, including the difficult question what needs to be done with the classicist developments of the last decade. Taking time for a broad participatory process on the past, present and future of Skopje, makes sense.

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[RM/02]

New methodologies for the transformation of informal settlements on the Apulian coast. The case of Torre Mileto

Guiseppe Tupputi[1]
1. Polytechnic of Bari, Italy

The essay intends to explore the problematic issue of abusive or informal settlements in Puglia, which have been the result of an absent (or also assenting) planning. and which have over time contributed to the disfigurement of the local naturalistic and landscape heritage, often by irreversibly altering the original state of natural places.
This research aims to work on the transformation and reuse of informal Apulian settlements that affect and weaken ecosystem balances of the highest quality, along the 830 km of the regional coastline.
Between the need of a theoretical analysis and the need of a design work, the research proposes to rethink the structures and forms of these informal and widespread settlements. The first step consists in recognizing and consolidating the aesthetic values intrinsically possessed by natural landscapes, and then, the second step consist in translating them into a renewed system of relationships, which could open the door to new scenarios for the settlement, production and accommodation purposes. In this way, the research proposes a paradigm shift in the setting of the problem: the change in considering these coastal territories of the abusive city not as a 'pathology' but as a possible 'resource', by grasping the fertile condition of the incompleteness of these places, by combining vision and feasibility.
The paper assumes as case study the informal settlement of Torre Mileto, which develops along the thin isthmus between the Lake of Lesina and the Adriatic Sea, behind the Gargano promontory and in front of the Tremiti islands.
Through the analytical/interpretative analysis of this anthropogeographic territories, the paper intends to identify the systemic invariants, the sets of structural, morphological, figurative and spatial relationships developed between the elements of the natural landscape and those of informal settlements over time (even if only on a subconscious level), in order to assumes them as pre-project conditions for a procedural transformation of these informal places.

keywords: Coastal landscape, Informal settlements, Geography, Urban design, Transformation, Renovation

1. Squatter and informal settlements in Mediterranean

United Nations estimates that nearly one billion people – which means one-sixth of the planet's population – now live in *slums* (Beardsley, Werthmann, 2008: 31), also called *informal* or *non-formal cities*, *squatter settlements*, or *shanty-towns*.
In the last fifty years, encouraged by various factors – including the laws enacted by some populist governments, the influence of property speculators, or sometime the mere need of houses – informal settlements have appeared almost everywhere in the world, in both city centers and on their peripheries, in both rural and urban areas (Beardsley, Werthmann, 2008: 31). Their organization is not the result of planning but it seems to consist in a new kind of "organization without hierarchy" (Fabricius, 2008: 15), resulting from traditional squatting and from new kinds of "pirate urbanism" (Beardsley, Werthmann, 2008: 31).
Nevertheless, because of its global scale, the phenomenon of informal urbanization has assumed very different local forms that change from place to place. In fact, these settlements grow a large number of varieties, which differ dramatically in dimension, density, the width of streets, the quality and scale of the housing, the availability of infrastructural services and the general quality of life (Fabricius, 2008: 15); and also, the communities that live in these places differ dramatically in size, character, age and level of political and social organization. (Beardsley, Werthmann, 2008: 31).
In this regard, for example, as opposed to the situation in Asia, Africa e America Latina, where squatter settlements grow mainly close to the world's largest metropolis and megalopolis, in Europe and more generally, in Mediterranean, their principal common feature seems to be that of littoralization. (Cote, Joannon, 1999: 112-116). As argued by Denis Bocquet (2013: 238) in these countries, especially on the eastern and southern shores of the

Mediterranean, an always growing portion of population tends to live not only in cities but also in large *squatter* and/or *informal* settlements within coastal regions.

> *"This phenomenon has roots in the history of the Mediterranean since ancient times, but more specifically in the rural exodus leading to massive urbanization in the nineteenth century; since the 1970s, the trend toward littoralization has increased, with the result of the creation of large coastal urban regions, which have changed the nature of (Mediterranean) metropolises" (Bocquet, 2013: 238).*

In any case, in the Mediterranean areas, the general trends toward an informal urbanization are quite different from Latin-American, Asian and African ones both in morphological/aesthetic and socio-economical questions. While in the former case, this phenomenon assumes the character of the *rurbanization,* relating both to the city and to the rural landscape and dealing with the condition of the local middle and lower classes, in the latter case, it assumes bigger scales and densities, growing at the borders of the mainly megalopolis and dealing with the problems related to the high levels of poverty and to the social and economic injustices.

For these reasons, we need to acknowledge the difficulties of generalizing about the global phenomenon of *informal* and/or *squatter settlements,* because it changes in relation to the places where it grows. Consequently, it is important to acknowledge that differing geographies, topographies, social and economic conditions, cultural traditions require different intervention strategies (Beardsley, Werthmann, 2008: 32). On the other hand, notwithstanding their formal and socio-economical variations, these different places share some characteristics: absence of planning, lack of order in urban or rural structures and hierarchies, high and irregular consumption and extreme privatization of land, lack of public spaces, improper and temporary uses of places, abandonment or illegal occupation of unused or unfinished buildings, insecure land tenure, inadequate housing, scarcity of access to basic services, etc.

> *"Unlike the planned development of a city or suburb, in which infrastructures – roads, pipes, electrical lines – create a grid for houses and people to fill, these settlements* – said Fabricius (2008: 10) – *develop in reverse. The infrastructures do not officially come until much later, when the* (settlement) *is urbanized and partially absorbed by the city* (or by the territory). *First the people come and build their houses; than roads evolve; electricity and water are pirated in. A community forms."*

2. Squatter and informal settlements on the Apulian coast

After having outlined some of the principal similarities and differences between these various types of informal settlements, the essay intends to focus on the analysis of the "Apulian version" of this phenomenon, which can be considered as a pregnant example of the trend toward littoralization in Mediterranean.

With its different natural and anthropic structures and components, the Apulian coastal landscape plays a strategic role in the context of regional territorial dynamics principally due to its considerable extension (about 830 linear kilometers of coastline) and its rich heterogeneity (landscape value, environmental and cultural qualities). In these territories, in fact, the geomorphological features of the coast (high rocky coast, low rocky coast, arenas, sand dunes, blades and / o coves, river mouths, etc.) have over time influenced the development of both agricultural plots and settlement forms as well as the structuring of environmental ecosystems.

However, today, this remarkable ecological, morphological and spatial wealth of landscape is threatened with the problematic phenomenon of the *squatter* or *informal* settlements spread on the coasts, which have been the result of a prosperous building activity (now almost completely exhausted) and of an absent planning. These unauthorized and/or uncontrolled building process have contributed to damage the landscape heritage, undermining its peculiar anthropo-geographic values. In addition, there is also a significant factor related to geological implications, namely to the increasing environmental risks caused by incongruous building practices that aggravate the safety conditions with respect to hydrogeological or coastal erosion risks, compromising the resilience of these territories.
This problem is distributed almost homogeneously on the regional area, involving many Apulian territories: we can mention, for example, the vast case of Campomarino in the province of Taranto; the stretch of coastline between the city of Mola di Bari or Torre a Mare in the Land of Bari, the areas around the town of Ugento in Salento or the emblematic case of Torre Mileto in the province of Foggia. For this reason, it is necessary to carry

out the research between an indispensable theoretical in-depth analysis and a desirable “design tension”, to propose to rethink these settlements and their forms, widespread and precisely informal. So, the work is firstly aimed at recognizing and consolidating the aesthetic values intrinsically possessed by natural landscapes, and then at transferring them into a renewed system of relationships that can open up to new productive, residential and touristic scenarios. Therefore, it is necessary to set a work program that aims both to develop new and more accurate tools and methods for reading the coastal informal phenomenon (both on the socio-economic and cultural level, and on the more eminently aesthetic, morphological and spatial level) and new theoretical and methodological processes for generating design experiments, namely some pilot-projects for the regeneration of these urban-rural-naturalistic territories. Finally, through the verification and the systemization of the different analytical experiences and the different pilot-projects (which refers to those areas chosen as a case study), it will be possible to list and classify a set of transformative and design strategies: some guidelines which could be useful to the actors of the transformations and to the administrations for the management of the reconversion processes of the Apulian informal territories, in order to improve their future tourist-receptive, productive and housing function.

3.The case of Torre Mileto. Between the shores of the Adriatic Sea and Lesina Lake

In order to focus on the analytical processes and to prefigurate the design strategies for revaluating these informal settlements, I think it is useful to refer to a specific case-studio, which corresponds to the town of Torre Mileto (province of Foggia), located in the municipal area of Sannnicandro Garganico, behind the Gargano promontory, in front of the Tremiti islands and the Adriatic Sea.

Very distant (about 20 km) from the nearest town of Lesina, in this peculiar geographical background, the phenomenon of squatter housing started to appear from the end of the 60s, namely a few years after the reclamation of the so -called “state-owned” lands that had affected the eastern part of Lesina Lake in the second post-war period. Thus, the right to a “beach house” has grafted on the right to land and work that influenced the process of ruralization of land a few years before, and still today, even if this new conflict is certainly less ideological than the previous one, it links together the interests of political and middle-popular class, triggering a vortex of concrete and direct involvements (Trombetta 2006: 7). In the 80’s, when this phenomenon reached its peak, the population of Torre Mileto exceeded the 5.000 people, which lived 4-5 moths per year in a romantic place ‘between the sea and the lake’, without clean running water, sewers and electricity.
On the other hand, we must also acknowledge that these facts happened in conjunction with the absence of a low-cost tourist zone in the planning programs of the municipalities of Sannicandro and Lesina.

Fig. 1-2. Photographies by ©Massimiliano Cafagna.

Fig. 3-4. Photographies by ©Massimiliano Cafagna.

Moreover, it is also important to recognize this settlement as a social problem that implicatehundreds of modest families and middle classes, which is quite different from other examples of property development and territorial exploitation carried out by big groups of private investors and businessmen (Schiavone 2006: 6), or also from other examples of extreme poverty implying the basic need of the house.

With respect to the emergence of such problems, the hypothesis of totally demolishing these squatter settlements by making a *tabula rasa* of the building heritage to completely re-naturalize the places seems to be difficult to carry out in practice, because of various reasons. In addition to the great bulk of the built heritage of Torre Mileto (which counts more than 2000 houses) and to the important demolition costs (which would be a burden for the public pursue), in addition to the previous considerations about the aesthetic-morphological possibilities and on the socio-cultural implications, this hypothesis seems to be unworkable (or at least not completely operable) due to the building amnesties (*condoni edilizi*) granted by the laws of the State issued by the Italian governments in 1985, 1994 and 2003, which have confused the current regulatory framework.

Therefore, after having recognized the impossibility of totally demolishing these settlements and, at the same time, the urgent need to intervene to safeguard the ecosystem and landscape harmonies that characterize these territories, we could prefigure and undertake a third way, an alternative to the total amnesty or the total demolition, a third way that uses the former or the latter method of intervention (and others, such as relocation, reconstruction, thinning/densifying, ordinary and extraordinary maintenance of buildings, etc.). These instruments have an exclusively instrumental and non-ideological value, which is chosen and elaborate in relation to the needs expressed by the transformation project itself.

Therefore, this objective presupposes a paradigm shift in the approach to the problem: considering the coastal territories of the "squatter city" and "informal landscape" no longer exclusively as a pathology but also as a possible resource; grasping the fertile condition of the incompleteness of these places and exalting, where possible, the intrinsic potentialities.

In this context, some positive steps have been achieved in Torre Mileto, mainly thanks to the analytical investigations that preceded and complemented the design strategies of the P.I.R.T. (the program of the restoration interventions for the territorial rehabilitation). First of all, the phenomenon has been mapped, through a database connected with GIS to aerial photogrammetric and ortho-photographic cartography, in which is recorded the exact number of "spontaneous" constructions (about 1700), their location, their use, the number of rooms, the areas of occupied land, the possible presence of requests for amnesty, etc. Secondly, this project has outlined the ways through which the local administrations, in concert with the owner of the land, have tried to drive the program of interventions for future transformations. But, if the first phase has certainly had a positive outcome, which consists in the elaboration of an archive of information and tools that are certainly useful for the analysis and knowledge of the phenomenon, the second phase, which aimed at the definition of transformation criteria, remained only on paper, finding no real implementation.

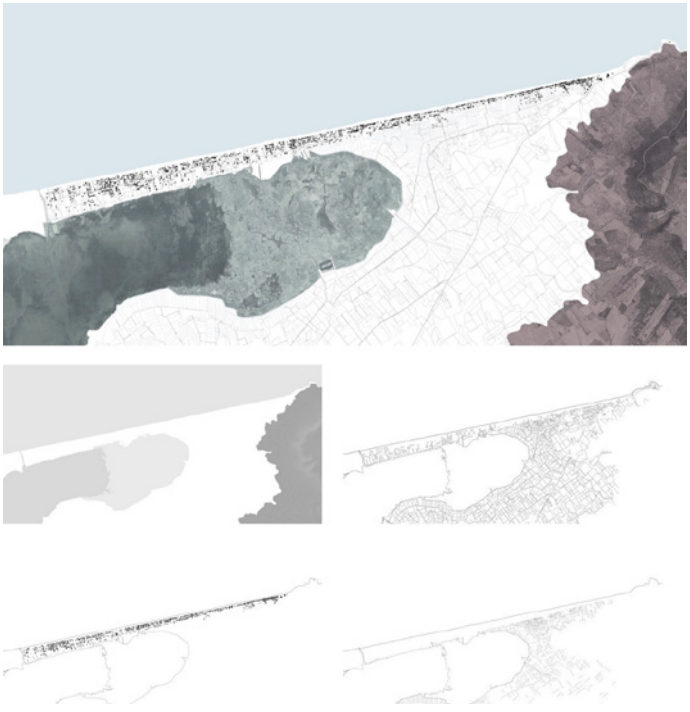

Fig. 5 Analysis of the anthropic and natural elements and systems of Torre Mileto.

This probably happened due to some factors related to the expenses of the numerous demolition interventions (completely burdening on public entities), to the indisposition of citizenship to the expropriation and also to the lack of a planning strategy able of contemplating these problems in a more organic way: for example, considering the hypothesis of a building relocation within the same settlement and not in other places in the inner lands, which would be also useful for the compositional principle based on "thinning/densifying".

In any way, through this attitude that recognizes, in addition to the administrative-juridical, socio-economic and cultural problem, above all the importance of the aesthetic-morphological problem – *the cultural and economic chances of a landscape lie in its capacity for aesthetic expression*s – it is possible to use in a strategic way a set of different design tools ranging from demolition (with or without delocalization) to densification, from ordinary maintenance to the reconstruction of the same volumes, even to the construction of small collective spaces defined by the architectural forms that fence of the property boundaries. All these procedures can therefore find their appropriate position within a unitary and organic project, which is built both in relation to the socio-economic conditions and the environmental, landscape, morphological and spatial qualities of Torre Mileto: an *anthropogeographic unicum* between the shores of the Adriatic Sea and Lesina Lake.

4. New methodologies for the transformation projects

The geographical features in which this small informal settlement is located appear as singular and interesting: a "territorial room" bordered by Adriatic coast in the North-East, by the Bosco Isola and the mouth of the Schiapparo canal in the West, by the Lesina Lake and the cultivated land that geometrize the plain at the foot of the D'Elio Mount in the South. Because of its peculiar geographical conditions, Torre Mileto emblematically represents both the centrality of the question of "informal (r)urbanization" as a detractor of the beauties of the Apulian coastal landscape, and a rare – but also paradigmatic – intimate connection between natural and artificial forms. In fact, although it is unplanned, Torre Mileto has been built as a small linear settlement about 8 kilometers long, which follows the only longitudinal axis (a road of very poor quality) because of the peculiar forms of the natural framework where it rises and develops: the thin isthmus that lies between the waters of the Adriatic Sea and the Lesina Lake. Half of the settlement borders with the marsh area and the eastern bend of the lake, in the point where its basin is most frequently characterized by seasonal dryness. The other half of the settlement maintains its linear configuration, growing near to the plentiful system of crops and canal systems of the plain.

Notwithstanding this linear morphology and its ostensible homogeneous development, by observing this informal urbanization on a smaller scale, it is possible to recognize that the settlement is composed by different and discontinuous parts, which overlapping each other in some points. In fact, the main urban axis joins together two different hamlets whose names derive from the two main toponyms of this area: Tammaricella and Schiapparo. Moreover, it is possible to distinguish other partitions that determines various types of aggregation of rural/urban fabrics, which differ with respect to the form of the built environments as well as to the relationships that these built forms define with the natural environment. This means that it is possible to recognize some traces of an implicit albeit unclear order – like a musical score – in the forms of the landscape, which intrinsically reverberates in the informal structures and forms of the settlement. This fragile order represents the unique possible starting points to reconstruct some new syntactic, morphological, spatial, aesthetic orders (and also functional, economic and cultural ones) in these territories.

The different sectors that composed Torre Mileto seems to contain a useful principle in order to achieve a future structural order of this settlement: it outline a partial division into distinct parts, which want to be like micro rural/urban islands located in the natural landscapes of the lake, the sea and the plain, and which want to be ordered by a syncopated rhythm that alternates, in the linear series defined by the natural isthmus, some pieces of nature and some piece of different small villages on the coast. Obviously, the dimensional scales are multiple and all equally important: it is necessary to keep them together, considering them in their interpenetration in such a way that any aspect of the problem is leaved out. For this reason, the analysis and the intervention strategies are structured in three themes or moments, which are articulated and linked to the different scales of observation: - the restructuring of territorial forms and of the ecological system; - the morphological reconfiguration of informal aggregates; - the morpho-typological transformation of informal building. At the larger scale, which includes the different forms of the territory in a single comprehensive and vast system, the most significant component elements are visible: the main structural hierarchies, the layouts, the geometries and measures of the different parts, the scars and seams (Borra, Franzel, Korsak, Loaiza 2004: 40); the unexpressed potential present in the settlement composition emerges in its relationship with the geographical structure of the territory. The analysis distinguishes in different layers the morphological and ecological systems that characterize the area and recognizes the features of their principal elements (lakes, rivers, parks, hills, infrastructural systems, streets and squares, architectural emergencies and urban patterns, etc.); then it overlaps them, connecting in a single articulated but also integrated and as much as possible agreeable overall design.

Following these investigations, from an environmental point of view, it is essential to reinforce the ecological network by activating renaturation projects that should concern above all the coastal strip, the area adjacent to the lake and the necessary connections between the lake and the sea (Ottolino, Testini, 2006: 31). So, it appears necessary to provide for planning the restoration of the sandy shore, the creation of new "ecological corridors" between the lake and the sea, as well as the improvement of existing infrastructural networks and the creation of new roads for cars, cyclists and pedestrians, through which also define new points of access to the naturalistic-agricultural park on the shores of Lesina Lake and to the seaside bathing area. Moreover, from a strictly morphological point of view – as already recognized before– although following abusive and informal processes, the settlement of Torre Mileto has developed the characteristics of a tendentially linear-city (with a lower density), because of the peculiar narrow and long shape of the lagoon isthmus.

In a linear composition order consists in rhythm and intensity, therefore through the calibrated demolition/ densification of some parts or some urban elements (through the demolition and delocalization of a part of the demolished volumes), it could be possible to redefine the "structural step" of these places: the metric principles that alternates passages of small suburbs with intervals of wild and/or cultivated nature. By coinciding with the necessary "sea-lake corridors", these pauses in the composition of the settlement would therefore have an aesthetic-morphological (landscape) meaning, an ethical-ecological (environmental) meaning and, finally, a civic connotation, offering themselves as the main collective places of settlement.By moving the observation to an intermediate scale, it is possible to deepen the morphological features of the settlement and to discern some distinct parts (which differ in density, ways of aggregation and predominant building types). This moment also coincides with the distinction of the different urban patterns and with the recognition of their different morphological and spatial conditions, which are linked together in a linear sequence that alternates urban and rural features in a kinesthetic progression nearly 8 kilometers long. In this way, it is possible to hypothesize a consequent 'abstraction' of urban and rural fabric or aggregate models towards which to direct the intentions of the future projects.The transformation of these proto-urban buildings into new clearer aggregation morphologies and into new residential patterns with variable density (in any case of medium-low density, a mix of urban and rural) seems to be a valid strategy to develop and strengthen the intrinsic characteristics and potentials already possessed by these settlements.

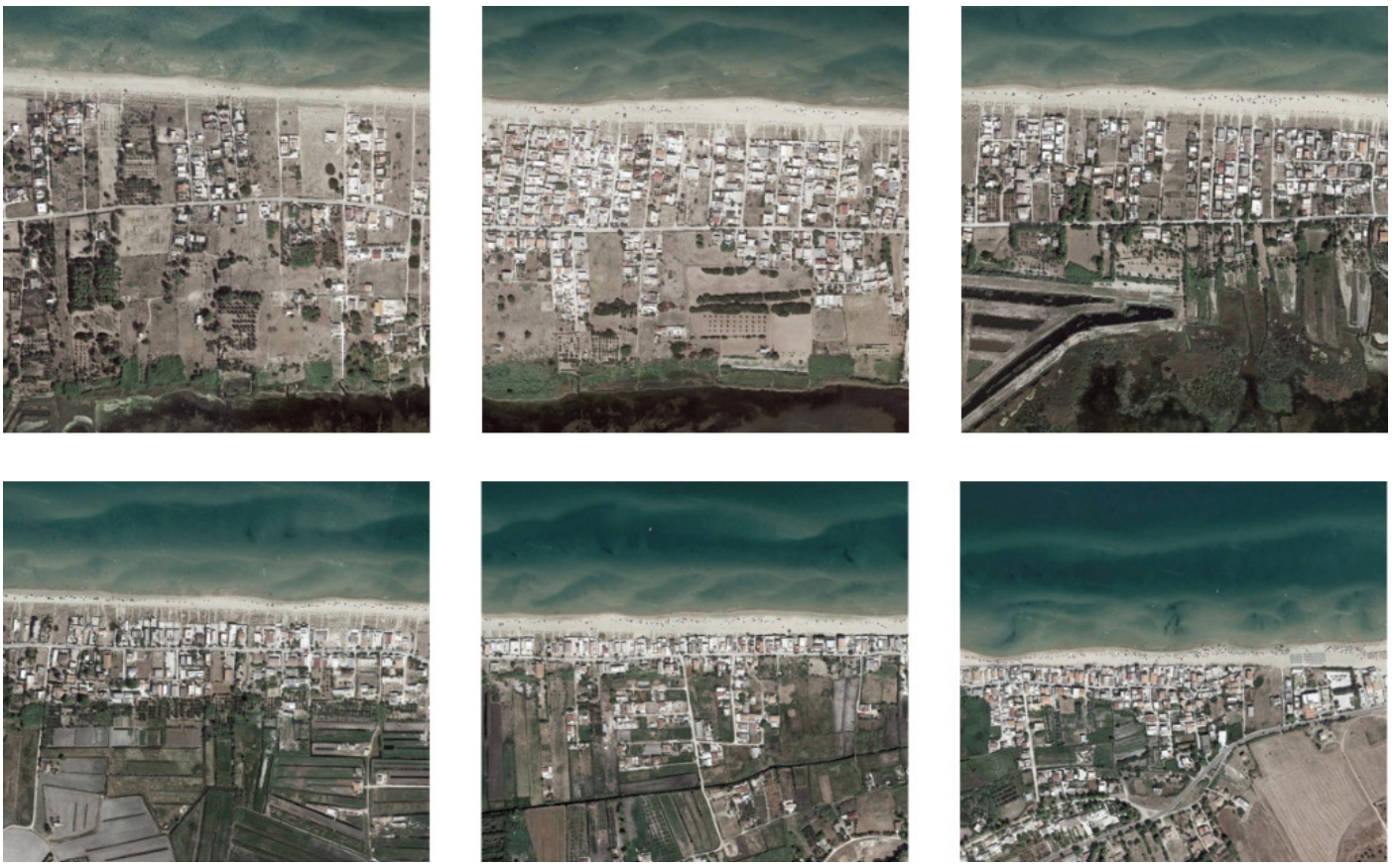

Fig. 6. Different orthophotos of Torre Mileto from Google Maps.

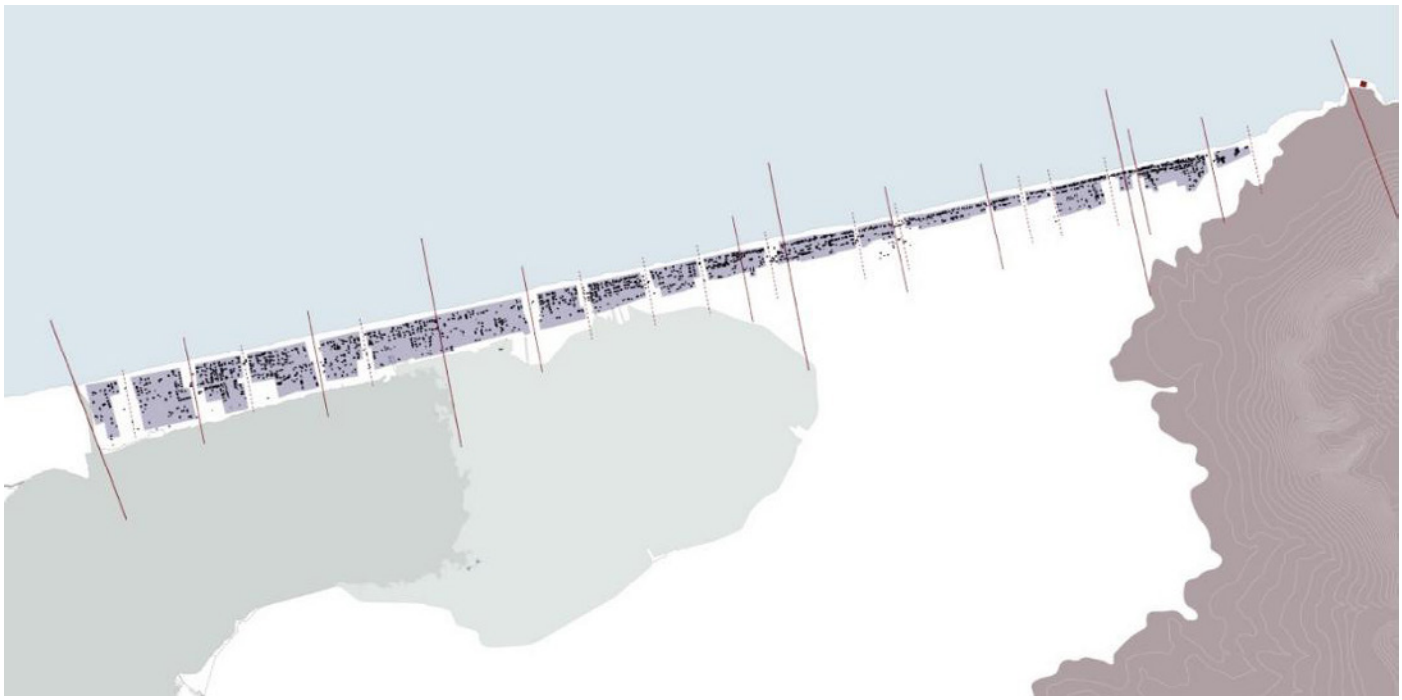

Fig. 7. Analysis of the anthropic and natural metrics and measurements of Torre Mileto.

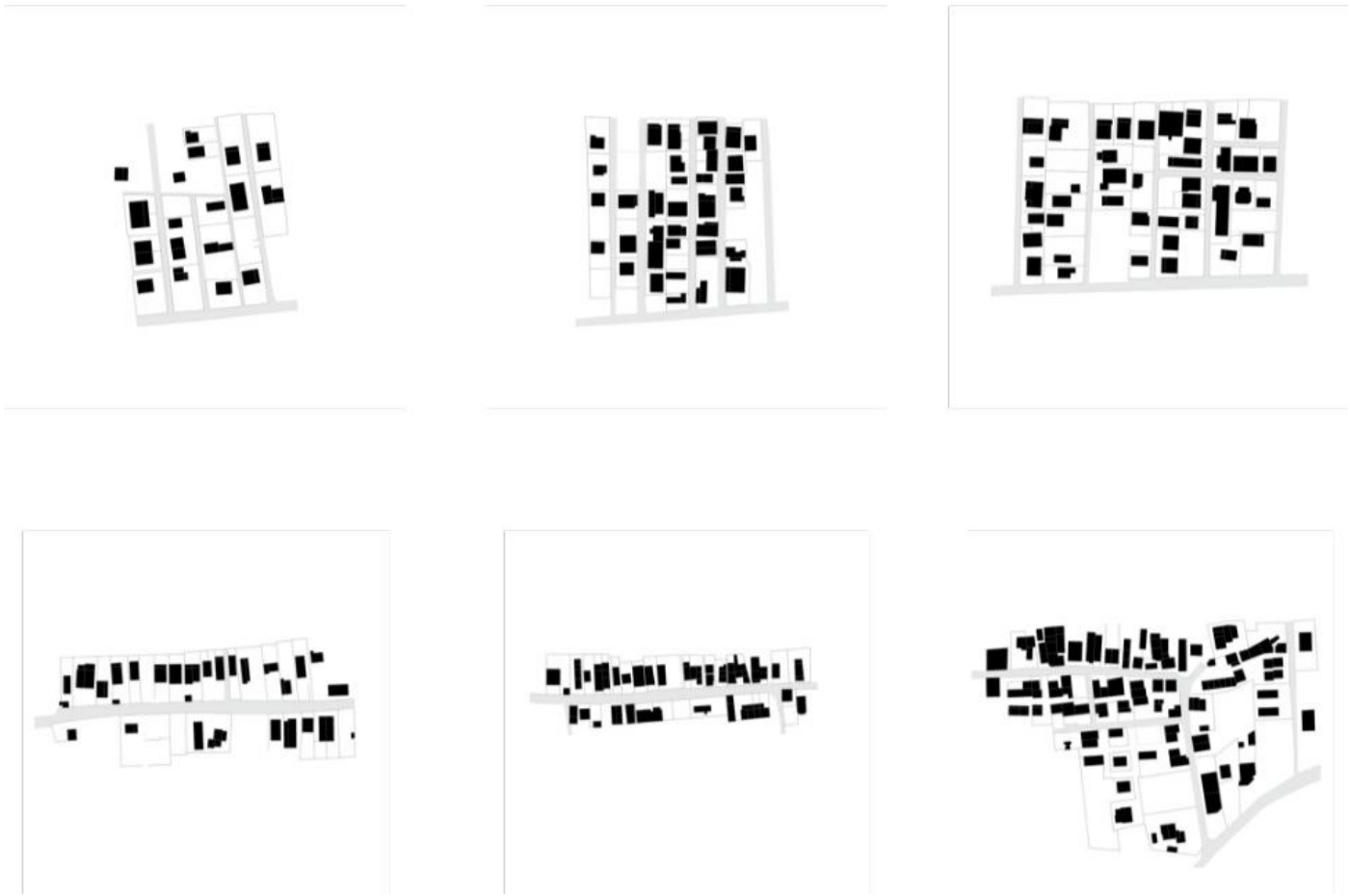

Fig. 8. Analysis of the different aggregates of Torre Mileto

Fig. 9. Pictures of the different squatter houses and of the mainly present architectural elements.

Finally, on a closer scale, it is possible to recognize the presence of various building typologies, which can be evaluate through their congruity of the type-morphological and spatial characteristics in relation to the territorial context, the orographic conformations, the overall strategies of the project and to the choices made at the other dimensional scales.

Moreover, in the settlement, the recurrence of some forms and elements of the house (such asterraces overlooking the sea, loggias and courtyards, entrance squares and private garden) seems to refer to the inhabitants' lifestyles and traditional values, which correspond to a common way to live in a "summer resort", where the tendencies to idleness, relax, outdoor lunches, walks in the garden, in the woods or near the lake prevail.

By decoding, denominating and, in some way, normalizating these architectural forms, which are so intimately and unconsciously linked to these stratified uses, it is possible to reinforce the aesthetic-formal characteristics of these villages. The aim consists in trying to generate a new aesthetic value that can aspire to confront with the strong aesthetic value of the natural landscape of Torre Mileto, through the repetition of the single elements and, sometimes, by their punctual alteration.

Moreover, this strategy could even manage to re-define the characteristics of the open spaces of the city through the re-design of the property borders (e.g. the facades and walls that build the space of the streets). With this intentionality, in fact, we could define a set of operations of type-morphological transformation (demolition or selective addition, remodeling of ground attacks, re-definition of roads on the road through the addition of arcades, fencing walls, etc.), which have to be conducted by private individuals (maybe also with the use of some public funding) and which could be part of a broader overall strategy: to operate both in order to achieve uniformity in building materials and elements (now completely absent), and in order to design public spaces (such as streets, squares and gardens) through the conformation and standardization of some elements of the residence itself.

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[RM/04]

The production of the form: The Castiglioni's lighting design between tradition and innovation

Raffaele Difonzo[1], **Alessandro Santeramo**[1], **Claudio Roca**[1], **Gigi Totaro**[1]
1. Polytechnic of Bari, Italy

After the Second World War, Italy was interested by a moment of deep and rapid economic development. All industries started to convert their production from war to industrial because of the current need of goods and services: between them, there where furniture elements and utensils that people strongly wanted to start trying to forget the war and begin a new life.
Among the main protagonists of this industrial and social renaissance there are many architects and designer who were asked to deal with the difficult task of in- venting new products that should be cheap and have high quality standards. In the field of the product design, between the most important figures there are Achille and Pier Giacomo Castiglioni, now considered masters of the modern design, who at that time (and during many years afterwards) were extremely able to give con- vincing answers to the discipline of design, not in aesthetic-formal terms as much as under productive and social points of view, always using irony and curiosity.
In the Fifties Achille Castiglioni started experimenting with the concept of 'ready- made': traditional object are transformed and re-designed with the aim of upgrad- ing them on a new communicative approach.
The paper presents a study on the work of Achille and Pier Giacomo Castiglioni specifically focusing on the lighting design experiences: starting from the relation- ship between tradition and innovation, the paper analyzes the relationship between design, craftsmanship and industry, finally giving a critical design interpretation of the concept of 'ready-made' intended as a continuous experimentation on the ev- eryday objects transformed with new forms, materials, innovative technologies and through a daily contact with artisans and manufacturing companies.

keywords: *Industrial, Tradition, Innovation, Lighting Design, Artisanal*

1. Design, innovation and invention

The term design was first used during the Industrial Revolution. The coincidence between design and planning implies that every object that has behind it a feasibility study, that tends to solve problems, that has the intent to improve a daily gesture, that wants to make our life simpler and more comfortable, that optimizes processing times and construction materials, is an object of design. To understand better, we can be helped by the words of Herbert Simon, who has developed the most universally known definition: "design is every strategy aimed at changing the existing situation into a better one". When we talk about design, we must also study the term innovation because we tried to improve every day the machines that were launched on the scene of industry. In analyzing the relationship between design and innovation, we felt it was our duty to make a difference between the concepts of Innovation and Invention, starting with an exhaustive analysis carried out by Thomas Maldonado in his book "Real and Virtual", which states that: "An important point, of which we owe mainly to economists, is to distinguish between invention and innovation. This is a subject first developed by J. A. Schumpeter. For the Austrian economist, not all inventions necessarily lead to innovation, but only the few that manage to survive, to show that they are the most suitable for the needs of innovation. The concept was taken up by L. Georghiou, who contributed with further clarification on the modus operandi of innovation, and on the relationship between invention and innovation. The analysis of the relationship between invention and innovation inevitably leads, as J. Schmookler has effectively explained, to having to make a choice of field with respect to a series of other issues. For example, with regard to the relationship between technical progress and economic growth, between technical progress and capital accumulation, between technical progress and investment policy, between technical progress and economic cycles. Apart from Schumpeter's positions in this regard, we would like to recall those of A. C. Pigou

who, in 1920, had examined, in his book on the Economics of Welfare, all these relations in a perspective in which the theme of invention is always placed in the utilitarian context of a discourse on social well-being. In 1932, J.R. Hicks, with his attempt to classify inventions, opened a new phase in the debate. Economists such as R. F. Harrod, J. V. Robinson, M. Kaldor, J.E. Meade and P. A. Samuelson took part. In the modern world there are many figures of the inventor. For example, there are the great inventors, characters who symbolize the epic moments in the history of inventions. The names are those celebrated in all the stories of technology: Watt, Marconi, Edison and many others. But in the nineteenth century we find the widespread figure of the inventor bricoleur, the inventor who thinks and does it himself, who works with few means and on a domestic scale (Maldonado, 2015: 89). Analysing the relationship between design and innovation and the difference between invention and innovation has been useful to understand the approach that Achille Castiglioni had in his projects. In fact, between the 50s and 70s Achille Castiglioni was the bearer and forerunner of countless inventions and innovations that can be reflected in all his projects. One of his design features was his genius in using low production technologies or in inventing new uses for existing objects, sometimes leading to a conceptual and formal modification.

2. Designers and craftsmen

Craftsmanship has always played an important role alongside design, although the many factors that have distinguished the latter have often had a strong propensity for industrial production, especially in the period of large mass production. From the experience of William Morris in the second half of the nineteenth century up to Theodore Dresser, to Art Nouveau, the entire history of design, but especially of Italian design, has had a strong relationship with the issue of craftsmanship. The relationship between design and craftsmanship has changed and evolved over time: from the demands of the Arts and Crafts, the combination of art and technique attempted by the Werkbund to the Bauhaus, the importance of craftsmanship in Scandinavian design and especially in Italian design that we remember saw in that "third productive force" the real engine of its development. At its birth, design was related to an idea of industry that, although already started on the technological choice, was quite far from the model to which we refer today, resembling very much, for the use of the still mandatory widespread manual skills of man, the craft business. Even this reflection would be enough to risk a possible reconnection between design project and artisan enterprise. It is not by chance that Renato De Fusco, in his treatise "Design and Southern Italy", states that before we can speak of Italian design in relation to the industrial development of European countries, we must speak of a previous history: the history of craftsmanship. In particular, the story that characterized southern manufacturing since 1734, the year in which Charles of Bourbon ascended the throne of the Kingdom of the Two Sicilies, is interesting. For almost the entire Bourbon dynasty, there was a vertiginous increase in industrial production, craftsmanship and the tertiary sector. It's no coincidence that at the International Exhibition in Paris in 1856 the Two Sicilies were the most industrialized state in Italy and the third in Europe, after England and France. However, it was a handcrafted manufacture, made by masters such as cabinetmakers and weavers. From the second half of the eighteenth century to the early twentieth century, Southern Italy was characterized by the spread of neoclassical taste, largely due to the discoveries of Pompeii and Herculaneum. Moreover, that vein of rationality of architecture and ancient art was reflected in the conception and implementation of neo-industrial products. Numerous elements were superimposed on the object. The ornament had an educational and bourgeois propaganda function. From these considerations we can see the passage from eclecticism to Art Nouveau, a complex passage that involves the binomials of craftsmanship and industry; élithel-people; traditional schools and industrial schools, etc.. In late nineteenth century Italy, mass production is ensured by a craft in which the manual work means pure and simple technical backwardness and does not exclude an absolutely repetitive work. They began to prefer an industry in which technical innovations guaranteed more accurate execution and the possibility - at low cost - of producing ornaments. Among the most significant examples of high quality craftsmanship and industry, De Fusco remembers among the many companies, Ducrot. According to De Fusco, one of the cases in which there is a relationship between craftsmanship and designer is when the latter calls a craftsman to make a model, born from a detailed design but also from a complement with a model on a real scale. The case described - think of the wooden models made during the design of cars or other formally complex products - is the one in which the greatest integration between design and craftsman is achieved, even if the latter is at the service of the former. Then there is the last characteristic of the relationship between craftsman and designer: the craftsman puts all his efforts on the object, while the designer puts all his attention on the project. Handicraft is destined to become more and more an "exceptional" work, becoming a genre similar to that of painting and sculpture, aimed at the creation of unique and unrepeatable objects. But a new social need is gaining ground and consists in increasing the production of handicrafts. This, in fact, means that it is no longer worth giving up the unique and unrepeatable custom-made dress in favor of the one produced in series.

Designers and industry

In this section we analyze the role of the designer in building the image of the company. In this relationship many professional links are formed between engineers and designers, architects and entrepreneurs, entrepreneurs and designers, etc. A special case that should be remembered is the collaboration between the industrialists Emil

and Walther Rathenau, who have led the German company AEG since the late nineteenth century, in collaboration with the architect Peter Beherens. From this meeting began the first collaborations between this industry and the designers, so as to lead to the birth of the Deutscher Werkbund in 1907. Led by Hermann Muthesius, this association opens up and feeds a confrontation between the themes of production and design. The aim of the association was to bridge the gap between industry and applied arts that had occurred during the economic development of the twentieth century, proposing a new culture of industrial work. For each project, in fact, production costs, artisan quality, production methods and times had to be analyzed, trying to combine them with company policies. Architect Henry Van de Velde is the first to open a dialogue between the project and the company. The Werkbund model will remain an advanced example of the opportunities for dialogue between design culture and business culture. Another important phenomenon in the history of design concerns the large Berlin-based company Allgemeine Elektricitäts Gesellschaft (AEG). This company realizes the very terms of design phenomenology: design, production, sales and consumption, making it the most successful case in the history of industrial design. AEG produced new articles of clothing, born from new technologies, related to the use of electricity for lighting purposes. One of the most famous products of this company is certainly the incandescent bulb designed by Thomas Alva Edison in 1879. In this company, the work of the designer comes to life thanks to a technologically advanced production made by a continuous cycle, informed by an assembly line and standardization criteria. In Italy, however, between the nineteenth and twentieth centuries, a complete industrial take-off was achieved, lagging behind other European countries. In the early 1900s, two occasions of confrontation were held for the nascent Italian industries: the first was the International Exhibition of Modern Decorative Art in Turin (1902), the second was the International Exhibition in Milan (1906). In this way we witness the start of a system comparable in different sectors with that of other countries, linked to the use of new energy sources, cutting-edge machinery, with a modern structure and division of labor. After the Second World War, Italian industries invested heavily in design. A new professional figure began to emerge, capable of designing objects or communicative artifacts and of following their realization with competence. A figure who acts as a bridge between the needs of companies, who need to sell their products, and the needs and expectations of the public. This dialogue will stimulate the transformation of different areas of Italy from artisan to industrial. Achille Castiglioni in a lecture given at the Polytechnic of Turin in the early '70s, addresses issues related to the awareness of the social role of the designer and producer. Some statements appear as a premise of a continuous ethical research of the project: the user is at the center of the designer's interests. Speaking of the sense of the current relationship between design and industrial production and of the sense of design, Castiglioni states:

"*the client of the industry has understood the need for the intervention of the designer. But there are few cases in which the designer has had the opportunity to intervene correctly, to give a very precise meaning to the design by targeting it to the real needs of users, and not to the profit needs of the industry. The problem of the designer is not only a problem of form and creativity, but also an ethical problem. In this vision, personal creative capacity is overshadowed*" (Castiglioni, 1970: 28).

3. Ready-made or re-used: an artifact in a new context

The meaning that is commonly assigned today to the term readymade is that of a re-use, that is, the result of an action, or a project, that has transferred an artifact, in its entirety or in some of its parts, in a new context, attributing a new function, be it real, technical, symbolic or virtual. A re-contextualization of another material/component, already existing, recognizable, with its own memory and its own experience. An operation that in design today takes on different and interesting meanings. Deepening the research on dictionaries we discover that the English term composed of ready and made, we attribute the meaning of: already ready, already accomplished, old and exploited (H. Collin, 1989), different from our re-use. The original meaning takes us back to Duchamp's ready-made, in which famous works such as "The Fountain", the urinal of 1916, or the "Bicycle Wheel", of 1913, had the aim of communicating the end of romantic art through the use of the "already completed", that is, objects taken from common production that, transferred to art galleries and re-contextualized, denounced the elimination of the individual and artisanal quality of art. Art was already made, already completed, with no room for intervention, except that of transfer. Seen from another angle, such as that of design theory, Duchamp's ready-made represents the elevation of industrial production to the status of major art of the twentieth century. Influenced by the idea of artistic ennoblement, many designers, including many Italian masters, with their products have followed the path of the ready-made. The ready-made in some contexts has become synonymous with breakage and destabilization. It is no coincidence that many young designers look at the ready-made as an alternative media, capable of conveying messages of strong impact. Martino Berghinz (1990), observing the famous lamps of the Castiglioni brothers, such as the "Bulbo" (1957), in which a 1000 Watt industrial bulb was deprived of its technical attack and transformed into an interior decorative lamp, or the "Toio" (1962) produced by Flos, in which the headlamp of a car becomes the light source of a luminaire for interior lighting, but also those of other designers of the 50s, sees in the discreet ready-made of these objects an aesthetic mediation. That is, faced with the need to create a specific aesthetic for new products, in this case lighting, unprecedented in material culture, the use of recognizable components, transferred from other contexts and other functions, becomes a reassuring element, the key to easier public

acceptance of the new product. Unlike the other currents, which in any case arise from a desire to know and interpret reality, the Dada movement is a total challenge to all values, starting with art. It was born in Zurich and the United States with two European painters, Duchamp and Picabia, and two American photographers, Stieglitz and Man Ray. These were the years of the First World War, which, with its production alone, put all international culture in crisis. Art, too, has been in crisis with other values: it ceases to be a way of producing value, it repudiates all logic, it is nonsense, it is produced according to the laws of the case. It is no longer a technical and linguistic operation: it can use any tool, take no matter where its materials. Dadaism proposes a disruptive action whose aim is to put the system in crisis, retaliating against society by its own procedures or using things to which it attributed a value in a nonsensical way. By renouncing specifically artistic techniques, Dadaists do not hesitate to use the materials and techniques of industrial production while avoiding to use them in the usual way. Ready-made is given as having value something to which none is commonly attributed. What determines the aesthetic value, therefore, is no longer a technical process, but a pure mental act, a different attitude towards reality.

4. Achille Castiglioni: ironia as a progettuality method

In Italy, the post-war years represented, as is well known, an extraordinary moment of growth for the Italian economy. It is easy to understand how, at that precise moment in history, new furnishings and tools were urgently needed for a dynamic Italian society that was rebuilding itself after the war. The theme that the architects of those years had to face was linked not only to the quantity but also to the quality of the product in its relationship with the price. The figure of Achille Castiglioni was fundamental to answering this question, both in the field of interior architecture and in that of industrial design itself. Analysing the most significant achievements of Achille Castiglioni (in collaboration with his brother Pier Giacomo) in the years between the second half of the fifties and the early sixties, it is possible to find recurrent methods that distinguish his design work. Irony and curiosity have always characterized Castiglioni's work both as a designer and as an architect. The small-scale design of objects was a constant aspect for the generation of architects who, like him, began to work after the war when there were still no major architectural assignments proper. In Castiglioni's method, whether designing a simple chair or an interior, the way of proceeding does not change. With his functional objects and installations, purist but sentimental, the figure of Achille Castiglioni has contributed in a valuable way to the creation of contemporary design, brilliantly synthesizing the lesson of modernism with the genuineness of that which has come from tradition.

5. Shape and usefulness

The Luminator is a floor lamp designed in 1954 by Achille & Pier Giacomo Castiglioni. In 1955 this lamp was awarded the "La Rinascente Compasso d'oro" prize. Their design method, often characterized by the use of poor materials and shapes and by a new and more functional concept of distribution of the parts, attributes an ironic character to the result of the final project. This procedure has often led the two brothers to re-propose traditional models, even if they have been modified in form and solved more deeply in technical problems. One example of these models is the Luminator, understood as a traditional model of floor lamp with indirect lighting and a fixed diffuser that projects light onto the ceiling (Fig. 1)
In 1926 the architect Luciano Baldassarri called a prototype lamp hanger with the term Luminator. It was then developed in 1929 in two versions, Barcelona and Bernocchi, the latter produced by the Italian industrialist Antonio Bernocchi. Many designers, including Chiesa, Albini and the Castiglioni brothers, took inspiration from this traditional model for their indirect lighting lamps. Luminator boasts two illustrious precedents on the theme of the upward indirect light lamp: the Pietro Chiesa lamp for Fontana Arte in 1933 and the Caccia Dominioni lamp for Azucena in 1948, both played on the design of the reflector that shields and protects the light source. Pietro Chiesa in 1933 designed a version of Luminator that over time has proven to be extremely innovative. Chiesa, in this project, was inspired by the lighting of photographic studios, in which he observed that thanks to a beam of light directed on the ceiling it was possible to perfectly illuminate a room with a diffused and soft light. Luminator is the first example of a floor lamp with indirect emission to appear on the market. Twenty years later Achille & Pier Giacomo Castiglioni designed a new type of Luminator. Their idea was born from the desire to re-propose the classic lighting of the photographers' studios in the home.

He then introduced light into the room, directing a light source, in this case a glass ampoule mirrored towards the ceiling. However, the Castiglioni brothers took a step forward: it was the light source itself that suggested leaving it "naked"; "In fact, at the origin of the project is, again, a novelty in lighting technology: the availability on the market of Philips Comptalux 150 watt lamps with internal reflector mirror capable of conveying the beam of light in a dominant direction and to protect from glare without the need for shielding. Hence the idea of eliminating the metal reflective cone that, shielding the light downwards, concentrated it on the ceiling, a solution that had characterized the original Luminator designed by Chiesa for Fontana Arte in 1937. The call of memory is declared, even in the resumption of the name, but the proposal of the Church is stripped down to the essential".
Designers choose to reduce the constituent elements of the luminaire to the only essential, industrially produced and easily assembled elements: an outer tubular aluminium casing (enclosing the electrical conductor, lamp holder,

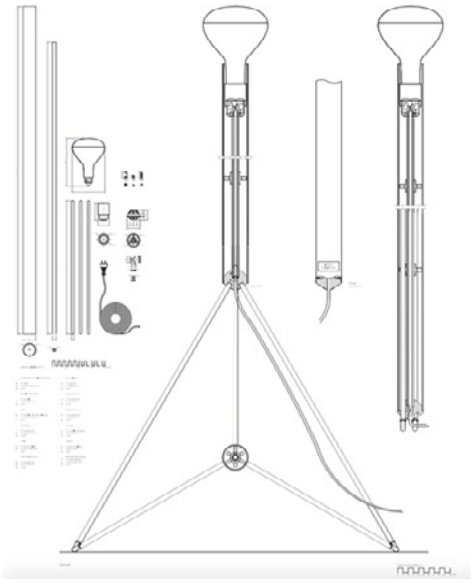

Fig. 1: Achille e Pier Giacomo Castiglioni, Luminator, 1954 (drawings by the authors).

switch, and lamp base) and a thin metal tripod acts as a grounding support. The drum also acts as a packaging, accommodating the three feet for transport. The Luminator is the emblem of Castiglioni's ability to reduce objects to a minimum shape. Designed as an object for mass production, Luminator was initially produced in prototypes by Gilardi & Barzaghi from 1955 to 1957. Soon this Milanese company closed down and the Luminator passed to Paolo Tilche's Ar-form: until 1992, when it became part of the Flos collection, from which, however, less than 600 pieces were produced. Slightly modified in the technical details, it became a mass-produced product with Flos, still in production today.

6. Ready making, the assembly of different components to create new uses and employments.

In the design of luminaires, of course, the main component is the light source. In 1962 a special 300 W car headlamp was imported from the United States, which, being 125 volts, needed a transformer to be able to be used in Italy as well. The essentiality of the shape of this spot suggested to the Castiglioni brothers the idea of the Toio, an indirect light lamp that has the appearance of an object formed by the sum of pieces found: a spot; a curved rod that receives the spot accompanying and exposing the shape; a rod consisting of a metal drawn of hexagonal section; of current production: fishing rod rings to contain the electrical conductors; a simple metal structure that acts as a handle on the base of which is fixed a transformer that also serves as a counterweight; a fixing screw to adjust the height of the rod, with two blades to wrap the remaining cable. They simply use industrial objects already in production, modifying their functions and looking for new applications (Fig. 2).

Fig. 2: Achille e Pier Giacomo Castiglioni, Toio, 1962 (drawings by the authors).

7. Economy, sense, formal reduction, environmental Adaptability

Parentesi is a lighting fixture designed by Achille Castiglioni, from a proposal by Pio Manzù, is suitable for solving a particular need for artificial lighting within an environment. The main requirement was to obtain a light source that could easily move in height and orient it in all directions without any complex mechanism. Pio Manzù responded to this need with a design consisting of a tubular bulb contained in a cylindrical box, which could rotate on its axis and could slide up and down on a forced metal stem between the floor and ceiling. In 1969, at the death of Pio Manzù, the study was carried out by Achille Castiglioni who, through various practical experiments, led to the current final solution.
The solution was to minimize the presence of the metal stem and replace this vertical element with a thin metal rope stretched and fixed between the ceiling and the floor with two screw eyelets (Fig. 3).

An attempt was made to slide on the cable "something" that could easily be stopped at any height of the cable. A counterweight was designed from this idea. This result was obtained by exploiting the tension of the metal rope and causing a considerable force of friction on the sliding element, obtained by the deflection of the metal rope by means of supports of different sizes fixed to the sliding illuminating element. Later on he decided to make this element as simple as possible by sliding a shaped rod in order to obtain the expected friction. In order to have a source that could be oriented in all directions, the designer thought of a spot light bulb started by a normal standard lamp holder with built-in switch, all within a rubber support with a metal core inside to obtain a vertical rotation and with a cylindrical joint that would fit into the shaped metal rod able to obtain a horizontal movement. Finally, an unstable floor suggested the possibility of not being fixed to the floor, but of keeping the metal rope taut with the help of a weight. A tensioner was inserted along the cable to allow the user to adjust the length of the metal rope according to the variability of the distance between the floor and ceiling. The design of this device did not end with the conclusion of the finished object but the architect/designer Castiglioni decided to also design the packaging which was resolved with two shells, in plastic material, of the same shape as the shaped tube, one of which was transparent, which allowed to show inside all the components of the device. This lamp has been obtained by a careful and scrupulous design reduced to the essential, reducing production costs, increasing functional performance and has formal values of the highest quality that make this product a true object of Industrial Design.

8. A reading junction

Grip is an object that strips itself of the heavy bases, the swollen stems, the voluminous lampshades that obscure the light. The lamp stripped away its arms and the suspension tubes became thin: the reflectors were reduced to small elements that supported the bulb and oriented the luminous flux. But always, the point from which the light radiates is left uncovered: the bulb is no longer the functional part, ugly, to be hidden, but the element around which the design of the entire luminaire hinges. The artificial light source bulb imposes its own law. It looks like a microphone, but instead it is a floor lamp with adjustable light. It is called Grip "knob", designed by Achille Castiglioni for lighting relaxation areas or for reading, produced by Flos in 1985. Composed of a painted steel base, a rod rises slightly inclined in the air and ends with a sort of protruding cardan joint. This two-tone "gyroscope" connects, on its own axis, two strongly characterized elements and allows the orientation of the light source according to the individual needs of reading. Below, a "microphone" houses the spot, screened and concentrated incandescent bulb to provide adequate light, without disturbing other people who may be present in the same room. Diametrically opposite, a "knob" - formed by a plastic coated tube - ends with a rotating snap switch, which is an object to be held with one hand to naturally orient the beam of light in the most appropriate way. Still a wise and easygoing assembly, impeccable in its functioning but allusive and disorienting in its appearance. This luminaire takes up many aspects of the Ready Made because it reuses many elements with different functions, for example the switch is taken from a rubber hose used for irrigation of the garden. In addition, the lamp holder and the switch are joined by a special gyroscope that allows a rotation of the light beam to 360 °. Currently, Flos no longer produces this lamp because they have not carried out a good advertising campaign and as a result have found few sales (Fig. 4).

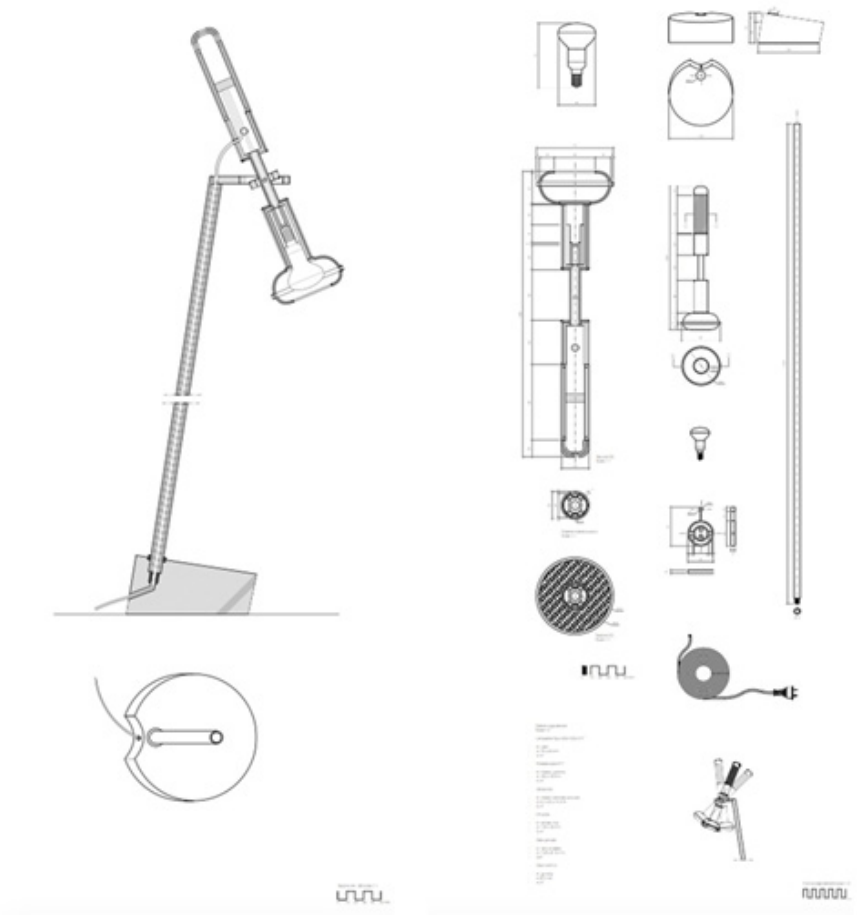

Fig. 4: Achille e Pier Giacomo Castiglioni, Grip, 1985 (drawings by the authors).

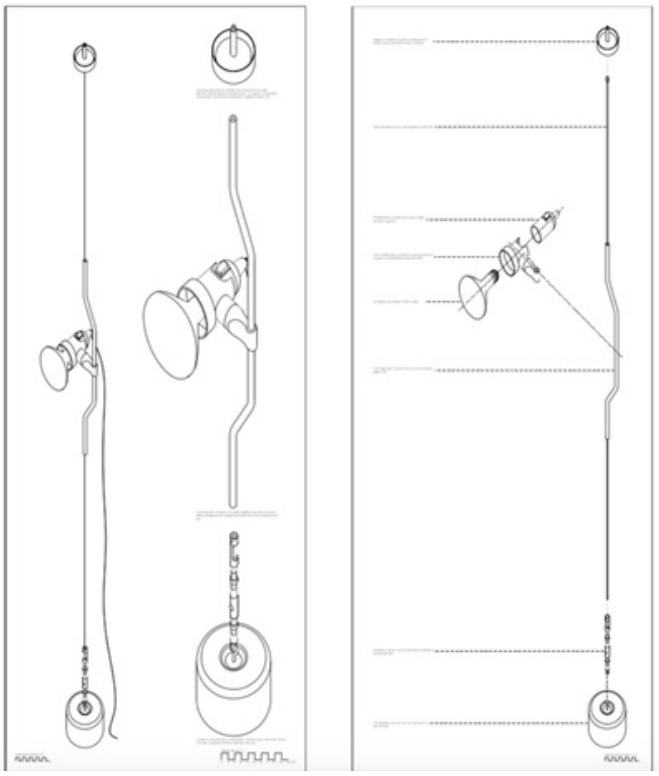

Fig. 3: Achille e Pier Giacomo Castiglioni, Parentesi, 1970 (drawings by the authors).

9. A ready-made experience: the design of the Apollo 11 Lamp

In this Thesis Laboratory, a wide-ranging research was carried out on various themes that embrace lighting design. As already mentioned, we started from the concept of design between tradition and innovation, studying the relationships between designers and craftsmen, designers and industry up to the "ready made", a recurring theme in the projects of Achille Castiglioni. For this reason it was decided to analyze, study and deepen his design method, characterized by continuous research and experimentation on new forms, new materials, innovative technologies, and a continuous contact with craftsmen and companies. Another characteristic of Castiglioni's numerous projects is the reuse of common objects, transformed to obtain a new function. Part of our thesis work focuses on "ready made", a key element for the selection of the lamps analysed. Finally, following the formal and technical principles at the base of Achille Castiglioni's method, we have created a lighting fixture that refers to the lines and language of the Architect.
For the design of our lighting fixture, we started from some of the Master's many precious sketches. In particular, we read and reinterpreted design sketches for the Grip lamp and the Toio lamp.
During our research, analyzing the Castiglioni brothers' lighting fixtures, in particular the floor lamps, we noticed that these were mainly made up of three elements of space such as: base, body and source. So we created a floor lamp that took up the technical and formal principles of their projects, especially the lamp Toio. These reflections gave rise to the Apollo 3 lamp. It is a lighting fixture formed by a base composed of a cylinder in Apricena marble, a curved iron rod (similar to that of the Toio) at the end of which is welded a second angular iron rod. The body is made up of a microphone shaft, which symbolically recalls the theme of ready-made and the shape of the Grip lamp. Finally, at the end of the rod is the source that, through a joint, "occupies" the position of a microphone. It is an LED bulb with an incorporated reflector. Thanks to the microphone holder and the movements of the main rod, the source can be oriented in different directions. In fact, this device can be used both for reading and to illuminate an environment like a classic floor lamp. Finally, with regard to the choice of the name, we decided to call it Apollo 3, where for Apollo we refer to the mythological god of the Sun, 3 is the number of elements of encumbrance (base, body and source) and overall this lamp reminded us of a "spaceship" from which was born the call to the space mission Apollo11 (Fig. 5).

Fig. 5: Apollo 11 Lamp (Design by R. Difonzo, C. Roca, A. Santeramo, G. Totaro; Supervisor: V.P. Bagnato).

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Philosophy And Objects

Moderators: **Stefano Romano**

TThe subject and the object have always been at the center of the discussions of the philosophers of all time. Understanding the similarities and differences between one and the other means reading reality, understanding how we perceive it, what our points of view are on identity and things. According to the German philosopher Hegel "rational is real and real is rational". Rationality must confront with reality to be true, and therefore reality is what it's understood and defined by rationality. There is nothing in objective reality that thought cannot elaborate intellectually. The relationship then, between subject and object is based on their mutual distinction between what concerns rational activity and objective materiality, but between these two terms, in Hegel, there is no longer opposition but complementarity. The subject is such because it can relate to the object and the object is such because there is a subject that considers it. In other words, our relationship with the external world also gives rise to an understanding of it, so we are the ones to give meanings to our surroundings, be it natural or artifact, but can the object change meaning according to who looks at it? Can the object somehow escape its conceptual standardization? That is, lose the function which was created for? Can its geometric structure be the subject of a conceptual and physical transformation? Can we overturning Hegel's concept, thinking that what has been defined by our intellect can have a real life even escaping its control, entering the world of the irrational, of the non-functional, of poetry?

Sessions: Non-standardization: *The first session of this section invites papers that reflect on the idea of non-standardization, that is on the possibility that the object loses its idea of standards and becomes "unrepeatable". How can the object in the era of its technical and technological reproducibility still be "unique"?*

Geometry: *The second session invites papers dealing with the structure of the object, geometry as a molecular structure, capable of transforming the object of use into a poetic object. Can we modify the geometry of objects, thus also modifying the rational approach to them?*

Material: *The third session invites papers that reflect on the material as the subject of the object. Can we use materials in a way that the object they shape, becomes a subject? That is, that can give us an unexpected and poetic point of view on reality?*

Up Close and Far Away: *The fourth session invites papers that reflect on the object as a subject of our memory, capable of establishing a two-way relationship and creating emotions. Objects can become subjects when they are symbols that are when they contain within themselves the memory of an emotion, or a thought when they become "totem".*

Play: *The fifth session invites papers that take into consideration the game as the final function of the object, we are not talking about objects born to be toys, but objects whose original function was other, but which find their definitive identity precisely through an unexpected, playful use. The game has the opportunity to talk about serious problematics, using an immediate and at the same time profound language because it touches our most archaic part, that of the child we all were.*

[PO/01]

Peripheral Vision in Architectural Experience

Keti Hoxha[1]
1. POLIS University, Albania

The architectural experience is multi-sensory and goes beyond the classic five Aristotelian senses categorization. In this complex perceptual processes are involved other peripheral senses, which deal with the movement, orientation, balance, temperature, etc. The given input is the sum of the gathered stimulus from all the sensorial entity. We cannot detach these senses from one another from their importance for obtaining the architectural experience. Though, it is undeniable the importance and the high amount of the input obtained by the visual sense, by which the human gets the first contact with the encountered objects and spaces. Furthermore, by this information, the perceiver obtains the first atmospheric sensation of a space followed by specific psychological states.
Though vision depends on the level of attention and occasionally may lead to illusive or distorted perceptual outputs, it remains as the sense by which we obtain the most information from stimulus gathered from an environment. From the biological aspect, the eye is a complex organ. Visual acuity is composed of the central vision or focused vision, which is what we directly see; and peripheral vision, which is everything that we experience in the visual field. The peripheral vision is responsible for environment learning, scene recognition and perceiving atmosphere in architecture. The aim of the present study is to understand the important role the peripheral vision plays in experiencing architectural environments and proposing architectural cues on how to design considering this type of visual acuity in mind.

keywords: Perception, Peripheral Vision, Visual Acuity, Scene Recognition, Architecture For The Visually Impaired

1.Introduction

Visual perception is strictly depended on the physical condition of the visual system, brain, and body. The physiology of the eye is quite complex and its visual field has a divided nature, which is composed of the central visual field (focal vision) and the peripheral visual field (ambient vision). The collaboration of these two ensures more exact visual information. Physiologically and morphologically they differ from one another and as a result, the central and peripheral vision function differently. Therefore, there is a functional distinction map in the visual system: the focal mode and the ambient mode corresponding to each of the visual fields. In architecture, the focal mode is crucial for architects while they design spaces with this mode in mind, concerning mostly about the focal vision rather than the peripheral one. There is scientific evidence that through peripheral vision we obtain the complete architectural experience of a space and its atmosphere. This research aims to analyze how architecture is experienced through our visual system, focusing on the importance of the peripheral vision. The main raised question is how visual field enhances the quality of architectural experience, taking as a case study a group of people with focal vision deficiency. Furthermore, the purpose of the research is to suggest architectural solutions which augment the architectural experience through peripheral vision. The research method examines theories

from other disciplines, such as Ophthalmology, Physiology, and Architecture.

2. Methodology

1.1 Central and Peripheral Vision

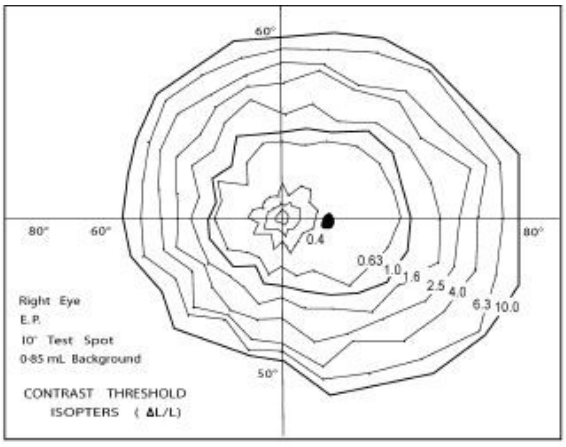
Architecture is manifested as a visual discipline since we appreciate, judge it visually through drawings and photography. We tend to admire buildings mainly based on visual appreciation rather than emotional evocation. Nevertheless, architecture goes beyond visual aesthetics. It is the architectural experience that matters which is obtained through all of our senses and body movements. Despite the fact that all these components are essential to perceive, vision facilitates the process of analyzing the environment and remains as the sense by which we gather a considerable amount of information. Through these inputs we are capable to observe and analyze the environment; orient ourselves and move in space; therefore experience the architectural atmosphere.

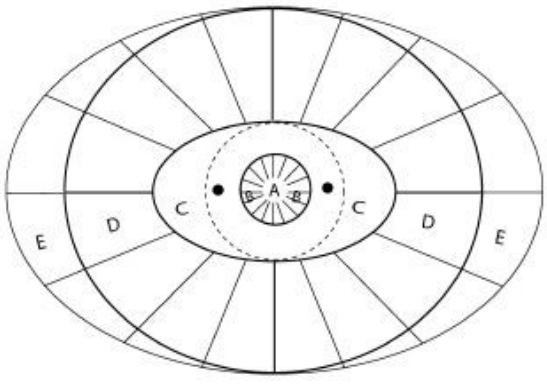
Through vision is obtained the first interaction with the environment. In a record of time, we are capable to detect contrast differentiations and movements. Our visual system allows us to locate and identify objects, people or obstacles. While we are presented with an environment, the eyes start looking for visual points of interests to focus on. For this process several actions are performed on each segment of space such as eye movements, head rotation, body movements, which establish the spatial representation of the environment. Vision is not only important for the gathering of the visual hints but is crucial for body posture and movement, which indicate the manner we orient in space. The neural fibers that connect the eye with the brain interact with the inner eye which is responsible for the balance.

The process of visual perception undergoes two steps: Firstly, light emitted from objects is sent to the retina and secondly, the retinal image created is interpreted by the neural system. Visual perception is directly depended to the activity of the visual fields. The presence of two eyes and eye movement (saccades) give us the possibility to see three-dimensionally. The brain combines the data collected from the two eyes to create the perception of depth. Each eye has a visual field of approximately 90˚. The dimensions and distribution of photoreceptors are not homogeneous on the retina, while the concentration of cones decreases rapidly with retinal eccentricity. Because of these differentiations in the physiognomy of the eye, the visual fields process differently the information resulting in visual acuity differences.

The monocular visual field consists of the central visual field and the peripheral field. The central fixation includes the 30˚ of vision and the peripheral one extends 100˚ laterally, 60˚ medially, 60˚ upward and 75˚ downward. (Spector, 1990) According to the representation of the visual field by Pöppel and Harvey (Warren & Wertheim, 1990), the visual field is composed of five regions: a. the fovea which shows the highest photopic sensitivity (of the bright light which stimulated the perception of colors); b. the perifovea with a radius of around 10˚ where photopic thresholds increases; c. a performance plateau extended to around 20˚ vertically and 35˚ horizontally; d. peripheral field where thresholds increase up to the border of binocular vision; e. monocular temporal border region.

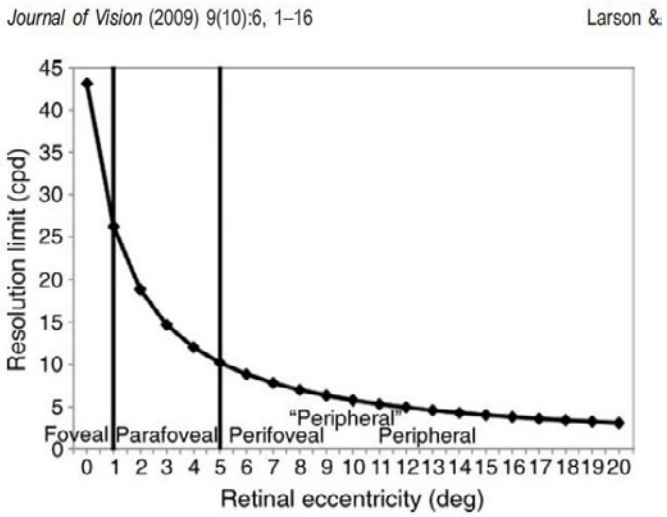
The main division of the visual fields according to the level of detail of information is: foveal, parafoveal and peripheral, where the highest point of visual resolution is concentrated in the foveal vision, which corresponds to focus vision, part of the central vision, and is responsible for the visual target processing. The resolution slightly





decreases while extending to the parafoveal field and reaches its lowest levels in the peripheral field.

The role of central and peripheral vision is crucial for scene gist recognition, which is the content of the scene and is necessary for the development of spatial representation. Visual fields respond differently to spatial recognition



due to the differences found from the physiological aspect. The central and peripheral visual fields differ in terms of the cortical representation in the primary occipital cortex. (Horton & Hoyt, 1990). Changes or loss in these areas lead to sensorial deficits altering the spatial representation's development. The central vision (foveal and parafoveal) provides the recognition of detailed information of objects in the surrounding environment, such as forms, shapes, contrast, and color. Whereas the peripheral vision is responsible for the processing of spatial relations, actions, movements and navigation in the space. Through this visual field, the surrounding is visually perceived as a whole environment and not as separate objects. This is due to the fact that in the peripheral vision there is only one single cell (mango ganglion) connected to many other receptors, leading to lower visual information. Nevertheless, this cell has a thicker and larger myelin sheath (which allows electrical impulses to transmit quickly and efficiently along with the nerve cells) and as a result, have a higher information processing speed. Furthermore, this means that peripheral vision is much more effective in detecting motion, such as changes in light, quite important for spatial perception. The peripheral visual field supports the processing of spatial relations, actions on objects and navigation of the environment. In this field is found the area PPA (Parahippocampal Place Area) which responds to places more than objects, people or faces. This area in the brain recognizes scenes and analyses the spatial frequencies' configuration.

Larson and Loschky (Larson & Lochky, 2009) showed that peripheral vision contributes more than central vision in obtaining maximum scene recognition accuracy. However, central vision is more efficient for scene recognition than peripheral, based on the amount of visual area needed for accurate recognition (Wang & Cottrell, 2017). Therefore, the peripheral field is responsible for perceiving the location of the whole composing elements of the environment rather than focused objects. From this aspect, it is necessary to analyze the important role this visual field plays in the architectural experience and also taking it mostly in consideration to create architectural works.

2. Peripheral Vision in Architecture

In a building environment the visual scene is a set of geometrical composition and proportion of objects obtained by the visual fields. By all means proportion depends on geometry and distance of the observer's position with objects. In architectural spaces the visual scenes are categorized in three levels, depending on the level of input obtained from the visual fields and defined by upper and lower limits that correspond to the peripheral vision. These frames in the visual scene are found vertically and horizontally, and correspond with the first two categories: Firstly, the surfaces located at the bottom of the visual scene, such as the pavement and secondly, the surfaces at the top of the observer's position and seen from below, such as sky domes. The third category is the visual central stripe which corresponds to central vision, and the visual scene are the vertical surfaces perceived, such as facades. This level is the most important in analyzing the environment in level of details, however peripheral vision is crucial for developing scene "gist", which has a significant importance in spatial perception. Scene "gist" is the meaning of a visual scene. The recognition of scene "gist" is the activity by which the observer perceives the context of surrounding environment. It is realized through the activation of several scene schemes which later affect critical cognitive processes, such as directing attention within a scene, or facilitating object recognition and long-term memory for objects within a scene. By all means, this important process is not only obtained through vision but also through body movement, which is essential for the embodiment of space in a three dimensional

way. According to Pallasmaa, architecture is not a series of images, nor visual units and Gestalt; also the interaction between sensory-motor and memory is crucial to perceive architecture: "*Our image of the world is held together by constant active scanning by the senses, movement, and a creative fusion and interpretation of our inherently fragmented percepts."* (Pallasmaa, Space, Place, and Atmosphere: Peripheral Perception in Existential Experience, 2014)

While walking or driving we mainly use the peripheral vision to avoid obstacles. During this process, we concentrate in specific objects through the activation of focused vision, such as street walls, pavement or other obstructions in order to gather the layout of the scene through peripheral vision. On the other hand, peripheral vision is responsible for creating a coherent mental representation of the spatial relationship between objects in space. Firstly, because structurally peripheral vision covers most of the visual field and secondly, the biggest amount of information from the spatial scene is obtained by this field, sending signals to the brain where to activate the focal vision for the identification and localization of objects. 1

Peripheral vision has a significant importance in relating ourselves into space even if we are not fully aware of. It is related to the atmospheric awareness since it provides the most of the information. There are two functional distinction maps during the visual process: the focal mode and the ambient mode. The focal mode is activated from the central vision which focuses on the objects and the interaction with them. In here attention is activated and as a result, predominates the conscious vision. In this mode is obtained the "intellectual architecture experience" which is the process of analyzing the composing elements of a space as individual objects. This process is characterized by high vision acuity, which means there is a high resolution in vision and a high level of performance of resolving fine details. This means that architectural contrast in material, texture, patterns, light and color is more sensible in central vision.

The ambient mode is activated through peripheral vision where pre-conscious vision predominates and "atmospheric awareness" is activated. This visual field responds to the processing of the environment as a big picture rather than to objects. Seeing a building from a photography is quite different from experiencing it in the visual point of view. The picture below on the left (Figure 1.1) shows a photography of an environment from a photography and Figure 1.2 on the right shows the information degradation from the central to peripheral vision, where is visible the differentiation in resolution, and presence of chromatic errors, refractive errors etc. The changes between central and peripheral vision are morphological and physiological. In peripheral vision the image is in a low resolution, appearing as blurry. Perception of luminance and colors is much lower in the peripheral vision, leading to reduced ability to resolve high spatial frequency color. Some colors can be visible till 60˚from central vision (Naïli, Despretz, & Boucart, 2006). Peripheral vision is more sensible to movement and velocity, meaning that performs better in detecting motions and spatial frequencies, which are useful to perceive the edges of forms.

These differentiations in visual acuity from focal to peripheral indicate also that visualizing an environment from a photography or from sequences of spaces is totally different from being inside it. We cannot experience

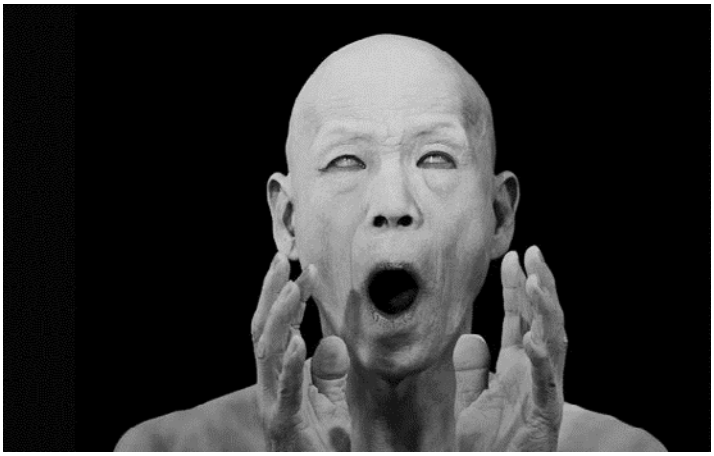
a building only by sequences of photography. The architecture photography is not a reliable witness of true architecture quality.[1] When we are inside a building the ambient mode is activated through peripheral vision and the surrounding visual environment will impact our posture, movement, navigation and mood. Peripheral vision envelops us and make us feel present in the flash of the world. Peripheral vision and echolocation cause space to open around us (Pallasmaa, The Eyes of the Skin: Architecture and the Senses, 2012). Perceiving atmosphere leads to the embodiment of space due to the fact that this visual field is connected to a unique circuit in the brain responsible for controlling movement, emotion, attention and decision making. Researchers have proven that peripheral vision has an immediate, direct impact on what we're feeling, how we're moving and how our central vision responds to different visual triggers (Walter, 2011). When we enter in a space we firstly perceive unconsciously the atmosphere and ambience rather than specific details. It integrates us in space through the

1. Gaston Bachelard

movements, while the focused one disconnects us from space providing more connection to specific objects perceived. As a result the sensation of participation in space of the moving body is present.

This aspect is not only important when we are dealing with architectural experiences but also in other disciplines, such as the Japanese Butoh dance, in which peripheral vision is an important aspect for their performance and it is deeply related to body movement. In Butoh dance there is seen a tendency of underrating the sense of vision, specifically to the central vision. This is evident in the rolling of the eyes, leading to a diffused vision. Mirror is not part of the training because the reflection of the body obtained by the focused vision might influence the movement of the limbs. The dancers concentrate mostly to the peripheral vision in order to perceive differently from what we perceive normally. By using the peripheral vision the dancers remain opened to their surroundings, diffusing the extends of the external world, in order to better perceive space. Relying to the peripheral vision enlarges the fields available to perceive of the external world. Osuga: "In the West, ruled by Christianity, a bird's eye view is common like the ascension of Jesus Christ, who viewed the world from a vertical standing position, while in the Orient of Buddhism, an insect's eye view is common, like the Reclining Buddha as he died surrounded by his disciples, a lot of animals, insects, and other creatures. The West, which views the world from outside, and the East, which is inside the world, have totally different vectors of the world." By employing the peripheral vision, another ability can be acquired, the ability of seeing void space, the space that is left behind. This is an alternative form of perception of Butoh dance.

Peripheral vision encourages us to experience indirectness, implicitness, embodieness, flow, harmony and depth. It involves engaging with the notion of between-ess, and requires calm attention and contemplation rather than



sudden shock of sensation, impression or excitement.[2]

Since the information obtained from this field deals with the atmosphere and architectural experience, becomes crucial for defining the quality of a space. The lack of consideration of the ambient mode or atmospheric awareness in architectural spaces leads the users to the feeling of being outsiders rather than being part of it.

In a space or building the atmosphere is the first we perceive. The creation of atmospheres is much more visible in arts rather than architecture which is mostly concentrated on the functional use and circulations rather than the atmospheric awareness. Specifically, there is a correlation between architecture and cinematography while buildings and city spaces serve as filmic device and visual fields give and take information. An example where this interaction is evident and peripheral vision is more activated is the set design in "Dogville" movie by Lars Von Trier. Firstly, the scenery of the film has the nature of a theatrical performance rather than a film, due to camera filming in a conventional manner in one interior and using medium and general plan, where more than one subject is on focus. As a result, the spectator choses the focus. Secondly, the simplification by eliminating distractions of the background facilitates the process of reading the information of the foreground through peripheral field. The walls and other barriers are not present, leading to a wider visual scenery for the peripheral field. A few hints are used to create the atmosphere, such as houses are symbolized by unique elements leading to better identification and orientation.

Aside obtaining the atmospheric atmosphere, the peripheral vision has a high impact in our everyday life. For instance, in web-marketing methods to draw attention to people are used while stimulating peripheral vision. This is seen in the appearing position of the pop-up advertisements, which generally is the contours of the computer screen, where the peripheral vision can read the motion and shift the focus to the advertisements. Other context where attention shift due to the peripheral field is seen in the most common environments, such as working

2. Iain McGilchrist

Fig. 3 Dogville set, Lars von Trier, 2003

areas. Focus vision is highly active while working on computer screens. If the workstation is positioned on the side of entrances or exits, which is the area with more frequent circulation, concentration will be disturbed and as a result the working performance will not be effective. Therefore in order to provide efficient working performance it is required to avoid such peripheral disturbances.

Peripheral vision can define the level of intimacy in spaces we frequently use, through processing the spatial organization of the space and light contrasts. In a bar or restaurant, apart from its primary function, this sort of space needs to provide comfort through the level of intimacy and privacy. Thus it is necessary to reflect this through making the neighboring tables for each table less visible for the peripheral fields. This aspect might define the distances of tables from each other and along with it the amount of artificial and natural light. If we consider the light, it is important that the luminance level should be focused on the table and the persons which are seated together and the dimmer light in areas of circulation in order not to have peripheral disturbances and along with it a high intimacy level.

In people with Macular Degeneration, peripheral vision is crucial for the spatial navigation. In Macular Degeneration is caused by the damaged macula, which is located in the back of the eye and is responsible for the central/ focused vision. This impairment inactivates the cells in this area through affecting the retina, resulting in blind spots and distorted central vision. The symptoms of this visual impairment are the degradation and shadowing of the central vision, distorted vision that causes difficulty doing actions that involve the activity of central vision, such as recognizing faces, driving or reading. The blind spots appearing in the central vision bring out also difficulty to see textures or even differentiating colors, since we mentioned before in this paper that peripheral vision is not very capable to distinguish mixed colors. Troubles for adjusting to light changes, light contrasts and decreased depth perception. People with this visual impairment are affected by the scotoma condition, which means that concentrating in seeing an object they find it hard to understand the object, due to the degradation of the central vision. The scotoma condition only allows you to see what is in your peripheral visual field (Larson & Lochky, 2009). In this condition when objects are longer exposed to the peripheral vision, they appear smaller and compressed in shape compared to central vision (vertically and horizontally). (The perceived size and shape of objects in peripheral vision). If the peripheral vision would be damaged, such as in the case of glaucoma, the objects would be identified but there would be difficulty with interacting with the objects. Furthermore visual impairments that have peripheral damage or window condition face dramatic problems in recognizing the scene gist, or spatial representation. In this cases (glaucoma or retinitis pigmentosa) mobility issues appear, where in static equilibrium patients with poor peripheral vision have a better quality of somatosensory compensation, but have a tendency to maintain equilibrium leaning forward and increasing the risk to fall down. Furthermore this condition leads to less accurate learning of large-scale spatial layouts than normally sighted individuals. The environmental layout as mentioned before plays a crucial role in visual and spatial learning. The spatial perception deficits often are a result from peripheral visual loss (Turano & Schuchard , 1991).

In these cases the quality of spaces directly depends on the peripheral vision and how much a space involves a person in it. As a result, spaces should reinforce the importance of this visual field especially in the case of the persons with macular degeneration. The spaces should have characteristics to meet all the users' needs and making them part of the build environment. Poverty of our peripheral vision in buildings alienate us (Pallasmaa, Space,

Place, and Atmosphere: Peripheral Perception in Existential Experience, 2014). Finally, this case demonstrates the necessity of peripheral vision in spatial recognition and orientation.

3. Conclusions

Vision is the sensory by which we obtain the biggest amount of information. It has a crucial effect in perceiving the atmospheric character of a space and this is provided by the peripheral vision which is responsible for spatial recognitions and scene "gist". This deals with several processes such as: perceiving each object and their spatial relations, maintaining memory traces over time, etc. Without this field the interaction with objects and spaces is quite difficult and as a result affects the architectural experience. It is important to design new spaces taking in consideration this visual field more than focused vision to provide more atmospheric, accessible and inclusive spaces for all.

Peripheral vision should be considered in order to provide a better orientation in spaces, . This can be achieved through the use of rhythmic repetitive and intuitive visual cues to allow the peripheral vision to work effectively in orientation. This can be obtained through the use of large scale way finding strategy points of references, such as the use of structural or architectural elements with a calculated rhythmic distance. Large scale objects are important especially for individuals with only efficient peripheral vision, since the use only of this field leads to viewing the objects smaller than they are and distorted. The use of color can work as orientation quite well, by highlighting emergency elements with color in order to have emergency circulation accessibility for all the users. In extreme periphery human color vision is predominantly blue-yellow, so it can be much more effective the use of these colors. In this way a way finding system is created with points of references.

It is scientifically proven that even in normal sighted individuals the transition of vision from central visual field to peripheral field leads to illusions and vice versa, so the use of complex patterns on the walls, or even materials with complex texture can be minimized in order to avoid these illusions. Wall and floors should be of materials that are capable to vibrate and in this way other sensory is used as an orientation clue, such as hearing and touch.

It is important for a space to provide transparency in spaces that tend to have a public character and where emergency accessibility is close in order to provide visual connectivity and safety. Transparent materials are necessary in order to extend the use of the visual fields through reflections which can enlarge this field of vision through monitoring the environment 360˚to avoid collusions around corners and also alert the individuals while others are approaching him. Furthermore transparent materials provide also indirect light inside spaces and avoiding shining light. The differentiation of light contrasts are inappropriate and can lead to disturbances of vision. The most important effect to be considered is the one created by the relationship of light and shadows or art of chiaro-schuro leading to atmosphere and ambiance in a space, such as using openings in the ceilings where light hits the wall.

In this aspect it is also important to consider as architect spaces where we predict the positioning of furniture, not only as in the cases of the office or restaurants, but also spaces where human interactivity aims to perform. The positioning of chairs aside to each other according to the scheme above is quite important for human interaction, to be fully aware of the presence of the other and his gesticulation but also activating eye contact between each other.

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[PO/02]

The design of connections : movement, modification and dynamism of the table lamps

Gabriella Lopuzzo[1] **& Irene Tedesco**[1]
1. Polytechnic of Bari, Italy

The table lamp represents probably the most complex typology of lighting device because of its double function of illuminating the (working or living) space efficiently and functionally, and of establishing a physical relationship with users through its systems of handling. The structure of the lamp has always joints, articulations and mechanism which may take different configurations in order to orient it and to allow its movement, modification and dynamism.
The different handling systems of the table lamps, attributable at least to three main morphological categories (counterweight, spring and hinge), define different config- urations not only in their use but above all in the relationship between man, artifact and environment.
The always changing relationship between man, artifact and environment could be analyzed considering the concept of 'connection', in three different interpretative variations: connection lamp/lamp (morphology, structure, form); connection lamp/ man (handling, modification, dynamism); connection lamp/environment (materials, production, processes).
Starting from this, the paper aims to analyze the idea of connection applied to the table lamps though a specific study on the work of the designer Joe Colombo. In par- ticular, taking into account three lamps having in common a deep semantic reflec- tion on the dynamic relationship between form and structure ('Domo', 1965; 'Spider', 1965; 'Topo', 1970) and presenting a concrete design experimentation inspired by the work of Colombo, the paper finally offers a theoretical contribution to the topic of the 'design of connections', in the framework of the more general investigation on the lighting design carried out at the Polytechnic of Bari.

keywords: *Lamp, Form, Structure, Lighting Design*

1. The table lamp: the form of complexity

Alberto Bassi, in "La luce italiana", writes that "The design of the luminaires lighting is presented as an articulated sector, with strong interactions between design and production skills, which require a reading capable of standardize aspects of invention, design and technology "(Bassi, 2000).
The table lamp, a type of direct light that directly affects surfaces and / or objects of the room, in particular the studio and work room, is the type of lighting technology more complex.
It has the task of illuminating the work space in efficient and functional way and for this reason it is equipped with movement that allows you to orient it to have a more precise and exhaustive lighting: but not only, because the light must be designed for humans, so the table lamp can also create situations in which light guide the observer in an "assisted" perception (Fig. 1).

The handling is possible thanks to the joints present along the structure of the lamp, which make it more laborious from the point of design and production, but more functional with regard to use.
The joint can take different configurations depending on the type of appliance: in applications that require precise aiming of the light beam, as in lamps concerned, it must allow a continuous and gradual rotation.
There are many types of structures that can be identified as: structure with counterweight, structure with spring, structure with simple hinge. The conformation it can influence the type of joint and therefore the different possibility of movement of the lamp. The structure with counterweight and the one with spring have suitable elements that allow the static performance of the lighting fixture. The handling is therefore conditioned by these elements.
The simple hinge increases the degree of freedom of the lamp. In this way it can be oriented in different ways without the influence of construction details.

Fig. 1: G. Balla, Lampada ad arco, 1909, MoMa, NY.

2. Handling, modification and dynamism

The handling is an important feature of the table lamp, which involves the modification of the configuration of the artifact-lamp structure. The adjustability of the luminous flux through the dynamism of the structure allows to satisfy every user requirement.
There are different similarities between the concept of movement, modification and dynamism of the table lamp and some artistic thoughts of the Avant-gardes, in particular with Cubism and Futurism.
The function of a machine is the work it produces; functioning is the coordinated movement of its devices. The need to develop the functionality of art is part of the general tendency of the company to realize maximum functionality.
You try to reform the internal functioning of the structure in order to be able to propose it as a function model: the value of the work of art is no longer recognized, but only the demonstration of an exemplary operating procedure or a process that involves and renews the experience of reality. The transformation of the system or the structure of the art from representative to functional is carried out.
The first analytical research on the functional structure of the artwork is in Cubism. The aim was to make the painting an object-form having its own autonomous reality and its own specific function; an object in itself, with its own structure and its own functioning. They are objects of which it is well known form and the mechanism must fit and function in the context of the usual experience. The form is considered as an integral part of the reality of the object.
Why admit that, among the infinite possible configurations of the object, one is the “true” form and all other occasional variants, depending on its “revolutions” in space?
The forms of the object are as many as only the sensations that can be received from its changing situation in space and in light and there are no “revolutions”, but continuous and unpredictable movements so the object as of space, the artist, the viewer.
The dualism of object and space is resolved in the physics of movement. Space and object are not two definite and immobile entities that move when they relate to each other: they are two systems in relative motion, and what we see is not a form already immobile and then decomposed and recomposed by a rhythm of motion, but it is the very form of motion.
Light represents the purest form of energy and the extreme limit of speed and it is at the center of the futurist imagination.
If the effects of light are among the recurring themes of Futurist literature, obviously it is above all in the visual

arts that interest in light is dominant: no longer to capture the atmospheres en plein air as in impressionism, but just for its dynamism energy.
Painters concentrate on performing the decomposition and interpenetration of objects, for the simultaneous action of light and speed.
Together with the representation of movement, the study of light and its effects magnetize the attention of futurist painters. Balla has the taste for experimentation and the gift of brilliant intuition: from the study of the synthetic representation of motion, of cosmic dynamic rhythms, independent of the moving object, it passes to that of luminous vibrations. Fascinated by light, he makes it one of the fundamental subjects of his figurative and abstract painting.

3. The concept of connection: a design interpretation

We have seen how the word "connection" is closely linked to design and in particular the table lamp. Three interpretative declinations of the concept of connection starting from the lamp-lamp relationship that results in hubs that it owns.
These have the role of connecting the various existing elements, like the base, the arms and the reflector, but also the role of making them mobile and adjustable.
In this way the table lamp will not have a single configuration, but will be able to move by changing its appearance according to human needs.
The lamp-man connection is instead understood as the interaction between the object lamp and the hand of man: it is the user who through a tactile relationship with the lamp creates its different formal configurations according to its needs. In this way the user has direct contact with the object and this latter becomes an extension of the hand of man.
Finally, the lamp-environment connection develops taking into consideration the material with which the lamp is designed and produced. We go to consider one eco-sustainable vision of the object by assessing the environmental impact of the processes of production and life cycle of the table lamp. The development of the three types of connections comes from a structural analysis of several famous table lamps, which focused in particular on aspects such as: type of structure, complexity of the joint, functional element present on the lamp to favor the grip and therefore the movement, material and sustainability of the lamp, production process and life cycle of the object.
Connection lamp-lamp

Table lamps have different types of structures. We have been identified three: counterweight, spring and simple hinge. The first is equipped with elements at the ends of the arms that give greater balance when the lamp takes on a new configuration. In luminous appliances equipped with the second type of structure, the various elements are connected both by joints and springs, which make the lamp stable during movement.
In both cases different degrees of lamp dynamism are allowed, but limited compared to those of the simple hinge structure. There are different types of joints that allow multiple types of movement: rotation in space, rotation and / or translation on the plane, which can occur individually or combined together to create a greater degree of movement. From the study carried out it emerged that in a simple hinge type structure the movements are freer and allow a greater number of configurations.

4. Connection lamp-man

The study done on table lamps showed that it is possible to identify three situations in which the lamp-man connection is created: moving it, transporting it and composing it. In the first situation there is a functional element in the lamp structure. This component can be an additional element situated on the reflector, it can be found as a counterweight already present in the structure, or the cover itself can be used to perform this task thanks to its ergonomic shape.
Each of these components facilitates the grip when the man decides to change the formal aspect of the same, choosing the most suitable configuration according to his needs. In the second situation the lamp is designed so that it can be transported. In fact, some features may be present that accordant with this purpose, including the absence of the wire, the compactness of the structure and physical qualities such as lightness. Finally, in the third situation the lamp is designed to be assembled and decomposed by the user.

5. onnection lamp-environment

Table lamps can be produced in a variety of materials. Through the research carried out, different approaches have been identified for the realization of luminaires, including the use of a single material, the use of different materials or the use of innovative materials in this sector such as organic ones.
Lamps made of a single material are easier to recycle. Unlike the latter, in situations where

Lamps made of a single material are easier to recycle. Unlike the latter, in situations where the object is made up of several materials, it is necessary to select and separate the various components according to the materials with which they were produced and only then can the recycling phase be started.
In recent times, after a greater attention to the eco-sustainable aspect of the products, the use of organic materials has also been introduced in certain sectors as for example in lighting design. This new category of materials not only is produced with waste materials but is 100% decomposable.

6. The sense of connection in the lighting design of Joe Colombo

The choice to consider the study of design by Joe Colombo is born from the awareness of his thought and his semantics that can be defined in the topics addressed in the previous chapters.
In his creations we can find the concept of movement also referred to his futuristic reading of the object and of the setting.
The concept of connection in the three declinations can be found in its lamps.
We talk about a lamp-lamp connection when it is Colombo himself who designs the junction points, as well as his joints to allow movement; the lamp-man connection is intrinsic in his desire to design objects that were extensions of man himself; his experimentation with new materials and the choice to design artifacts from extremely simple production processes, instead, defines the concept of lamp-environment connection.
Joe Colombo has an active role as professional figure of the industrial designer in Italy in the 1960s; role that he was able to interpret putting his aesthetic sensibility at the service of a technological, functional and sociological research on the wider project of living, often the result of an experimental attitude whose avant-garde outcomes were not always understood and accepted by industry.
From the first projects, Colombo's interest in the kinetic dimension and in the change and transformability of objects and spaces over time is evident. The continuous variation and the transformation of object represented one of the key elements of Colombo's research on objects.
He contributed to the dissemination of the image of Italian design through travel, exhibitions and publications, which favored the recognition of his work in Europe, America and Japan.

6. The Colombo's lamps: morpho-typological and constructive analysis

The decision to analyze the Domo, Spider and Topo lamps designed by Joe Colombo comes from a study done first of all on all the luminaires of the designer, to then identify those that corresponded to the themes of connection and handling previously addressed.
In the three lamps there are three types of movement made possible by different joints also designed by Colombo. In particular, the Domo reflector can perform rotary movements in space (Fig. 2).
The Spider reflector, instead, performs rotational movements on the vertical and horizontal plane and in space, but also vertical translation (Fig. 3). Unlike the first two, the movement of the Topo lamp involves the whole structure with movements on the vertical plane of the two arms and rotary movement of the reflector in the space (Fig. 4). The connection with man is found in the functional element added to the structure to facilitate the grip. This in the Topo lamp is a stick that is on the reflector, while in the Spider lamp it is a handle on the back of the reflector. In the case of the Domo lamp, instead, the ergonomic shape of the reflector facilitates its grip.
The three lamps are produced entirely with metallic materials, in particular aluminum and steel, which presupposes environmental and sustainable performance in the recycling phase of the structure. The choice to use these materials also derives from Colombo's desire to create simple objects from the design and production, in fact the covers of the lamps in question are made of pressed or bent and sheared sheet metal. There is also a motivation linked to a formal aspect such as the theme of the "light bulb envelope". Finally they belong to a series of lamps that Colombo designs giving to the function an essential shape. In fact, they respond to ergonomic proportions compared to the seated man and worktops or spaces to be illuminated.

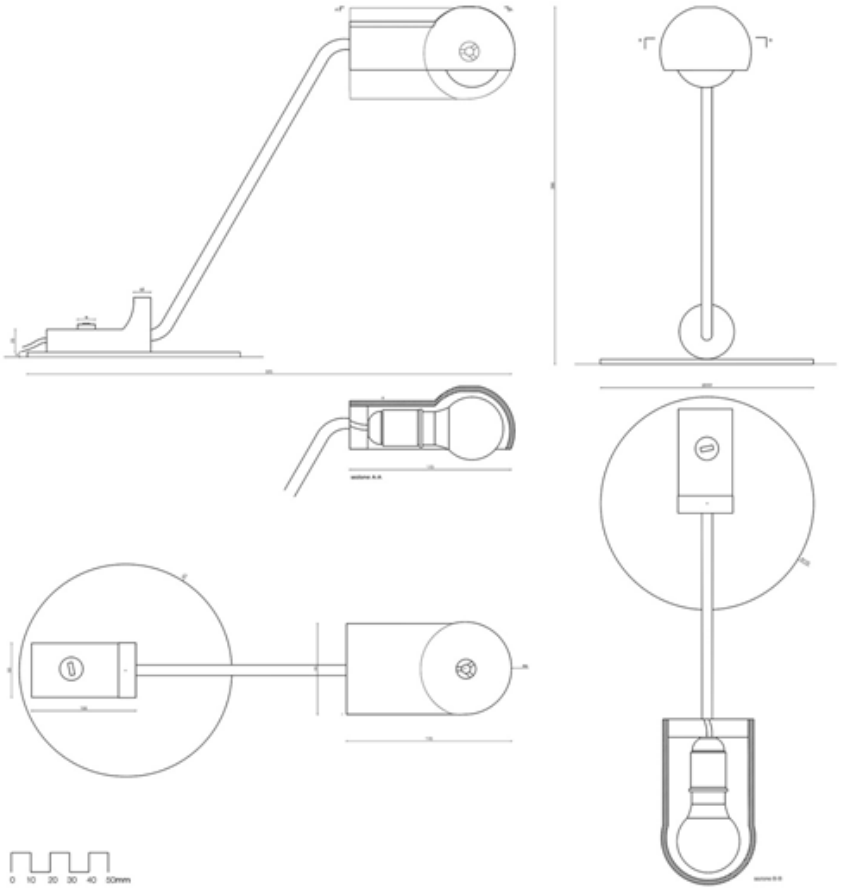

Fig. 2: J. Colombo, DOMO Lamp, 1965 (drawings by the authors).

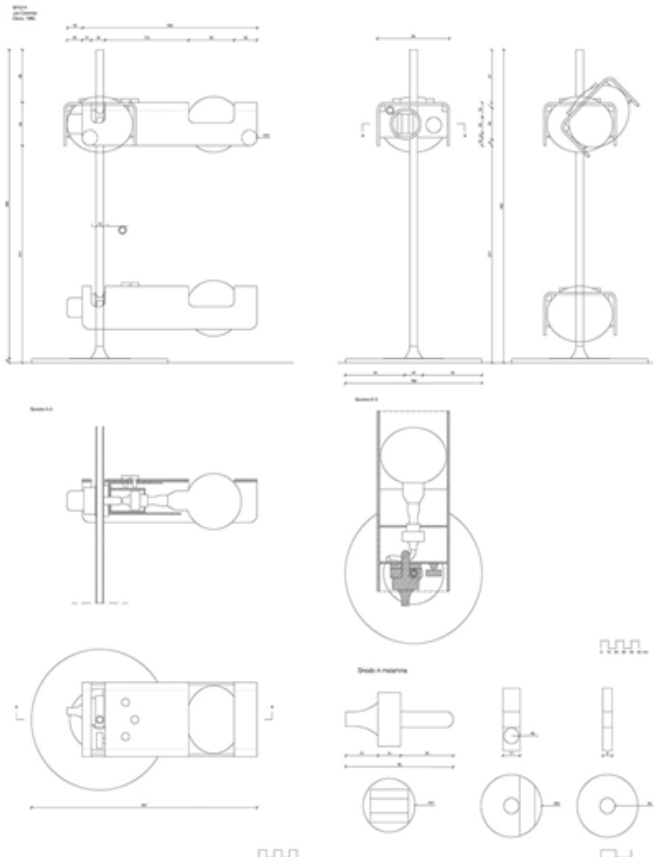

Fig. 3: J. Colombo, SPIDER Lamp, 1965 (drawings by the authors).

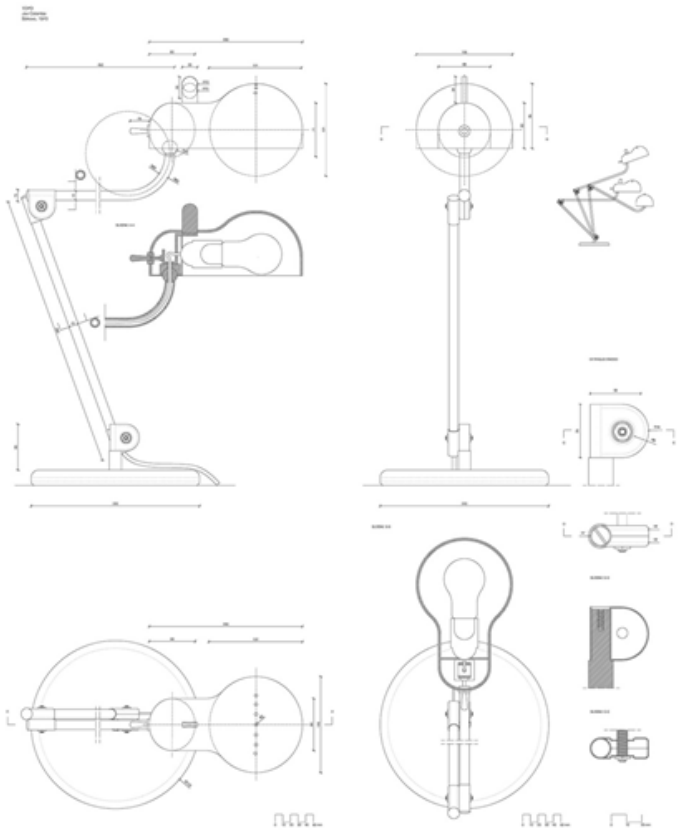

Fig. 4: J. Colombo, TOPO Lamp, 1970 (drawings by the authors).

Fig. 5: Flamingo table lamp (Design: N. Alilombo, G. Lopuzzo and I. Tedesco; Supervisor: V.P. Bagnato)

7. The Flamingo lamp: a design experimentation

Reflections on the theme of connections applied to table lamps and the study of Joe Colombo's design experience come together in a design experimentation through which the designer's semantics linked to the continuity of shapes is reinterpreted, which translates into an accurate philosophy of lighting design. The study of Colombo's three lamps (Domo, Spider and Topo) led to the identification of some elements that recur in each of them, including simplicity, morphological sinuosity and the absence of sharp edges. The Flamingo lamp, designed in the contest of the research laboratory, has a very simple and linear structure. It consists, in fact, of two arms having the same shape and the same dimensions, placed perpendicular to each other and joined by a joint that allows rotation along the vertical plane. The reflector is connected to one of the two rods through of a hidden ball joint that allows the rotary movement of the same. Furthermore, the presence of the three declinations of studied connections is tangible: we found them in the two joints (lamp-lamp connection) in the handle of the counterweight (lamp-male connection) and in the materials used (lamp-environment connection). The luminaire, in fact, is made entirely of aluminum, a sustainable and 100% recyclable material, and with low environmental impact processes. In fact, for the realization, production processes made are similar to those of the three lamps studied in deep. In particular, the slab used to produce the reflector is constituted by a rolling process. After we have the profiling, but not the punching, because the reflector of this lamp, contrary to that of the Spider, has no internal cuts. Subsequently, thanks to a press, the slab is folded to reach the designed shape. Finally, regarding the arms, they are obtained thanks to the tube bending process, as also happens to the Domo and Topo lamps.

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Innovative Processes: Habitation

Moderators: **Joana Dhiamandi**

How to innovate, today? How in Tirana, 100 years after the establishment of Bauhaus could we address this question? The challenge of this paper & poster session is to deal with these questions. It is incorrectly assumed that creating new ideas is the beginning of the innovation process; indeed, ideation occurs in the middle of a disciplined process that can lead to differing and unexpected/innovative outcomes. It is clear then how the purpose of innovation is not "simply", (is in quotes because it's not so easy to do) definable, the value itself can take many different forms. As we noted above, it can be either incremental improvements to existing products, or the creation of breakthroughs such as entirely new products and services, cost reductions, efficiency improvements, new business models, new ventures, and countless other forms as well. The method of creating innovation is to discover, shape, and develop ideas, to refine them into useful forms, and to use them to earn profits, increase efficiency. So we focus on how to innovate.The paper session Innovative Processes invites abstracts that explore the connection between design processes and tools used towards innovation. The concept of innovation in the context of an era after-crisis is going to be examined as a matter of research methodology, education vs. industry, product development, and customization of social needs. This challenging process of the continuous exploration, analysis, reflection and inquiry of needs can lead to a new definition of innovation using research methodologies like design thinking, user-centered design. To this end, we welcome a broad exploration of the field of research and education in design and invite submissions that address topics such as innovation through research, practice-based research, innovative teaching methods, and other related issues, systems of things, production.

Production: *The first session Production invites paper abstracts that deal with such relationship, and also how it changed under the emerging conditions of personalization, mass-production and customization process.*

Habitation: *The second session Habitation invites abstracts that register different manifestations and developments of Human settlement, a community in which people live, and dwelling, as the self-contained unit of accommodation in the scale of the products and system today. Looking at the act of living in a building, we seek to explore different approaches, expressions, and styles.*

Intelligence: *What is Intelligence in Design? In the third paper session, we seek to explore how Artificial or non-artificial intelligence, human and machine intelligence can be combined to develop innovative solutions to social challenges.*

Human Centered Design: *The fourth session Human Centered Design serves as a case study to focus on the design research approaches for innovation. It invites abstracts that deal with the approach to designing products to work in ways that people can easily understand and learn, improving human well-being, user satisfaction, accessibility, and sustainability. What is Human Center Design? How does such this path help us to better design products and lives?*

Ecology: *And last, the fifth session Ecology (from Greek: οικος, "house" or "living relations"; -λογία, "study of") invites papers that deal with the role of the distributions, abundance, and relations of organisms and their interactions with the environment and understand what is normative and non-normative within systems.*

[IP:H/01]

Live as a Process: Nature-Human Approach for Dwelling Design

Alessandro Perosillo[1], **Michele Spano**[1]
1. Sapienza University of Rome, Italy

Living areas play a key role within these changes, especially about the used methodologies and the compliance to the needs and expectations, as well as the quality of life.
«The actual socio-economic context is characterised by a continuous change of its working, relational, familiar, and social models» (Diversereghi, Cavalleri, Rebecchi, 2012).
With these premises, dwelling should represents a new and complex relation network in which ecology and Human Centered Design determine the relationship of the built environment with nature and people, respectively. In this view, IT has a paradigmatic role in the habitation notion, from urban to architectonic scale. Indeed, data coming from urban systems become main substance of the project. This approach deviates from the figurativism of the twentieth century, since it is oriented to the becoming rather than to the praxis. We argue that this is a real process which guarantees the centrality of the relation network without forgetting the form control.
In particular, we base the entire approach on the following four key points:
1.Open Big Data: it aims at extrapolating relevant data for the project.
2.Diagram: «an abstract machine with active and transforming functions» (Fabbri, 2015), it interpolates and organizes the data received in an algorithmic form: an open process that is both adaptive and responsive.
3.Simulation: the uniqueness of the architectonic and urban project needs virtual realisation models to evaluate and forecast the dynamic take place of events and processes.
4.User Experience: the depiction of the space does not end with its building. There is a continuous feedback coming from the occupation of the space, which in the end triggers a cyclic design process.
Dwelling is now seen as a process. It is a novel concept of space capable of:
•taking into account socio-economic needs
•reacting to comfort requirements
•pursuing the criteria given by sustainable development.
The built assimilates the inhabitant and the community, which influence each other and the built itself exactly as it influences them.

keywords: Open Big Data, Diagram, Stimulation, User Experience

1. Introduction

The living concept is the first gesture though which the people marked their presence in the territory: at first the circle of stones to investigate the sky, then tree fronds such as roofs, the dwelling idea doesn't end through the home building experience. It's a concept that expresses and describes the complexity of physical and mental space within which it manifests the full sense of existence. We mean 'the living' such as 'modus habitandi', substantiates the occupation of space, the "stay", the "being here" and, for an extension, the construction of relation with others. In this sense, it represents a genuine form of human culture, a reflection of human development through history, a testimony of the social evolution.

During the XX century, the dwelling has represented a social right, a project dimension network dense of scientific parameters. In particular, the space was inspired by industrial and productivity criteria. The project was oriented by the optimization process, with a consequential homogenization of the image. «*At the beginning of the XX century this model shows evident marks of crisis,* [the lack of] *cultural assumptions, the ideology,* [...] *the social project*» (Vitta, 2010). At the variation to the social-economic context corresponds a radical change of the work model, relational model, familiar and social models. The dwelling space assumes a central role in this transformation, mostly for the way of building and for the compliance between need and expectation as well as the quality. This transition forced the

new methodological and project paradigm assumption, and through this the possible oscillation of modern society and the variation of the context, where it fits and operates, can be measured. In other words, «*there is the need to pass from the functional 'inhabit' concept* [or any other archetype concept] *to the cultural 'dwelling' concept, placing in the center of the analysis the resident, seen in his corporeity, conduct model, and relational interactions*» (Vitta, 2010). As a consequence, the inhabitant becomes the principal 'author' of his living space, inside which architectonic project provides the essential tools to trigger of the development.

However, the new social condition is not the only factor that affects the transformation of the living contemporary experience but we should consider the climate change and IT Revolution.

«*Along the centuries, geological and climatic change have changed the biosphere, and influenced the ecosystems and living organisms. The acceleration of these anthropic changes depends on human development, that, while remaining subject to the laws of nature, it has spread unprecedented, including serious environmental changes with its culture and technology*» (Perosillo, Spano, 2017). In this scenario, considering the disappointing evidence in the last two conferences about climate change (Copenhagen 2009 and Doha 2012), it is evident that governments' prevailing interests are in the economic development rather than in the planet ecological deterioration. In environmental budget terms, we see a decreasing spiral which evidenties the fall of Brutland's approach (1987). The latter claims that the sustainability objective is to keep unchanged the existing resources for the next generation in a conservative method. Today, more than in the past, it is evident that our way of living must be more active in reintegrating resources in 'regenerative' optics. This approach can make «*positive impact, rather than merely causing less damage, to increase the health and wellbeing of humans, other living beings, and ecosystems as a co-evolutionary whole*» (Akturk, 2016). The regeneration idea is centered on specific studies and the active part performed by the community because of the damages by human activities (the building field affects 40%) on Earth is always accepted by the societies though in a not univocal and general way. Therefore, the education roles are always more important inside the process. These extremelly fragile conditions forced a re-writing of the relationship between living organisms and the habitat, orienting the architectural project towards responsible interpretations of one's role. The new design method must promote nature, health, and wellness in a systematic and comprehensive way with the environment for a longer life expectancy. For this purpose, the bioclimatic, biophilic, biomimetics design can be the key to build a new dwelling space less harmful, which provides adequate views, air quality, natural light, and thermal comfort. This factor can be monitored and systematized thanks to the simulation instruments and the Web. The World Wide Web connects all these arguments: big data have become part of the design and part of our life, helping us to control and understand the different impact on our actions. In the same way, BIM model is a digital representation of the physical and functional characteristics of the project: shared resources that drive all decisions regarding the life cycle of living space, from idealization to demolition. Information dominates our century, it is part of us, we use this everything. A practical example is the recommendation system, which is a filtering software used by e-commerce markets for creating our buying suggestions. Today, we always try in all fields to provide a subjected answer for every single person. In the same way, the digital platform manages our relationships with service and people, also «*the architecture produce platforms for the world relate to the features of buildings*» (Moussavi, 2018). Today it is possible to modify our house conditions with a simple touch on our device: the domotics system will bring, in the next few years, a true and proper synergy between us and our homes, in order to increase management and efficiency objectives. At the same time, we can create public spaces through carefully, being aware of people's needs. The XXI century architect, comparing with the information system for design, will create a multifunctional space across the computer and the simulation process. Systematization of data and model can evolve the design process, analysing in a parametric model what was previously measured in a qualitative way.

In the next sections, we propose a field action set within which the above-described scenario can be designed and realized. In other words, the creation of an operative agenda in suggested for a new design reflection in dwelling.

2. Open Big Data

In order to realise this vision, it is of vital importance that the wide range data needed for public goods are readily available. Generally speaking, data play a central role in our lives by now. So, it is no surprising that significant efforts (by both public and private organisations) have been devoted to defining guidelines concerning the management and publication of the so-called 'Open Data'. In particular, Tim Berners-Lee (Turing Award, inventor of the World Wide Web, and Founder and President of the Open Data Institute) suggested a 5-star deployment schemas for opening data:

«*1-star: Available on the Web (whatever format) but with an open license to be open data;*

2-star: Available as machine-readable structured data (e.g., Excel instead of image scan of a table);

3-star: As 2-star plus non-proprietary format (e.g., CSV instead of Excel);

4-star: All the above plus: Use open standards from W3C (RDF and SPARQL) to identify things, so that people can point at your stuff;

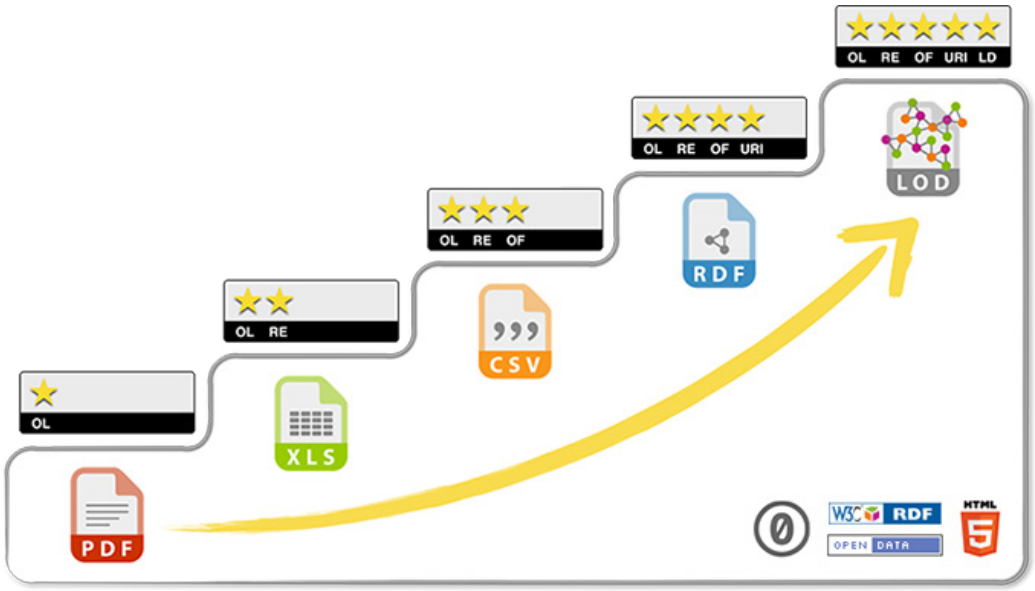

Fig.1: 5-star deployment scheme (https://5stardata.info/en/)

5-star: All the above plus: Link your data to other people's data to provide context» (Berners-Lee, 2006).

Observe that the 5-star system is cumulative and each additional star presumes the data meets the criteria of the previous steps. The 5-star score is achievable by publishing open dataset(s) as RDF on the Web and by setting RDF links between data items from different data sources. RDF links enable to navigate from a data item within one data source to related data items within other sources using a Semantic Web browser. This is what is called Linked Open Data (LOD).

Although there are several works on platforms and architectures for publishing Open Data, there is still no a formal and comprehensive methodology supporting an organization for publishing and documenting "high-quality" open data. One attempt comes from the W3C that has formed a working group with the goal of releasing a first draft on Open Data Standards as we can read in the paper "Data on the Web Best Practices. 2017." Realized by Bernadette Farias Lóscio, Caroline Burle, Newton Calegari. https://www.w3.org/TR/dwbp/. We point out that, however, it does not mention any specific technology. Furthermore, after years of focusing on technologies for big data storing and processing, many observers are pointing out that making sense of big data cannot be done without suitable tools for conceptualizing, preparing, and integrating data (see, e.g., https://www.dbta.com/).

Only very recently semantic solution for opening data sets have been proposed. In particular, as we can read in the papers "Semantic technology for open data publishing. In Proc. of the 7th Int. Conf. on Web Intelligence, Mining and Semantic. 2017. Gianluca Cima, Maurizio Lenzerini, Antonella Poggi." and "Preliminary results on ontology-based open data publishing. In Proc. of the 30th Int. Workshop on Description Logics. 2017Gianluca Cima." they propose to publish open data by taking advantage from the "Ontology-based Data Management" (OBDM) paradigm, which enables a form of semantic data integration as we can read in the paper "Ontology-based data management. In Proc. of the 6th Alberto Mendelzon Int. Workshop on Foundations of Data Management. 2012Maurizio Lenzerini.". According to such paradigm, a system realizing the vision of OBDM is constituted of three components:

1. The ontology, a declarative, logic-based specification of the domain of interest, used as a unified, conceptual view for clients;
2. The data source layer, representing the existing data sources in the information system, which are managed by the processes and services operating on their data;
3. The mapping used to semantically link data at the sources to the elements in the ontology.

The basic idea is that the OBDM paradigm can provide a formal basis for a principled approach to publish high-quality, semantically annotated open data. The most basic task in open data is the extraction of the content for the dataset(s) to be published, where by "content" we mean both the extensional information (i.e., facts about the domain of interest) conveyed by the dataset, and the intentional knowledge relevant to document such facts (e.g., concepts that intentionally describe facts). In most current methods for open data publishing the semantics of open data sets is not formally expressed in a machine-readable form, and therefore they are in stark contrast with the principles of open data since such open data sets have a maximum score of 3-stars in the 5-star deployment scheme. Conversely, OBDM opens up the possibility of a new way of publishing data, with the idea of annotating data items with the ontology elements that describe them in terms of the concepts in the domain of interest for the organization.

3. Simulation

The digital media plays a central role and they define a real change in founding concepts of architecture because the design managed, into cyberspace, is characterized by a holistic expression of architectonic data. This can be made possible only through a BIM approach, in which the entire project documentation is linked into a single archive able to establish a relation-network among all the project components. All the people involved in the various phases of the build process can use interactively this model, which minimizes data loss and more, their successive modification corresponds to a successive change to the information-related fields. These models are not the only site-specific database but a good instrument to study alternative solutions, good for to simulate and optimized the purpose. The simulation skill,in particular to the physical model, find in the digital instrument its full expression because to do this it benefits from a simple and immediately changeability. A simulative model oriented to design is not form exclusively by a data generation system but also a representation system. In architecture, we use the simulative model to represent an object rather than in the creative process contrary to what happens in other disciplines like in engineering, where the dynamic simulation and representation instrument have been a serious impact from the design to the final result.

«*For simulation, we intend in the technical and scientific language and in particular to systems theory, every procedure to research behavior of a system in particular conditions that are based on a reproduction system or environment in which it operates (there are mechanical, analogic, numeric or other systems)*» (Treccani 2018).

In truth, the simulation aim has to be found in the ability to prefigure solution as if they were real in all their aspects: behavioral, performance, geometric, perceptive, comfort, cost and all the others deemed necessary for design studies. The actual environmental situation, the continuous climate changes and the social crisis have created, for some years, fruitful interaction between information technology and architecture, environment and man (ITC Information and Communication Technology). The aim of his interaction is to support the design now more than past based one, on scientific data to create a more comfortable space for the dweller and as zero fossil energy source: NZEB (Nearly Zero Energy Building). Therefore, we can understand everything about the physics simulation process, however this concept is not so clear in its collateral field because it influences the social behaviors and whiting the cities dynamics. Per capita domestic space in cities is shrinking in favor of outdoor activities that are used as social spaces. The space design must obtain tools for testing a comfort level like input data ante operam, to provide effective output design data. For the outdoor space design, we are going to analyze the micro and macro scale. From the bioclimatic perspective, for example, the thermal mass and the soil have a predominant role for the stability. In other words, we need to develop a critical perspective, diagnostics almost, able to inquire about the micro and macro space components. A significative example is environmental tomography, Tomographic Environmental Section (TENS), «*a simulation and elaborating data method capable of delivering bidimensional representation* [...] *of the thermal and fluid dynamics of the urban environment*» (Ottone, Cocci Grifoni, 2017). To operate under this method means to introduce at the base of design the habitant comfort conditions. This interdisciplinary approach is able to provide new possibilities, especially if assisted by territorial network tracking intel. Almost all aspects that involve the simulation field are defined "immaterial design aspects" and they are not easy to define to the physical ones: for understanding this we must take into consideration the people's happiness in their space, the appeal, the mental well-being or the user's experience. However, we believe the immaterial city's aspects must be essential components to be taken as a design variable. Understanding the project quality during the modelling, offer the possibility of extending the sensitivity of the designer, now able to have a strategic evaluation of design solution.

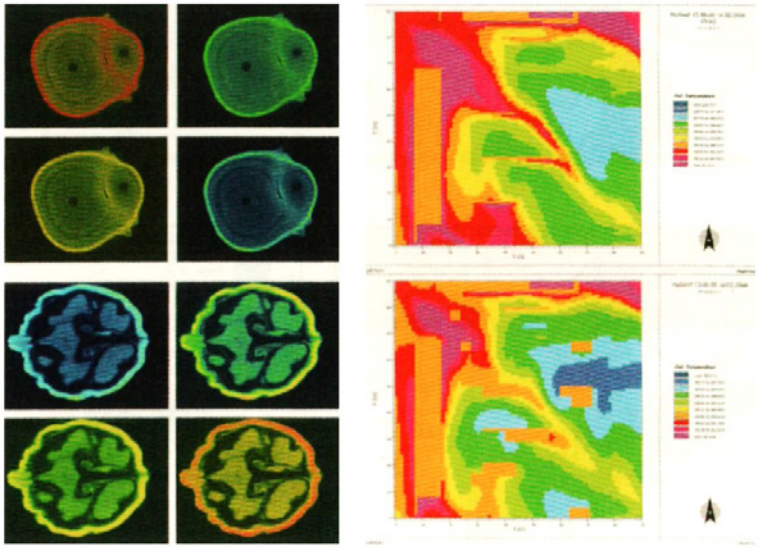

Fig.2: examples of TAC (left) and TENS (right). (Ottone, Cocci Grifoni, 2017)

Extensive example is SUPE.R.P! ex Pegna, Torre degli Agli, Firenze (Italy), designed by Case SPA. The Torre degli Agli housing is the result of the European program known as "Patto dei Sindaci". This project has a prevailing environmental nature, it was started prior to climate macro scale data collection a macro scale followed to solar radiation simulation that allowed, first of all, to calibrate active and passive solar systems. For understanding the uniqueness of the area environment parameters (every area has unique contextual factors) a fluid-dynamics simulation (CFD) was carried out, thanks to which it was possible to study ventilation channels into the urban morphologies, so we can correctly insert opening and ventilation towers to optimize cross ventilation.
At the micro-scale, a dynamics simulation was performed to evaluate the energy performance respect of the occupancy comfort and, through the interactive elaboration and feedback it was possible to calibrate the active and passive system. Finally, another simulation CFD realized with Energy plus ensures there is a lack of interior turbulence and stagnant air zone, thanks to this, the integrated behaviors to natural and mechanical ventilation was optimized.

Fig.3: Picture of new neighborhood called "Torre Agli". (Tucci, 2018)

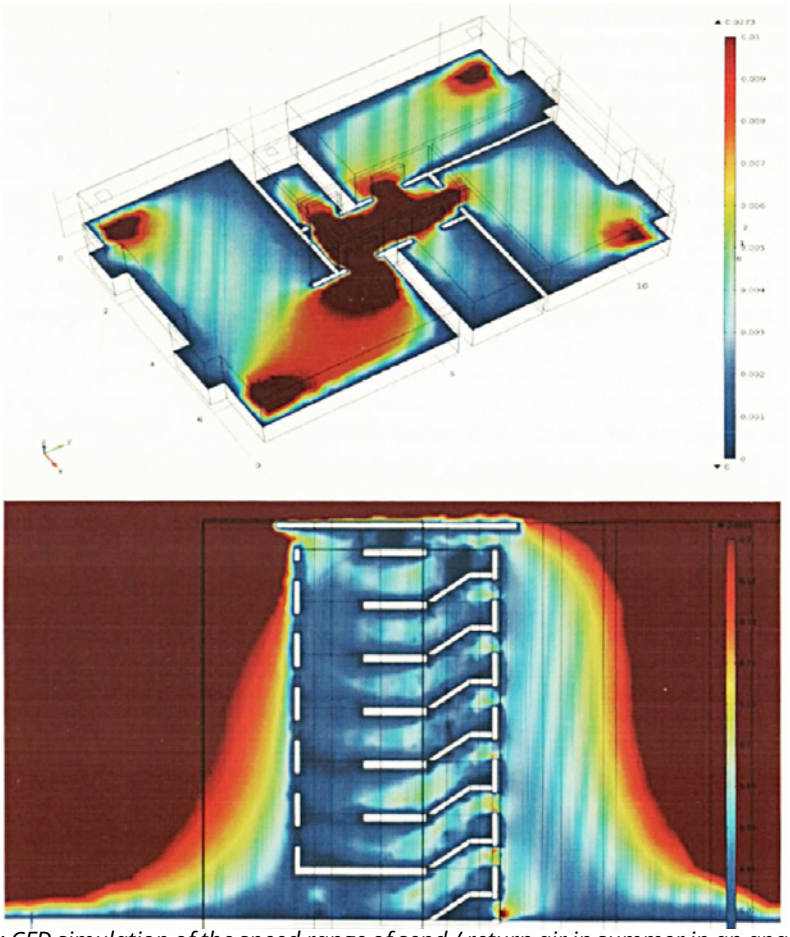

Fig.4: CFD simulation of the speed range of send / return air in summer in an apartment with fancoil (up); CFD simulation of the air speed field in section view of building, with a view from the east side (down). (Tucci, 2018)

4. Diagram

A greate collection of data and parameters depend on a complex relations system, of which correct management and comprehension depend on the project's guidelines. The process moves from the abstract to the figurative. It is about a new modus operandi which requires a leap, logic and interpretative at the same time, which is expressed in the diagram, revolutionary methodological instrument. Whit the term diagram we usually think of 'graphic scheme' especially in the field of architecture.

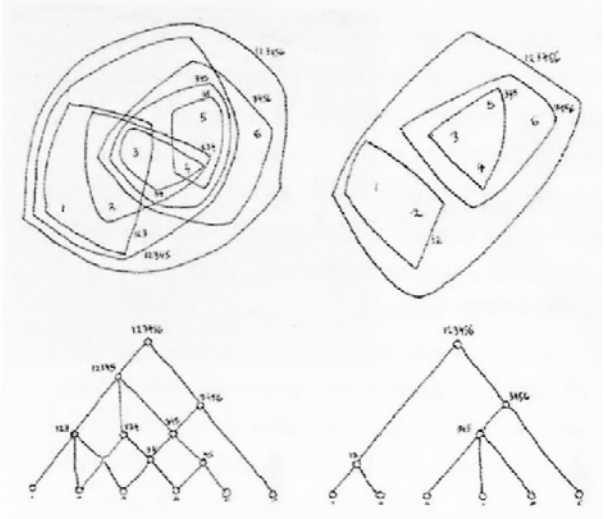

Fig.5: Christopher Alexander, diagramma City is not a Tree. (Saggio, 2015)

It is indeed a conceptual device the aim of which is «*to represent in synthesis the trend of a specific phenomenon or more phenomena connected between us*» (Treccani, 2019). Given its nature, the diagram expands the concept of the context, matter, relationship between human and living area environment. « *Being an abstract instrument,* [...] *it analyzes, reduces, simplifies and schematizes the project's categories and processes multi-interval information*» (Spano, 2015).

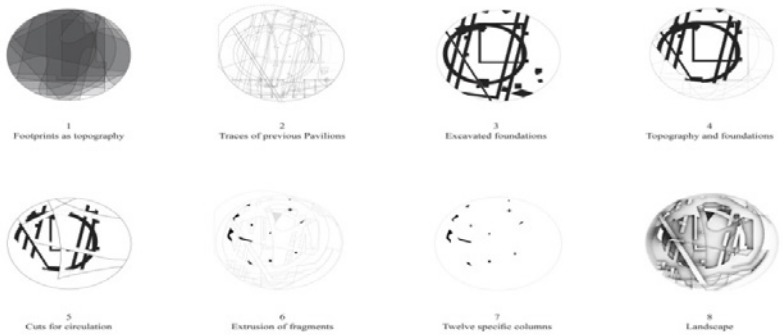

Fig.6: Herzog & De Meuron, Serpentine Pavillion concept diagram (Spano, 2015)

In this way realistic approach is established which draws its assumptions from information technology «*by its algorithmic models, capable of computing more different units. The diagram in this sense puts the emphasis more on the productive features than the represented one*» (Spano, 2015). Architecture eliminates the linguistic problem, breaking the connections of the last century figurative traditions. In this regard, the dwelling project breaks away from the typological and functionality issues, whose object was an individual data optimization, to navigate towards a dialogical system, in which collective interest prevalise. The project can be now intended like an 'open process', subject to constant and recurring input, capable of formalizing unfinished scenarios. Inside this idea, the design of the living space loses its traditional boundaries, by becoming interactive and shared. In this way, the process of creative thinking no longer concerns only the designer and the model but, especially users and constructions. Now, environmental parameters of how sunlight, ventilation or social and economic aspect, people's age and jobs, are nothing else than territories and inhabitants computerization. These interconnects and describes new and unexpected semantic connection, each of which matches specific and contextual needs, by returning to reality

as sensible architecture. Not only: the multiplicity of relationship, made possible by diagrammatic tools, allows describing always a different scenario even under aesthetics and spatial profiles. The architectonic form does not defined in advanced but, becomes the variable of a larger equation, therefor measured and balanced in respect at the parameters underlying the design projects. Marotta claims, «*the diagram cannot be representative, did not portray a real situation, but can be used to create a new reality, new picture*» (Marotta, 2015).

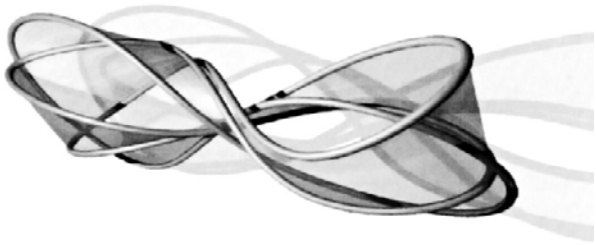

Fig.7: UNStudio, Mobius House concept diagram (Marotta, 2015)

A good illustration of this, is Arnhem Station, by UN Studio. The idea is based on an in-depth study about the people's movement relationship and the other activity pre-existing in the same area. The geometric reference is to Klein's bottle, a parametric model not orientable which differentiates itself for a total absence of boundaries. In this object, there is not an 'interior' as well as there is not an 'exterior'. Because of this, UN Studio was able to solve the complex connective system through the definitions of an interdependent flow system wherein the nodes are inserted in cross-section connections. Klein's bottle application in architecture, however, has exposed structural and spatial consideration, an incentive emergence of a new relationship into the project. «*It is not necessary to go from the idea to the form: we can go from the diagram to the space*» (Marotta, 2003).

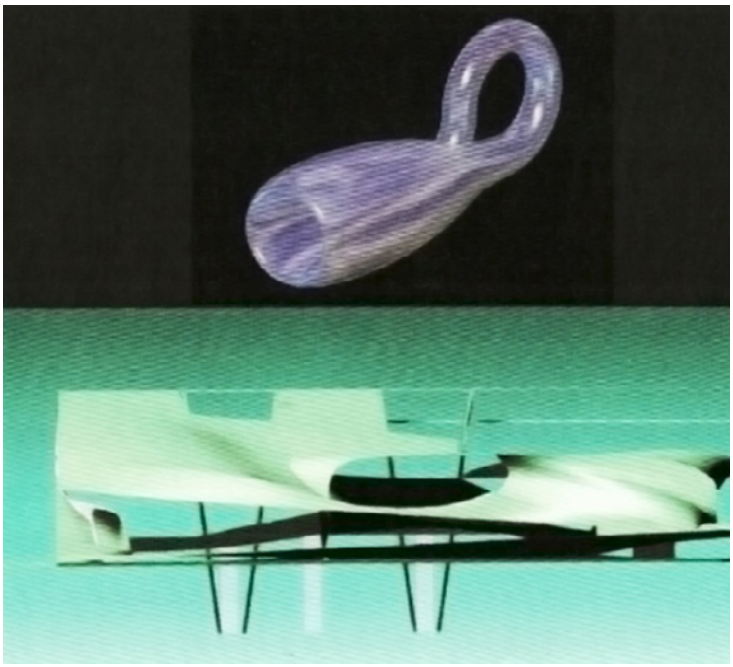

Fig.8: UNStudio, Klein bottle model and Arnhem Central station's Transfer Hall model (Amore, Di Biase, Campana, Iacovantuono, 2015)

What is the architect role in this diagrammatic and generative process?
To translate this new element in architecture «*necessarily involves a gap, there is not a perfect match from starting data to results. It is at the moment that the input is translated into the solution that the architects assume a central role, compared to the stage where there's a generation and collection data process, when the architects are placed in the background. The architect must be able to understand the relationship between data and the final form*» (Amore, Di Biase, Campana, Iacovantuono, 2015).

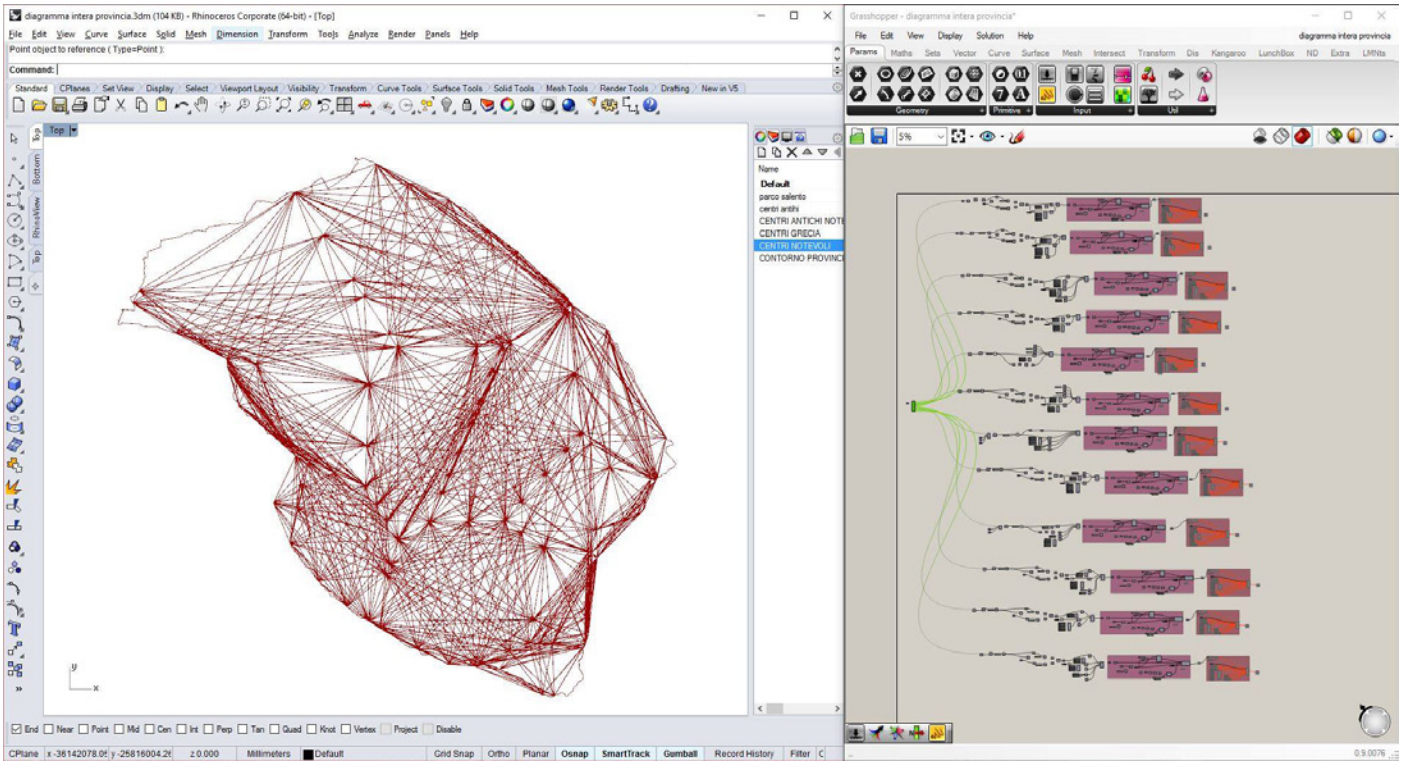

Fig.9: Example of algorithmic visual script in Grasshopper, plug-in for Rhinoceros®, for a territorial relational system.

5. User Experience (UX)

For user experience, we mean «*perception and response of one person resulting from the use or by proof of products, systems or service*» (International Organization for Standardization, 2010).

The new technologies supported by information, allow to bring the person in the center of the design process. Design returns on a "human" approach, directed to individual wellness and expressed in a technological key, is already common in the product design.

The architectonic product, on the contrary, is a single product almost impossible to test in the pre-design process. In this respect, the virtual reality and the simulation could help the designer to assess the user's experience within the project itself. «*The end-users of the new "functionalities" are directly involved in detecting the opportunities for "distinctive competencies".*

More than that, they are called from the outset to jointly build the strategic vision that gives shape to a certain "distinctive competence": they are the soul of the strategic design vision» (Maldonado, 2018). Usually, the UX is associated with information technology or interior design. However UX has an important role in delivering a good relationship between form and function in all design processes. The designer defines the function to be applied to a space, transforming this, giving it versatility, full feeling aesthetics request with the objective of responding to user requests and expectations, from interior design to urban planning. To define a user experience in relation to the functions requires an understanding of the project which goes beyond the single user needs because it depends on a scalar factor. If we think of a small space, here the UX can be conveyed directly towards the occupancy needs, however, in a big space, we need a better comprehension for interactions, relations, human behavior, and buildings roles. The emotion evoked in the user, plays a key role in a product or event experience: it represents the result of user valuation. To understand how this evaluation affects human emotion is the key aspect of the emotion design in a creative process. In the paper "The pleasures of walking: User Experience in the urban space" realized by Taís Lagranha Machado, Carla Link Federizzi, the authors offer as a result the experience of an interaction between user and product to understand the foundation emotion elements and making them a tangible element for design.

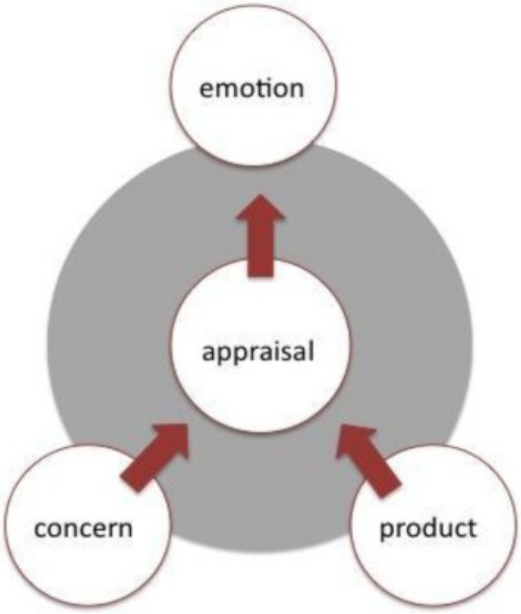

Fig.10: Basic model for the understanding of emotions when regarding products. (Machado, T.L., Federizzi, C.L., 2013)

The emotional responses are six, and represent the user response to perceived well-being:

1. Motive Consistence: relevant to the product experience related to the user's expectation.
2. Pleasantness: relevant to the sensorial pleasures caused by some products or situations, directly related to the aesthetic pleasure and due to spatial characters (materials, presence of the platform, natural daylight, face and height of the buildings, nature, smell, ventilation, sounds... etc.).
3. Agency: the degree of ease of recognition of the agent responsible for emotion, related to exploring phenomena of detail but also of a new way of using the space.
4. Standard Conformance: relevant to the product evaluation when compared them with other one, experiencing the equivalent in accordance with shared social roles.
5. Certainty: security and safety.
6. Coping Potential: relevant to real ability in people's problem-solving people's ability.

We must not forget the potential product uses by the user plays a key role because depending on this his level of concern: the evaluation between concern (non-use) and product (use) is automatic and depends on user wellness; this evaluation engages the emotion. In this sense, an important role is played by the user's education/sensitization respectively according to the use mode and the possible utilities if artifacts, trying to free the user's creativity.

We can state that «*intelligence acts on information, transforming it into knowledge*» (Maldonado, 2018) which in turn evolves into innovation when it is mixed to creative and collective use. User Experience is based on the diversity of competence and knowledge and these tend to highlight the importance of opportunity areas like spaces where users sets new functions. The necessary UX design information in architecture should be decided by designer and related to single design needs, and especially should enter in the process in the pre-design phases. However, the lack of simulation software and data collection now is a barrier for a design process which points to knowledge relegating the UX at ex-post valuation.

6. Post Occupancy Evaluation (POE)

The post-occupancy evaluation was created in 1970 with the goal to verify efficacy to the architectonic product in relation to the user and owner needs. Pursuing this objective POE analyzed the building on the user perspective with the aim of improving its use, maintenance, and ordinary management together with the possibility of correction error and problem behaviors. There are more type of POEs, and their setting depends on the objective: it is possible to evaluate, into specific boundaries, also the creative process. In general, however, we can say that this tool enables a better comprehension between designers and occupants. We can divide the POEs into three categories:

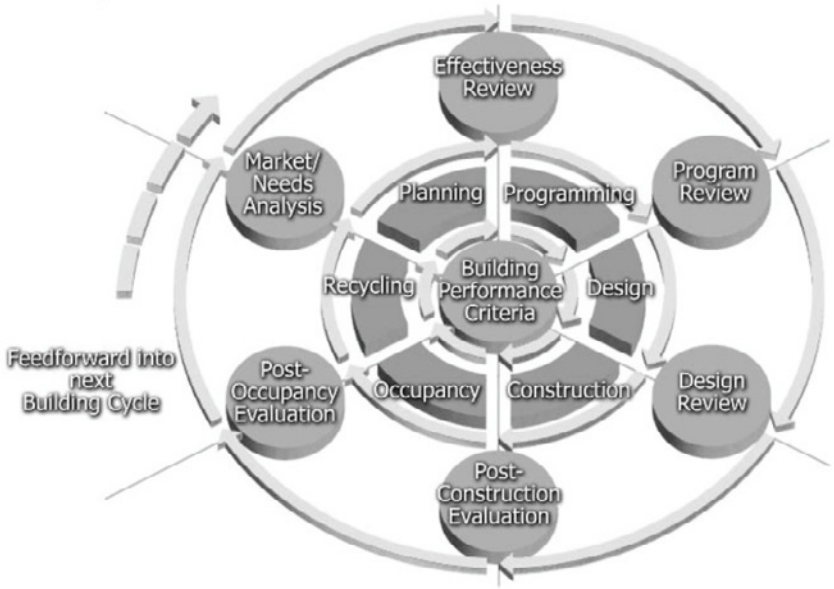

Fig.11: Building performance evaluation: integrative framework for building delivery and life cycle. (Federal Facilities Council, 2001)

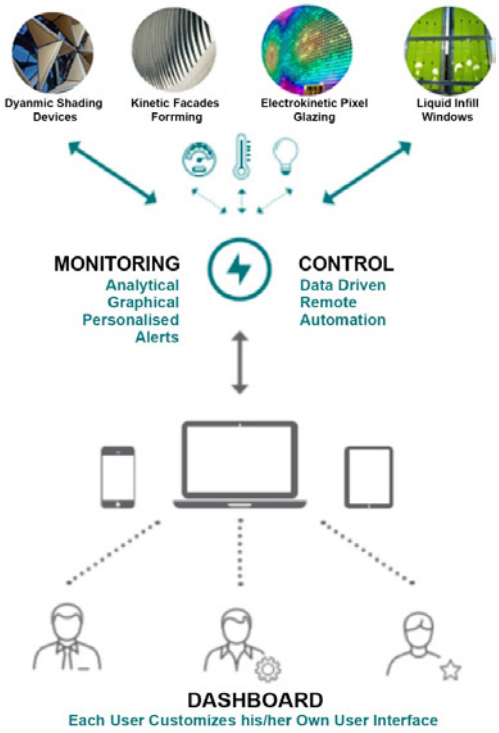

Fig.12: Adaptive Facade Framework for dynamic post-occupancy evaluation (Attia, Navarro, Juaristi, Monge-Barrio, Gosztonyi, Al-Doughmi, 2018)

1. Indicative POEs: provide guidance to better forces or weakness compared to a particular building performance.
2. Investigative POEs: more specific than the first one, in this assessment criteria and objective are explained in the functional program of the structure.
3. Diagnostics POEs: the most recent (1988), it correlates the physic data with environmental data and user's perceptions, its objective is to define new fields into spatial building performance.

However, in 1997 the POE process is evolved into an integrated framework for evaluating better the building performance. This development engages the six key building phases from built to demolition, each of which is accurately described in "Learning From Our Buildings. A State of the Practice Summary of Post-Occupancy Evaluation" and for each, there is a check loop.

In the XXI century, the POE becomes more careful about the habitant dynamics and able to constantly readjust. The database enables transversal and interdisciplinary connections across all building data. The data collected with POEs have to be processed to be easily available to all those concerned. To this end in 2001, the Center for People and Building (CfPB) developed a new method and instrument to support this sector, although specific to working space. However, while POE is focused to evaluate the building's performance to the user perspective, the ecologic building performance is becoming prerogative to the recent protocols LEED, DGNB, BREEM, they suggest a perfect organization to physics, energetics and management qualities of buildings. Only one factor remains unsolved: the evaluation is not interactive and maybe less more responsive. Bell and Callaghan in 2012, to resolve this problem drew up adaptive strategies and then applied these to a responsive skin, where the user control level can be gradually increased according to user consciousness.The conflict between technological systems (calibrated for efficiency) and effective user needs (to be construed for occupant's freedom use) seems inevitable. This conflict would require continuous feedback and machine-learning capacity to make the system flexible and able to reach the best compromise. Bell and Callaghan's work has led to programming a Building Management System (BSM), whose purpose is to transpose POEs in a dynamic and interactive process while providing frequency and adaptability. The user's interface can be accessed by any device that enables him to offer collected feedback.

7. Conclusion

Dwelling can be now seen as a process. It is a novel concept of space capable of:

- taking into account socio-economic needs
- reacting to comfort requirements
- pursuing the criteria given by sustainable development.

The building assimilates the inhabitant and the community, which influence each other and the building itself exactly as it influences them.

In the end, we can affirm that connection between design, information technology and data are the keys of today's projects. In this scenario, interactivity and adaptability of models play a central role making continuous and cyclical optimization. The result is the human wellness as a driver for design in a nature restorative view. Unfortunately, we still can not show a project to show that embodies all our four keys, however we can keep in mind these words:

« *[..] Never program can be thought of without people, since there cannot be value without users [...]*»

(Van Berkel, Boss, 02,pag 38)

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[IP:H/02]

Subjectivity Displacement: Biodesign as interface to explore multispecies collaborations and to overcome normative anthropocentrism

Selenia Marinelli[1]
1. Sapienza University of Rome, Italy

It is a common opinion that humans often are the sole source of normativity in the world. This attitude encourages a bias in favor of the interests of members of the predominant species (who becomes the main subject), against those of other species, generally defined as non-human objects (such as animals, plants or microorganisms). This anthropocentric background is recurrent also design field, where we primarily see human interests as the praxis to develop solutions, without considering the footprint the we leave on the non-human environment. Moving from anthropocentrism to ecocentrism could help us to re-establish the importance of "the other" in the web of life and to render designing products an interface for multispecies co-existence. Philosophical theories such as new materialism or the perspective of entanglement suggested by posthumanism are crucial to stimulate a mind-shift finalized to support and to embody different subjects that have been traditionally ignored in design processes.
If we start conceiving design in its overlapping with the biological realm, we can in fact develop alternative methods, not through top-down strategies, but with approaches literally emerging "from the ground".
The paper will explore some Biodesign practices that can be used as a means to understand the complexity of human and non-human inter-actions and to open ourselves to what lies beyond rationality, cognition, knowledge and human mastery.

keywords: Multispecies, Co-existence, Biodesign, Posthumanism, New materialism

1. Introduction: Disrupting the anthropocentric bias.

Our relationship with nature is complex: we cannot imagine humankind existing outside of its environment. It has always been more than just background scenery as we are inextricably linked to it. But conventionally, history places humankind in a privileged position, often forgetting the reciprocal character of the human-nature relationship and pointing out an illusory emancipation from nature, which allows a bias in favour of humans' interests, as they are recognised the members of the predominant species. This anthropocentric position assigns a significantly greater amount of intrinsic value to human beings than to any non-human things and it finds it problematic to articulate what is wrong as it does not question the assumed moral superiority of human beings over members of other species on earth.

One of the most evident results is the important ecological crisis we are currently facing. Researchers, in fact, recognise global warming and all other consequences in terms of global environmental problems as anthropogenic products. This opens to a new era, the Anthropocene one (Crutzen, 2000; Schwägerl, 2014), defined as a new geologic epoch, where human activity is assumed as a geological force, able to compromise terrestrial biosphere equilibrium. The ongoing growth in human population and resource consumption is, in fact, drastically changing the planet, leading us to start thinking also of alternative places to live in Space. But we can say that the Earth itself has become a vast terraformation experiment, in which man shapes his habitat. Natural biomes, therefore, need to be embodied to the anthropogenic components forming the so-called "anthromes"- anthropic or human biomes (Ellis et al., 2008), where ecological patterns result of the direct human interaction with ecosystems. However, we do not refer to the Anthropocene only as a new environmental condition, but also as new positive paradigm in which nature and culture can be seen as components of the same system and not anymore as independent categories. This represents an important paradigm shift, as it could help us to overcome the dualistic divisions and to start conceiveing humanity in ontological continuity with Nature (Caffo, 2017).

Ethical and ecological reflections about the problems arising from the environmental crisis then becomes necessary: how can we promote a new mindset in order to allow sustainability and equity not only for all humans but also for the other species on the planet?

2. Re-positioning the "self": a biocentric perspective.

Currently many disciplines focus on environmental and biocentric approaches.
For instance, the emerging legal philosophy know as "Earth Jurisprudence" is one of the most innovative and interesting contribution in legal theory. It emphizes the rejection of the legally dominant behaviour, which includes a bias against other forms of life or an emphasis on nature as collection of resources to be used regardless of the consequences to other beings. Earth Jurisprundence in short terms acts in favour of a more ecosystemic approach and Earth-centred understanding of how we can conduct our lives in a mutually enhancing relationship of co-existence (Berry, 2002; Cullinan, 2003). It is in fact a common opinion that humans often are the sole source of normativity in the world and changing this normative practice could be a very important challange to face what we (as individuals, societies and species) can do to address our role in the biosphere crisis.

By (re)positioning ourselves in the web of life (Capra, 1997) we can in fact move from a certain "transcendence" related to normative anthropocentrism, in order to develop a more embodied engagement of human intervention to be addressed by a deeper ecological awareness (Pelizzon, Ricketts, 2015).

Reflecting humans' interdependent relationship with the natural world, also philosophical theories such as new materialism/material feminism or posthumanism suggest a perspective of entanglement which could be very useful for application in design processes.

New materialism promotes a return to "matter" as essential for embodied circumstances and subject formation. Matter is not longer seen as passive or inert but it is recognized its agency, challanging the linear models of causation based on the constructivist perspective and focusing on the development of models taking into account complex inter-actions through which "matter" emerges, persists and transforms. Material feminism starts from this point to underlie an epistemological level of the notion of "situated knowledge" (Haraway, 1991) to disrupt the duality of objectivity-relativism and to underscore the co-constitution of material and discursive productions of reality. Donna Haraway and her pioneering "Cyborg Manifesto" (1995), the first text of post-anthropocentric feminist theory of the 20th century, produced a significative change in the understanding of how the human is constituted in its interactions with non-human otherness. Without being excessively nostalgic, but recognising the potentiality of high-tech world of information technology and telecommunications to further advancing the non-anthropocentric feminist thought, human subjectivity in this complex context of forces becomes a relational and extended self. New material feminism line of thought extends this notion promoting the respect to the non-human, understood as animals or technological devices.

An affirmative ethics for a non-unitary subject based on the quest for empowering relations proposes an enlarged sense of inter-connection between self and others, including the non-human or "earth" others (Braidotti, 2008). By rejecting self-centred individualism, this philosophy implies a new way of combining self-interests with the well being of an enlarged sense of community and it suggests a perspective from where we can define oureselves as subjects constituted in and by multiple entanglements.

During the global warming era, environmentalism must then renounce to the traditional concept of Nature as a metaphysical "elsewhere" to be preserved and we must embrace a completely posthuman/meterial feminist thought where man perceives himself as part of the same system of Nature. One key aspect would be to detach ourselves from the environmentalist rhetoric that defines us as purely ecosystems devastators: we need to see the Anthropocene era also as a stimulus to our creative force, in order to support a long-term positive future where humankind is decentered to become aware of his belonging to a larger ecosystem.

In this posthuman context, human is not perceived as an autonomous agent, but is located in an extended system of relationships.

Furthering these important observations, as designers we need to develop a heuristic point of view that redefines also the boundaries of the discipline in its interaction with the "natural", to favor complex relationships.

What futures can we imagine in light of the Anthropocene? What kind of new relational forms can be built by breaking down the dichotomy between organic and inorganic in a spatial continuum also in design strategies?

3. Biodesign as interface for synthetic ecologies: beyond biomimicry.

A posthumanist/new materialist approach to design could expand the architectural subject beyond the human user and could extend traditional notion of materiality to include assemblages of inorganic and organic matter. This could represent a new way to conceive design as interface to embody human and non-human co-existence and co-operation and it could lead us to rethink about what was formerly known as "nature". As we humans drive this process of hybridization we are part of both the biological and technological realms and biodesign products can be therefore seen as an intersectional place for hybrid subjects.

In Biodesign the concept of having a hybrid ecology, formed by biological actors like plants or microorganisms in convergence with artificial matter or technological devicies, enables us to expand our methodology and to rethink the relationship between design and techo-natural world.

Due to the use of biological matter, this practice represents a further step forward compared to biomimetics: unlike this last one, Biodesign does not point to mimic nature, but it is more about how to overcome metaphorical processes and to actual embody natural ones.

The integration of biological systems is often due to achieve also better ecological performances and to transform objects into "living organisms" themselves, enhancing their potential to interact with the ecosystem around in a feedback loop process. This dynamic relation of mutual adaptation makes design structurally coupled with environment and users in an autopoietic system (Maturana, Varela, 1985), thanks to continuous bilateral interactions between both parties, which enables to pursue a homeostatic balance and to react to external inputs.

Biodesign could underlies co-evolutionary operations of co-construction and we selected some meaningful experimentations in support of this theory: "BioVer: Animated Adornment" designed by BioBabes collective, "Mycelium Chair" by Studio Klarenbeek & Dros, the "Aguahoja Pavilion" designed by Neri Oxman and finally the "Salamander Superhighway" and the "Butterfly Bridge" installations by Natalie Jeremijenko. These last two case studies, even if not strictly part of Biodesign, represents a non-anthropocentric way to take action in town space with small interventions directed to sustain and to protect a multispecies co-existence.

4. "BioVer: Animated Adornment". An embodied symbiosis with the living.

BioBabes is a collective of feminist biodesigners, makers, and biohackers engaged in construction materials and fabrication processes, which include living organisms and organic matter. One of their recent product of Biodesign is "BioVer: Animated Adornment", a series of bio-wearable pieces of jewellery/habitats aiming to synchronise human activities with natural cycles. The starting point is the pathways and behavioural analysis of Physarum Polycephalum (also known as slime mould), a unicellular protist that, despite its simple biological composition, shows a basic form of spatial intelligence, the ability to find optimized paths in several kinds of networks and a surprising form of spatial memory and adaption to changings in environmental conditions (Baldissara, Marinelli, Perna, 2018). Slime mold is in this case used as host of a glass habitat, consisting of a ring and a necklage acting as wearable applications catered to the care of the living organism. Along the glass habitats, a workable kit is provided to deliver the necessary instruments to achieve laboratory standards of sterility which are important when cultivating microorganisms. The kit also provides nutrients, disinfectant and tools for preparation, cultivation and maintainance of the glass apparatus and it seeks for a complete user engangement in the process. The user not only observes, but he is encouraged to experience directly another species, stimulating a persistent attention to its health. The transparent material connects the human observer with the non-human living being pulsating and growing in strict proximity with him. Hence, "BioVer" aims to promote a more collaborative and symbiotic relationship between species.

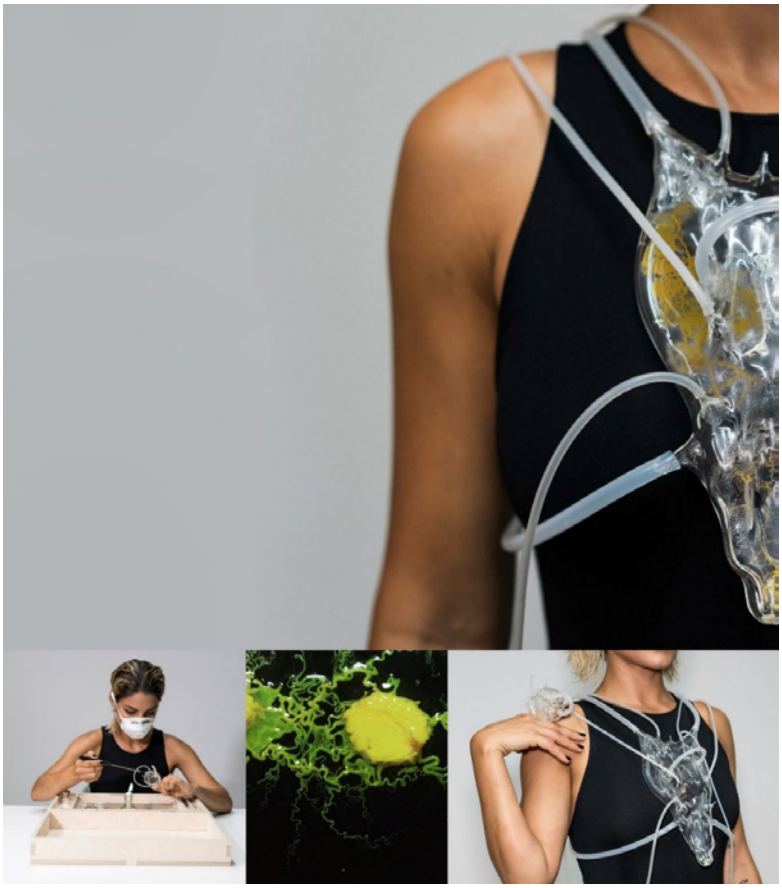

Fig. 1 BioBabes, BioVer: Animated Adornment, 2018

5. “Mycelium Chair”: growing the archetype.

Mycelium is the vegetative part of a fungus or fungus-like bacterial colony, consisting of a mass of interconnected filamentous cells called hyphae, through which a fungus absorbs nutrients from its environment. Many designers became interested in its tendency of growing on a wide variety of substrates, therefore resulting into a range of diverse materials and applications, related to the architecture and the design fields. Moreover, this organic network embodies peculiar properties such as strength, elasticity, thickness, homogeneity and water repellency, representing a great opportunity to the development of completely new materials.

One example is the “Mycelium Chair”, designed by Studio Klarenbeek & Dros for the Duch Design Week 2013 and also exhibited during “La fabrique du vivent” event at Centre Pompidou last february-april 2019. It is the result of a collaboration between Klarenbeek and scientists at the University of Wageningen to develop a new way of 3D printing with living organisms. They chose a chair as model as it is the archetype for a funcional design object, suggesting how everyday objects could transform into new semi-living entities with a negative carbon footprint. The “Mycelium Chair” was printed using a mixture of water, powdered straw and mycelium as a binder. The 3D printer machine simultaneously prints the infill and outer shell, which prevents its fresh mycelium and straw mixture from falling apart. After printing, the structure is placed in an incubator to grow and gain strength.

The result is a strong, solid and lightweight material with a thin layer of printed bioplastic covering the structure to contain the growing fungus. Form-wise the chair embodies the mycelial organic network reflecting also the incredible capability of 3D printers to reproduce these complex forms.

This technology can be applied also to a bigger scale and it aims to create a new collaboration between the machine and nature and to transform biological organisms into architectural mediums and building materials. Bio-materials, made from organic life can led to new sustainable, biodegradable objects and could extend our understanding of what can be considered as “alive”.

Fig. 2: Studio Klarenbeek and Dros, Mycelium Chair, 2013; with other prototypes made with the same technology.

6. The “Aguahoja Pavilion”: environmentally responsive skin.

Neri Oxman in her research as architect leader in the Mediated Matter Group at MIT in Boston is author of a new approach to design, defined as “Material Ecology” or “Material-based design” (Oxman, 2010): starting from organic material, through processes of synthetic biology, synthetically constructed products are built in order to autonomously react to the external world, just like living beings. Modern design culture is in fact experiencing a shift to material aware design and the last “Aguahoja Pavilion” proves a crucial progress in the application of environmentally responsibe biocomposites. The project consists in a pavilion and a series of artifacts constructed from molecular components found in tree brances, insect exoskeletons, human bones and whose behaviour is inspired from natural ecosystems in order to produce no waste. The pavilion is five meters tall and its skin is composed by flexible biocomposite with functionally graded mechanical, chemical, and optical properties made possibile by the deposition of cellulose, pectin and chitosan. These materials allow for the creation of a generative surface able to alter its stiffness and color in response to external parameters, such as heat and humidity. When exposed to water, the skin degrades programmatically without provoking any damage to the natural ecosystem. This level of environmental programming can be important in the future to design structures able to modify their properties relative to determined conditions and in full respect of the ecological footprint.

Fig. 3: Mediated Matter Group, Aguahoja Pavilion, 2018

7. "Salamander Superhighway" and "Butterfly Bridge": site-specific installations for multispecies co-existence.

Natalie Jeremijenko is an Australian artist, designer and engineer and with her Environmental Health Clinic aims to couple art and environmental activism. Her performances wants to raise awareness to ecological issues and to human and non-human relationships in a way which empowers the audience to take action.

In 2012 the two-part exhibition "Civic Action: A vision for Long Island City" opened at the Noguchi Museum and artists including Jeremijenko were asked to proffer alternative visions for the northern industrial stretch of the city. The teams were very heterogeneous, comprising architects, artists, urban planners, writers and other consultants in order to re-imagine the area and to face the increasing resindential development and ecological threats with site-specific installations, earthworks and participatory and social activities. Jeremijenko and her team focused on the production of devices to challange the understanding of our relationships with natural organisms. These operations wanted to help us to directly see and to feel immediately engaged about urban ecologies. By triggering design strategies in order to be more involved in creating real-life experiments that enable social changes, Jeremijenko designed two installations in New York's Socrates Sculpture Park.

The project "Salamander Superhighway" brings to light one the greates species extinction crisis, that of the amphibians like slamanders, who are critical keystone organisms particularly in the North-east part of USA. The starting point is the observation of the incessant cutting of salamanders' migration corridors, with the disseccation of the vernal ponds where they breed or simply the lack of attention citizens put to their passage across the roads. Jeremijenko asked a simple question: can we adapt our urban infrastructure to support the organisms upon whom our healthy system depend?

The result is a micro-speedbump trying to connect salamander habitats, to protect them and to draw attention to the other organisms using human infrastructure. The structure is made with little holes to mimic the kind of spotty lighting that salamanders are used to in the wild and some sensors are also installed in the tube to detect their movement. In this case some messages are sent to a twitter account.

Fig. 4: Natalie Jeremijenko, Salamander Superhighway, 2012

The last example is the "Butterfly Bridge", also part of the the Socrates Sculpture Park exhibit. It is a flower-lined overhang designed to draw butterflies away from traffic, in order to preserve them from the impact against cars windshields. The purpose is to provide a safer way for butterflies to move around urban environments with pollinator resources to make the presence of these organisms more durable and to possibly increase biodiversity and connect otherwise isolated ecosystems.

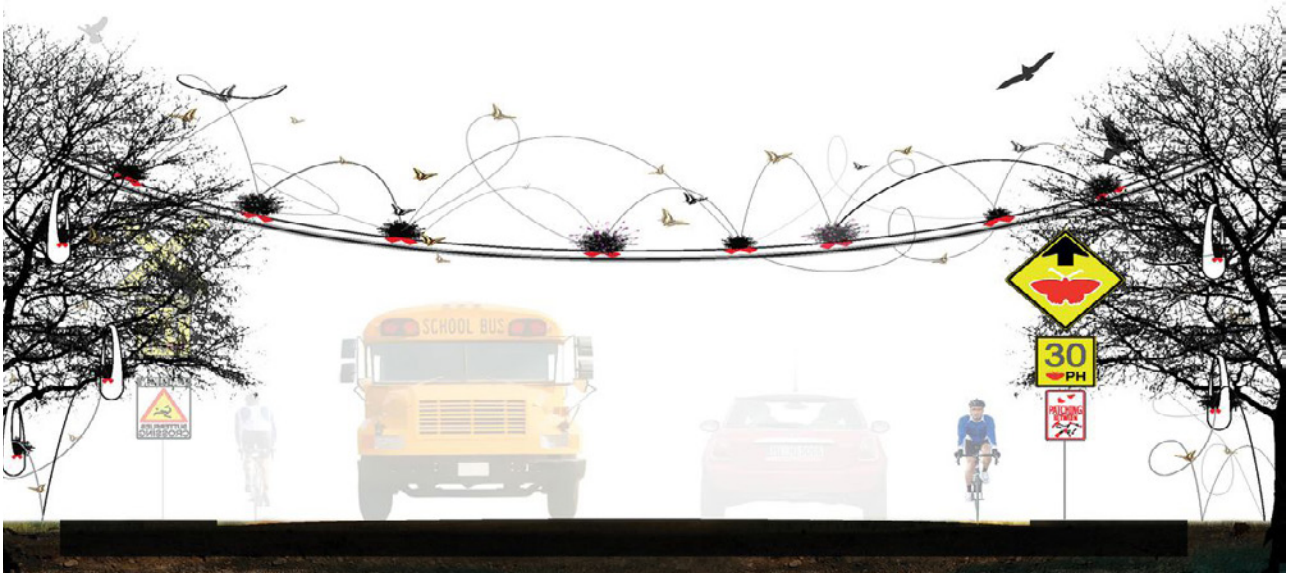

Fig. 5: Natalie Jeremijenko, Butterfly Bridge, 2012

Both these installations, although they suggest a more playful approach to the environmental problem, could be used as a relevant metaphor on how designers could promote interventions in the city in order to stimulate popular imagination and fascination on how much complex are urban ecosystems. Acting as public signals these examples let other organisms gain the visibility and the care they deserve.

8. Conclusions and discussions.

Only detaching ourselves from a hyper-centered position we can expand the design field beyond human mastery, to integrate networks for niche construction. In order to experience the evolutionary dynamics of ecological systems, we can inherit metabolic and responsive behaviors by stressing a radical embodiment between organic and inorganic layers. Biodesign could therefore represent a mean through which humanity triggers interactive capabilities with the "otherness". By creating a deep entanglement with the design products, we can emancipate them from merely be objects, but actually they can become living subjects, other knots and actors wih its own right to be part of an interconnectivity in perpetuos evolution.

Recent design exhibition like "La fabrique du vivent" at Centre Pompidou in Paris or the "Broken Nature" Triennale in Milan are only few example on how this new paradigm is progressively gaining more attention in the current debate, setting new standards for future development and experimentations in design and architecture.

Of course, this practise could show some side effects, like an excessive anthropomorphisation of nature and the tendency of seeing nature and humans as one big homogeneous entity, while the main goal should remain the awareness of beeing inside a complex ecosystem among other beings, without flattening individual pecularities. Another possibile implication could be the reducing of these experimentations to the umpteenth way of exploitation, even if more ecologically compatible.

However, since the use of biological organisms (like fungi mycelium, algae, protocells, bacteria..) coupled with artificial materials could also generate unforeseen circumstances related to the unpredictability of living systems, Biodesign could act as mean to overcome the anthropocentric desire of beeing in control. This perspective could be a relevant inspiration to build new relational modes of "inter-action" and "intra-action" of architecture with other non-human species and with the biotic and abiotic forces of our planet.

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[IP:H/03]

À la recherche du temps perdu
Liberated dwellings within the provinces of capitalism

Marson Korbi[1], **Giuseppe Tupputi**[1]
1. Polytechnic of Bari, Italy

In contemporary times, according to the philosopher Byung-Chul Han, the paradigm of the neoliberal capitalism has found new forms to exploit single individuals. In his essay Psychopolitics, Han writes that individuals (referring to the many freelance and autonomous professional workers) consider themselves as free subjects, which must work endlessly (in name of free competition and productivity). Within a similar scenario, where life is put to work, Han suggests a return to what he calls idiotism that is 'being an idiot' which, according to Spinoza, refers to a function of philosophy: 'a field of immanence of events and singularities for thought'.

The recall for being an 'outsider' – a foolish subject escaping from society – leads our reflection towards alternative forms of dwelling, in the search of appreciation of a real free and beautiful bare life. We propose a revisiting of the historical domestic spaces and 'landscapes' of the Mediterranean house by comparing two similar models: the Salentinian traditional house (like, for example, that of Latiano) and the Albanian house of the south villages (Qeparò, Himara, Dhermi).

The Mediterranean South still conserves its characters in those places that Michelangelo Sabatino, in his seminal essay "North versus South", has defined as the tangible result of a vernacular tradition, where the form of the house was the result of the addition of rooms and its use depended on certain ways of living that have been practically forgotten. In both the Salento region and the Albanian coast, the individual room was just a standard space for individual living, freed from a specific function, whereas its oikonomia was strongly related to domestic labor and its aisthetikos was strongly connected to the relation with nature. It is arguable that in historical times the single room was principally an elementary space collocating individual within a natural place, but such ancestral and forgotten way of interpreting the idea of dwelling can be possible only by narrating how once upon a time a similar domestic life occurred.

keywords Mediterranean House, Domestic Space, Nature, Vernacular Architecture, Historical dwelling.

1. Dwelling and thinking alone within the internment places

Under Fordism, capitalism imposed its disciplinary governance through the *internment places* defined by Michel Foucault: the factory, the family, the hospital, the school and the prison (Foucault, 1977). Even if in the city structure, living, working and studying, were apparently separated activities, discipline broke into every different spatiality through a very rigid system of rules that were useful to capitalism to reproduce itself and to maintain its order. The family had its own patriarchal norms, the factory functioned by the rhythms of production, and the school had its own severe discipline. The entire form and program of the city under Fordism was a sort of machine operating through these educatory gears of domesticity and collectivity, putting freedom in a sort of ambiguity. Indeed, capitalism stressed the ideological meaning of freedom that is to be found in the isolated sphere of the 'comfortable' private house, outside from working or studying. Among the internment places, family dwelling, like prison, was related to a domestic form of discipline, reduced to the scale of the individual. A prison cell is similar to a family bedroom to the extent that both the prisoner and the child's (or the wife's) life is put under the control of someone's else, but while every prison cell is similar to the others, the family household corresponds to a hierarchical distribution of rooms and functions depending of the family member's role.
In these regards, Marcel Proust's life in his own room represents for us a paradigmatic moment of interpreting domesticity as an emancipatory political project. For writing his most famous novel, **À la recherche du temps perdu (**Proust, 2003), Proust followed a sort of personal form of life, where daydreaming, remembering, and writing introduced him within a different spatiality of individual freedom. He turned day into night focusing only on his work, without interruption, "determined not to miss a single one of those intertwined arabesques" (Benjamin, 1978: 126-142): his own room – according to Walter Benjamin – with his bed, and furniture, and with his handwriting, crated Proust's microcosm.

In the contemporary scenario, the crisis of the *internment places* has spread to new forms of exploitation that include the entire scale of the metropolis and focuses on individual life. The South-Korean philosopher Byung-Chul Han argues that within neoliberalism and the hegemonic rise of immaterial forms of production, individual freedom is the new form of exploitation used by capitalism to reproduce itself. According to Han, we live in an historical moment where being free generates constrictions and submissions (Han, 2017). To understand this, we just have to think to the way immaterial forms of labor are creating many freelance workers, and other precarious subjects as university researchers and other workers related to knowledge.

In post-Fordism, dwelling depends on working to the extent that the domestic sphere becomes a productive space: the individual room seems one's office rather than the "daydreaming place". Unlike Proust, for the new subject, both *intellect*, performative act, and personal relationships as also the capacity to think, are put to work within the sphere of capitalism production.

These conditions are even more problematic as we collocate the individual *knowledge worker* (Bologna, 2015) in those cities of the Mediterranean South formerly based on pre-industrial production. As we think, for example, to Albanian, or south Italian cities, local governments are spending a lot of money on "innovative" processes and letting pure university research to the uses of private enterprises. But, we strongly argue that these small metropolis, trying "to keep up with the times" at any cost, are just *provinces* of the aggressive capitalism. Forcing post-Fordism forms of production in those contexts undermines any possibility of their own gradual emancipation.

Moreover, in these parts of the world, the hegemonic family structure is still rooted both in the urban fabric and in youth's mentality. Thus, personal freedom assumes a new ambiguous instance between a strong relation to family ideals and the scarce possibilities to be "an individual project". Living and working in the provinces of capitalism does only increase precariousness of those individuals studying for the rhetoric of a "better future". The general retirement of the state has reduced any welfare protection to the family unit: freelances, students and precarious, on the one hand have the possibility to be alone, offered by global market, to go and live outside, but on the other hand they are still anchored to their family economy.

Evidencing these problematics means for us, as architects, trying to address architecture to a political consciousness. Domestic space can be a space of dissidence and liberation if we put in *common* all these suffering singularities. Dwelling can be an *undomesticated* place only if, starting from the individual cell, the city could be extracted from the logic of profit and exploitation. In these regards, "province of capitalism" is not for us a negative connotation, but has a dissident character, something able to be transformed in a project of autonomy. At the same time, the cell of the daydreaming could be a place of self-realization only if organized in common, against the exploitation of man by man, towards a non-hierarchical mechanism of collectivity.

2. Houses of silence and lost time: the character of beautifulness versus the status of provinces of capitalism

With the rise of global economy and the retirement of industrial labor, many of these provinces are now being abandoned as a result of the continuous exodus of post-fordist *labor force* towards metropolitan regions. These new paradigmatic shifts have produced a new ambiguous condition between *semi-big* cities, that are just provinces of capitalism but wants to be more than that, and close rural environments. This condition refers to all those medieval *borghi* that have conserved, on the one hand, their historical appeal and their urban form, but on the other hand, they are becoming the ghosted scenarios of a lost time within picturesque country and natural or historical landscapes. While the former condition is being stressed by local policies totally oriented on mass tourism and is often resulting in compromising the beauty of natural landscapes, the latter refers to the abundant presence of free abandoned historical dwellings, whose typo morphological characters risk being compromised and/or erased. Instead, contrary to this process, we suggest that, many of these realities, still inhabited by peasants, fisherman's, or even intellectuals and artistic laborers, represents for our discourse, a new possible terrain for the research of the *common*.

2.1. Houses of silence: Qeparò's House

In Albania, one of the youngest neoliberalist countries in Europe, there is a very pronounced contradiction between urbanized economical areas and rural historical villages. In particular, historical contexts have only conserved their original forms on those areas where geographical conditions have allowed, during the history, a sort of protection from external influences. The coastal region of Labëria, on the south Riviera, surrounded by a continuous ridge of mountains, has resisted also to the ottoman empire domination both in cultural and architectural terms. In cultural terms, these places maintained their Mediterranean character, while their architecture was a sort of response to a necessity to dwell without hierarchies, less patriarchal in confront, for example, to the ottoman tradition.

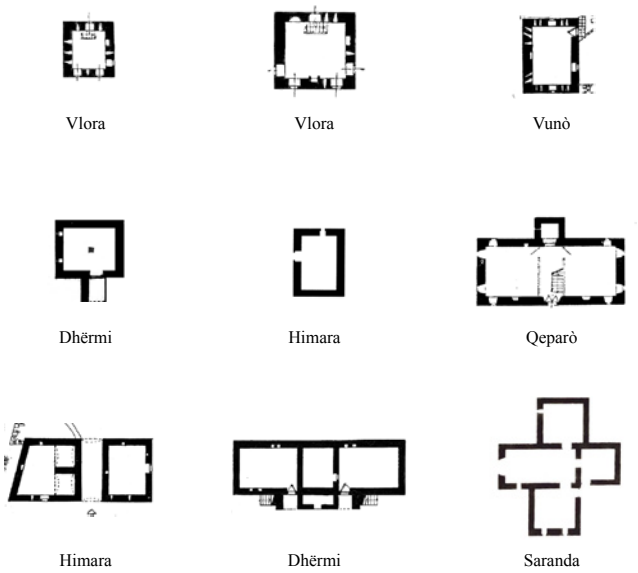

Fig.1 Houses of many rooms" – typical houses of the Riviera region of Labëria, Albania

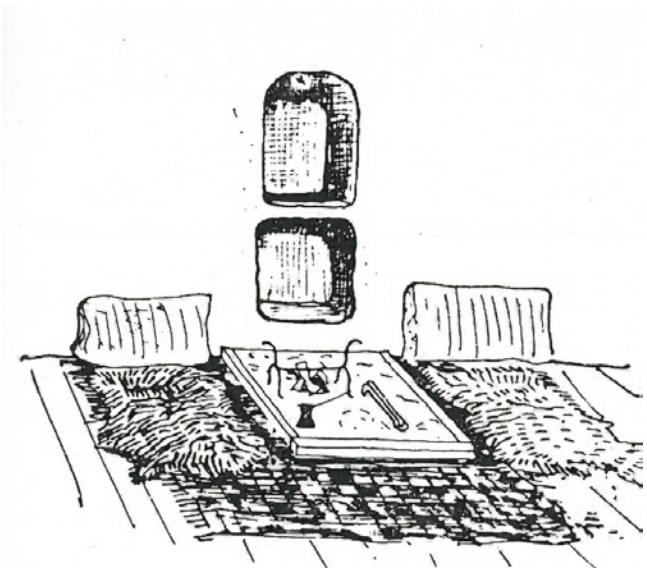

Fig. 2 Sleeping bed of the Guest's Room in Albanian houses

During the XVII cent. along these "natural walls" of mountains, small settlements were built parallel to the coastline, as a sort of archipelago of *domesticated* hills. The villages' morphological structure was basically a multiplication of regular forms of houses enclosed within irregular fenced gardens where streets and squares were just in-between spaces. This system can be intended as a spontaneous 'territorial project' of micro-factories strongly related to agriculture and the **οικονομία** (the economy) of the family structure. Indeed, the word factory means both a place of production and refers also to the possibility to put something under control and to possess it. This was basically, the archetypical logic of these Albanian dwellings, and thus it was shaped by two architectural elementary forms: the *garden* and the *room*.

In feudal times, pastoral farming in these areas was the very leitmotiv of dwelling that conformed also the shape of the closed garden. In order to maintain its reproductive character, the house had to be self-sufficient and both women and men were involved within agricultural production. The garden had thus a double character. It was both the place of accumulation and an artificial caption of the *common* land of nature. Its dimensions and spatial articulation determined both the morphology of these villages, and the status of the owners. Within these garden fence, the form of the house was a mere spatial translation of the *necessity* to dwell and work. Southern famers, unlike the patriarchal families of the larger Albanian cities (where man and women had separated spaces), didn't have pronounced hierarchies between members; their dwellings were just the result of the multiplication of one identical room.

Depending on many factors, this form of construction generated different compositions of domestic spaces: from the linear aggregation of the little villas to the vertical *Kulla* (tower) and from the one-room house, to the multifamily complexes. Horizontal and vertical distribution were usually solved by juxtaposing wooden loggias or stairs and other smaller volumes, like external niches and alcoves. The square shape of a *typical room* was never 'questioned' conserving thus its generic character. Function was totally disrupted by form. In the *Kulla*, for example, the room was both the place for cooking, sleeping, or for fighting external enemies from the embrasures. While these typologies were part of those residential complexes built for defensive purposes, the same happened in smaller houses where there was not a specific distinction *use* from one room to the other.

Petro Marko, the Albanian writer who joined Ernst Hemingway in the 30s, in the International Brigades in Spain, lived with his family in one of these houses in the village of Dhërmi. Although Marko, passed much of his life trying to struggle the fascist regime, living in different prison cells, from Ustica to Regina Coeli (Marko, 2007), we prefer imagining him writing in his own bedroom on the top of the Ionian nature. We prefer to describe his rituals, by imagining a fragment of his creative domesticity, away from persecution: a room full of books and manuscripts, a typewriter on a table, an ashtray with a cigarette on it and the small little window framing a portion of the southern forest and the Ionian Sea.

In Albanian coastal villages, the room was a sort of universal basic space allowed to every family component. As the Albanian architect Emin Riza notices, when new marriages happened, new identical rooms were built inside or close to the garden (Riza, 1984). Children's houses had to be close to their parents' home for reciprocal needs. These facts relieve also an ambiguity of this epoch: on the one hand they demonstrate parent's control on children's life but on the other hand, dwelling was a *process* of making equal rooms. Moreover, in Albanian tradition hospitality was also part of living

considering that every house had always an available room for temporary peasants, travelers or relatives.

Of course, all this scenario is undoubtedly the archetype of our relation to family and private property ideology, but at the same time, this archetypical operation belongs to a conception of dwelling without hierarchies, which necessarily refers to a more general nature. Houses of equal rooms is an architectural thematic that could be easily adaptable to contemporary uses. In fact, this validity is being unfortunately recognized by private interests. On the one hand, the villages of Vunò and Dhërmi, that are the most accessible ones, are today undergoing gentrification processes. The government policies are envisioning large mass tourism that exploits the "historical appeal" of these houses and better adapts to hotel and b&b uses. On the other hand, fortunately, other villages (like Himara and Qeparò), conserving an isolated quality, are still resisting in *silence*.

2.2. Houses of lost time: Latiano's House

Another interesting case study is represented by some southern Italian traditional houses such as for example Latiano, which is a small town in the inland countryside of the Salento region. The city is located halfway between Brindisi and Taranto and halfway between the Adriatic and the Ionian Sea, therefore it is far from both the major urban centers and the sea, living in the silent and vast plateaus that precede the Murge hilly system.

Even in the etymology of its own name - from the Latin *latius*: wide, spacious, or *latex, laticis*: water source - it is possible to grasp the agricultural vocation of these lands. The people of Latiano have been (predominantly) farmers for generations; the connection with the fields has characterized their life since the origins of the city itself, and then this character has reverberated in the local culture, in the way of building houses and streets, squares and courtyards - the whole city - and even in the citizens' way of life.

In this respect, the words pronounced by Heidegger (Heidegger, 1954) - which researched the origin of the word "to inhabit" referring to the ancient German word *buen* (which means at the same time to live, build and cultivate) - seems to be very effective in describing Latiano's architectural and cultural heritage. Here, the historical process, crystallized in the forms of places, has been strongly characterized by a mutual interaction between agriculture, architecture and life – an interaction which has been useful in order to achieve men and women's needs through the agricultural use of the fertility of the soil and through the architectural interpretation of the aesthetic characteristics of natural places.

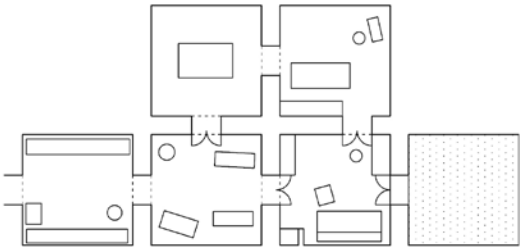

Fig.3 Typical Diagram of the Latiano House

The traditional Latiano's houses can be considered as one of the most representative products of the southern Italian peasant culture: their forms are humble and essential, and therefore they are ancestral (namely linked to some primordial human will and conceptions of life) and universal (namely linked to some common human needs and ways of life). A profound element of necessity characterizes them and constitutes the peculiar expressiveness and functionality of the Latiano's traditional houses. This character is linked to the parsimony of the means of productions used to achieve both practical and aesthetic aims.

In the ancient city, the houses have been built as an enfilade of rooms obtained through the homogeneous iteration of the basic nucleus of the singular room, which had canonical forms (almost quadrangular) and dimensions (approximately 5 x 5 meters). The aim of this construction method was to research and develop with an extreme naturalness - which sometimes becomes elegance - the simplest way (and the simplest form) to meet the different everyday needs of the peasant's life. Sometimes, the elementary cells of the domestic rooms join together in order to give rise to larger spaces such as the living rooms, and other times they are omitted in order to let the amount of light and air through some patios.

However, this open-air room – the so called *ortale* – is the place that represents the heart of the Latiano's traditional house, which value consists in its balanced relationship with both functional and expressive requirements. It is useful for satisfying both the practical needs related to the economy of the house, and the aesthetic needs related to the representation of domestic life.

As its name suggests, the *ortale* (from the Italian word *orto*) has been originally conceived as a small vegetable garden, but it has been also used as a little, temporary storage of crops (walnuts, almonds, oil or olives, wine) and firewood, or also as a drying room, an open-air laboratory for potters, artists and sculptors, etc. But, at the same time, in the middle of the house, far from the noise of the streets and from the strangers' eyes, the space of the *ortale* has also been conceived as the most intimate and pleasant place of the house. Thus, it is a place for production (work) and reproduction (domestic activities), but it is also a place for leisure; it is an intimate, enclosed and secret place, but it is also able to establish a harmonious relationship with the external forms of nature that permeates even the most hidden spaces of the house. This room is designed in order to allow the experience of an extraordinary intimacy: in fact, the people of Latiano have grasped the possibility of relating a piece of land with a piece of sky inside their own dwelling, through the definition of this very simple architectural typology.

Moreover, the aggregative principle that builds the traditional house of Latiano as a set of single and autonomous rooms has been also adopted to build the urban blocks, conforming the urban design of the whole old town center of Latiano as a single "anonymous but choral" architecture (Buzzi Ceriani, 1955). Urban blocks are made up of the agglomeration of all these houses with *ortale*, that have different shapes (which depends on the aggregation principles), but retain the same regular and not hierarchical structure built of both indoor and outdoor rooms put together without corridors. Also, the block circumscribes other internal courtyards and small gardens. Through their repetition, the closed, compact and at the same time permeable and porous urban blocks conform the peasant *borgo* as a city made up of many private rooms with a view on little "secret gardens" and collective courtyards and streets.

This peculiarity reveals a singular relationship between the individual (represented by the rooms) and the community (represented by the forms of the urban blocks) that seems to be composed according to a clear principle of organic continuity, which is also and physical, material. This principle is radically different from the one which mediates the relationship between individuals and collectivity through the forms of modern apartments, which segregate the community into classes of workers, families, elderly people, etc.

Finally, it is also useful to observe that, within this continual repetition of the single room, the identity of each domestic space, the singularity of each rooms is defined by the furniture and, in general, by all the objects placed inside the rooms. Rather than curb the expressiveness of individual, the structural homogeneity of the house exalts it by providing a neutral and uniform background and by creating the physical substrate of a code of common values: it represents an "aesthetic superstructure", a common language that has been unanimously recognized by the whole community.

During our visits, the personalities of the men and women who inhabited these houses were especially expressed by means of the objects that surrounded them, in a sober and simple way. By entering these houses (such as the "sculptor's house"), it was inevitable to become trapped in a continuous game of "*correspondences*", which expressed many possible meanings, but emanated the aura of a single, unique and total sense, which is ancient and common, collective and universal. Each corner was able to refer to something else, to reveal some meaningful details, and therefore to stimulate the thought, freeing the mind and inviting it to follow these strange and old-fashioned "atmospheres" of domesticity between reality and imagination. Each object seemed to be "lost in time", maintaining a strong link with the mysteries of the past civilizations that build these places. Through their simple forms scratched by the flow of time, these rooms seemed to remind us a common origin, which binds us together as human beings and which binds us to the natural world.

3. Toward a new "Mediterranean atelier"

By the intention of recognizing the possible lifestyles underlying architectural forms, the descriptions of the traditional houses of Latiano, Qeparò, Vlorë or Himara allow us to recognize the presence of a common paradigm, which seems to be expandable to a larger area including, in addition to the southern Italy and the Balkans regions, all the rest of the Mediterranean basin. This paradigm defines a sort of unity of the cultural languages (including the architectural one), which we could define as a *vernacular tradition (*Sabatino, 2013: 273-285) and which is primarily characterized by a deep "character of necessity". This character reverberates in some architectural principles which can be principally summarized in some main concepts.

First of all, the significance of the peasant's cultures, of local vernacular living traditions, which suggest some alternative possibilities to the dwelling models proposed by the real estate market nowadays. We think that it is true that this way of doing and thinking has been typical of those pre-industrial civilizations that during the recent decades have been relegated "to the margins of history and official culture" (Buzzi Ceriani, 1955). But, it is also true, on the other hand, that the isolation has allowed these civilizations to progress for a long time according to development models which are radically different from the logic of commercial gain and from the promotion of mass- and consumer-orientated cultural models.

> These civilizations have lived their own history of resistance and have elaborated their own culture, which includes also the architectural and urban design principles that they have set themselves (Buzzi Ceriani, 1955).

Fig.4-5-6 Towards The Ortale Room, Latiano's Sculptor House; Sculptor's Living-Working Room; Sculptor's Atelier Room

This is why we decided to deal with the study of these dwelling models and with their underlying ideas developed by: because we believe that in the vernacular cultures of the Mediterranean world are hidden some characters that today could be considered "revolutionary". Throughout the centuries, these forms (and these ways) of living have resisted the sudden historical changes. Today, they seem to be able to propose again to our renewed contemporary vision and to provide some interesting food for thought that can contribute to the elaboration of new housing models and ways of life. Furthermore, these models constitute themselves as possible and real alternatives to those imposed by the contemporary global society, which is creating increasingly unsustainable problems in the environmental, social, economic and working conditions.

Compared to the contemporary urban cultures, a lot of Mediterranean vernacular and traditional civilizations have developed different and closer relationships with the natural surroundings, with the local characters of the places, achieving in generating meaningful relationships between the house and the surrounding forms of the nature.

From the architectural point of view, the elementary structure of these traditional houses represents the most important key principle: the autonomy of rooms inside the house and, at the same time, the autonomy of houses inside the urban block. The not hierarchical organization of rooms and dwellings comports the possibility to change, interact, modify together the form of houses and also the form of cities and communities, as organic systems, composed by different and interrelated parts and elements: collective groups of autonomous individuals and families, which should change and evolve time by time. This kind of structural configuration consents the creation of close neighborhood relationships, based on sharing places and boundaries, spaces and walls.

Furthermore, the homogeneity of the morphological, spatial and constructive structure of houses and urban blocks offers the possibility to build a communitarian system of urban values, defining itself as a kind of background for

the individual representation.

These themes – *houses of rooms,* the *cities of many rooms* and the *city-nature* – are both architectural ideas and concrete conditions that really exists and that are rooted in the ages where living and working was a necessity of one's own and not submitted to someone's else – not far away from the centers of the provinces of capitalism. Although forgotten by mainstream politics and culture, this ideal of organic society is still latent in the "subversive beauty" hidden in these poor provincial architectures. Although this beauty is deeply and uniquely identifiable with the human processes underlying its conception and construction (Quistelli, 1986: IX-XI), it is also real and concrete, and thus it is available to be physically occupied and to be culturally and intellectually interpreted.

For this reason, we have tried to clearly define the theme and the methodology to be adopted for subsequent necessary researches: the subject consists in the analysis of those forms of houses that singularly characterize the vernacular Mediterranean communities, and that seem to develop an organic dialectic between the autonomy of the individuals and their cohesion in a whole community.

After the focus on the themes and methodology, the next step will consist in a collective research focused on the study of that large number of similar frameworks scattered all over the remotest provinces of Mediterranean area. Through the comparison between some different architectural and cultural heritages, which need to be analyzed in relation with the principles of liberty and of resistance incorporated and expressed by the spatial, functional and architectural features of houses (and of urban collective spaces), as well as expressed by the particular lifestyles that are still alive in these amanous places, the final objective will consist in producing an atlas of these meaningful *heterotopia*.

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The lamp design in the traditional home environment of the Mediterranean area

Alessandro Dionisio[1], **Antonella Semeraro**[1], **Lucia Zagalolo**[1]
1. Polytechnic of Bari, Italy

The paper aims to investigate the relationship between the traditional lighting de- sign and the home environment in the Mediterranean context. The cultural aspects and the productive factors in the production of the table lamps are the basis of an analysis which tries to re-discover the ethical value and the social significance of the Mediterranean design approach, where the word 'Mediterranean' is not intended as a fashionable formal approach but a rather critical attitude based on the correct use of traditional materials, artisanal manufacturing and attention to the local context. The paper identifies the work of the Italian architect and designer Umberto Riva as one of the most important design experiences of the last decades which offers a very clear and inspiring interpretation of the so-called 'Mediterranean design'. Considering the Riva's lamps as a proper transposition of the concept of 'artidesign' as illustrated by the historian Renato De Fusco, the study goes through the work of Riva analyzing its multiple and integrated contribution in the fields of architecture, design, art and graphic. The lighting design artifacts actually constitutes a synthesis of these different interpretative perspectives and, at the same time, they can be considered examples of 'centripetal design' in which becomes extremely clear the harmonious co-existence of different aspect, both conceptual-philosophical and technical-practical.
Afterword, three lamps are chosen to investigate in detail the concepts above mentioned: the Lamp E63, which dialogues with poor materials and with sculptural forms, the Lamp DILEM, symbol of a process of design democratization, and the Lamp Veronese, expression of the craftsmanship heritage and of the regional productive knowledge.
Finally, the paper presents a prototype of a table lamp which comes from a design experimentation that, re-interpreting the Riva's design philosophy, tries to integrate the product design components with the architectural elements.

keywords: Traditional, Table Lamp, Design, Light Design

1. Mediterranean design

The research "The design of the lamp in the traditional domestic environment in the Mediterranean area" is based on an analysis of the cultural and productive factors that combine the unique character of Mediterranean design by identifying recurring themes at the basis of Mediterranean design: the attention to local materials, a preference for handicraft production and the morphological study of the context.
The research starts from an epistemological framework relating to the term "Mediterranean" which derives from the Latin mediterraneus, composed of "medius" and "earth", plus "aneus", or sea basin that is circumscribed by lands.
Different meaning assumes the term "Southern" that etymologically comes from the Latin meridionalis, from "meridies, medius-die" that is "south", because situated precisely at noon. The Mediterranean Design defines a territory whose the sea is the leitmotiv, unifying the different ethnic groups that over the centuries, thanks to it, have had the opportunity of interfacing each other.
Over time they have developed a style (albeit typical of their own people) that can be traced back to that of its shores. The territories, in particular in a situation such as the Italian one, have productive, tourist, cultural, food and wine resources to be valued, but very often in companies and public bodies, there is no "know-how" necessary to design and develop processes to enhance these resources.
Today every territory is in fact a node of a worldwide network and is called to participate in the network and to connect with the other areas: a territory that is not exploited, in fact, that does not participate in this network, is destined to remain marginalized and to live nostalgically of memories only. In this framework, the idea of Mediterranean design is a design that aims to define a personal identity of each country along with a trait of "Mediterranean" common to all.

Design Mediterraneo is, for example, the language of L.A.N.Design (Local Area NetWork Design) whose purpose is to reflect, share, draw, make, tell, and spread the heritage of resources of men and things. In the specific, the L.A.N. Design is so defined below:

Local, in the sense of a project that has its roots in the place, in the reference land from which to extract traces, signs, fragments, for the design of places that become events. Area, soil intended as a common good, limited non-renewable, physical surface that can be seen, touched, listened to, tasted, perceived. Network, as a network of meetings, of real incentive of people who share a path of doing that starts from their own land.
Key elements of a design representative of this territory are the use of balance between the parts that denounce the structure, use of simple connections, absence of unnecessary decorations, but above all use of local forms and materials as well as a close correspondence between function and technical-morphological components.
This concept of design represents an idea of "supply chain" that starts from the knowledge and the interest for the territorial themes of the place up to reach the project of the detail, combining technologies and materials with forms and parts functional to the service of the product. An "abacus of recurring types and characterizing elements", whose knowledge and cataloging is useful for the definition and rewriting of a Mediterranean, rural, rustic language for contemporary and recognizable products thanks to careful and continuous research.

2. Design between Text and Context

The contribution of design to the territory is the expression of another important relationship, namely that between Text and Context, where the Text is represented by the object, and therefore in our specific case by the lamp, while the Context from the place with which the text relates: the home environment. This report clarifies the basic principles of living, highlighting the way in which the object creates a connection with the environment. With the environment it generates a unitary and never extraneous system. The context thus becomes a long in which all the elements have a connection between them, nothing is given to chance and above all each element is designed to create a context and not to adapt to it. This connection is particularly relevant in our research case, namely the analysis of what can be considered one of the main elements of the home environment: the lighting system. In a context where everything is part of the same communication network, the lighting system makes it possible to define connections arising from specific design interpretations, starting from the basic principles of Mediterranean "*living*". The concept of *habitus* has entered our language and, in fact, we use terms like *habitat*, *habit* or *ability*. In the Latin language habitus derives from the verb to have "*habeo*" (to have, to behave); but it is also a noun with the very important meaning of "appearance", "quality", "disposition" and "behavior". *Habitus* is also derived from *habitus* which indicates habit, familiarity, and custom. This means that the concept of living is actually something more intimate and connected to the environment itself. This principle is at the basis of Mediterranean Design because, more than in other territories, the "Mediterranean designer" plans to live in connection with the territorial context reflecting colors and moods linked to nature and the landscape.

3. Low Tech versus High Tech

The third fundamental theme of research is that of production processes, to which the question of the relationship between low technology solutions and high technology systems is linked. Often in contrast to an uncritical propensity towards high-tech, low-tech is an approach that prefers the use of simple and low-cost materials, technologies and construction systems, in addition to the definition of simplified and economic construction details, in line with the requirements of environmental sustainability and reduction of production costs. A low technology approach reduces consumption and offers more sustainable energy choices that adapt to current environmental needs and can provide solutions to the economic and energy crisis that are characterizing the beginning of the new millennium. The low-tech model provides, in fact, both the use of natural materials and traditional technologies in continuity with the established historical tradition that exploit the energy resources available in nature and optimize the conditions of environmental comfort, the use of traditionally neglected industrial materials and technologies (metal mesh, textiles, plastic, glass) or the recycling and/or reuse of materials and waste components. All this optimizes the cost-benefit ratio and reduces the environmental impact of construction in terms of energy used for industrial production and waste disposal. The limitation of budgets and the simplification of construction processes, become a creative opportunity for many designers who experience new forms and new language expressiveness, including through DIY techniques, assembly of traditional materials and components, entrusting the quality of the artifacts to a combination of environmental, social and economic factors that contribute to their sustainability and their rooting in the context.

Lighting design between naturality and artificiality

Domestic lighting consists of two components, one coming from natural light, the other from artificial lighting. The design of the lamp for domestic environments must therefore take into account these two levels of lighting:
Natural light (direct solar component, diffuse light from the atmosphere).
Artificial light (luminaires and lighting systems).
In order for the internal system to be optimal, the relationship between these two lighting elements must be considered: in a Mediterranean context, where natural light has a fundamental and a role of identity, it is important that before lighting an environment, consideration is given to how natural light comes into space, its intensity and inclination, how it interacts and what effects it causes on objects in space. In the light of these considerations, the design of artificial lighting of a domestic space "dialogues" with the light which illuminates the same place during the various hours of the day, consequently this relationship in a territory like the Mediterranean becomes extremely characterizing also the aesthetics of the artifact lamp.

4. Umberto Riva's design and the survey about the shape

The architect and designer Umberto Riva clearly represents the Mediterranean design theme declining with great ethical awareness questions related to the relationship between project and specificity of the environment context through attention to construction detail, a propensity for simplification, an interest in artisanal production process and traditional materials. About lighting design, Riva offers an interpretation of the lamp artifact in which the object, with the plasticity of its form, its colors and its handling system, becomes part of a broader and more unified vision of domestic living as "interior" in constant dialogue with the "exterior".
Since 1963 Umberto Riva made lamps for companies such as Fontana Arte, Francesconi, VeArt Scorzè, Barovier&Toso, perfect interpretations of the relationship between design and the Mediterranean context, today rediscovered as point of reflection on the relationship between craftsmanship and industrial production. Each lamp is for Riva an exercise about the shape that bases itself on three fundamental principles: attention to detail as point of observations and element to be designed at its best, the use of the material seen as a medium by which the form can speak, the artisan production, strong about its uniqueness, that becomes a way to tell the story of the Mediterranean culture.
One of the most important witnesses of these principles is the E63 lamp produced for the very first time in 1963 by Francesconi (Fig. 1).
This table lamp was designed for an Artemide competition about plastic; however only in 1991 the lamp was re-edited in die-cast aluminum to have greater lightness and surface elegance. Its simple lines seams to wrap and shape the light, a shape legitimized by use. This lamp represents some recurring themes in interior design by Umberto Riva: propensities for broken lines, disjunctive between surfaces, symmetries, attraction for instability, the propensity of closed forms. In 2015 the collaboration between Tacchini and Riva brought a reissue of the E63, this time in steel, then copper and bronze, to renew the dialogue between matter and meaning.
Another important Riva's lamp is the LEM, designed in 1973 and produced for the first time with semi-transparent fiberglass lampshade by Francesconi (Fig. 2). Several years will pass before a new edition by Fontana Arte in 1991 in which the product will be called DILEM with the opaque LEXAN plastic resin lampshade.
The product initially appeared as a desk lamp without support base (it would be hooked to the top thanks to the die-cast aluminum clamp connected to the bracket), but with the re-edition was opted for the pedestal that guaranteed stability on the surface thanks to the weight of the structure.
In 1992 Fontana Arte published a less famous appliqué lamp made just from the plastic resin lampshade. Unfortunately nowadays out of stock, in 2015 a 9 piece limited edition reissue between DILEM and E63 was edited by Antonia Jannone.
A third interpretation of the Mediterranean lighting design style is obviously the Veronese lamp, designed in 1984 and produced by Barovier&Toso. Umberto Riva fascinated by Murano glass blowholes, was inspired by the classic Venetian Veronese vase, restyling it in a modern way with the aim of highlighting the matter qualities, those that consist of diffuse an indirect light, combining tradition and innovation, exploiting the main characteristic of a material typical of a specific territorial context (Fig. 3) The Veronese table lamp consists of three parts: the lower part consists of turned brass sheet base with two wooden supports, the first ones holds the main part of the lamp, the latter allow the attachment of tie rods; the central part is the glass ampoule in which are located the tie rods and along the central shaft there is the crystal reflector; then the upper part consists of several burnished steel finishing elements and a support slab that allow the upper anchorage of the tie rods that firmly support the lamp, setting free the glass from maintenance.

5. Design experimentation: the VIRA lamp

The last phase of the research had the purpose to analyze the Mediterranean design notions through experimentation and design of a table lamp. The incipit of design thinking derives from Riva's work according to which the design of the object is integrated with that of the architecture and therefore of the construction

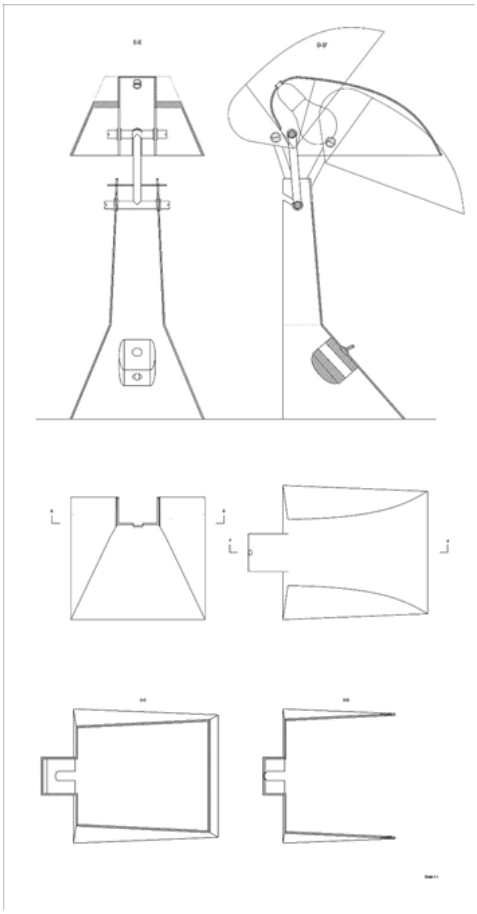

Fig. 1: U. Riva, E63 Lamp, 1963 (drawings by the authors).

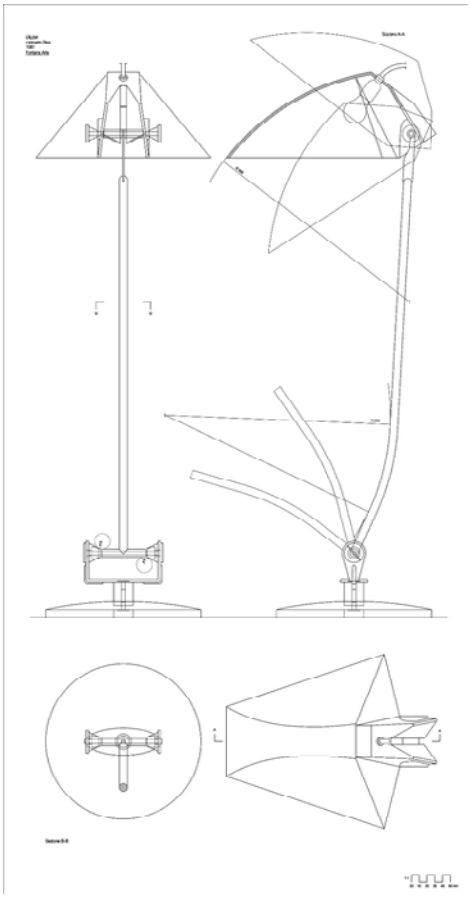

Fig. 2: U. Riva, Dilem Lamp, 1973 (drawings by the authors).

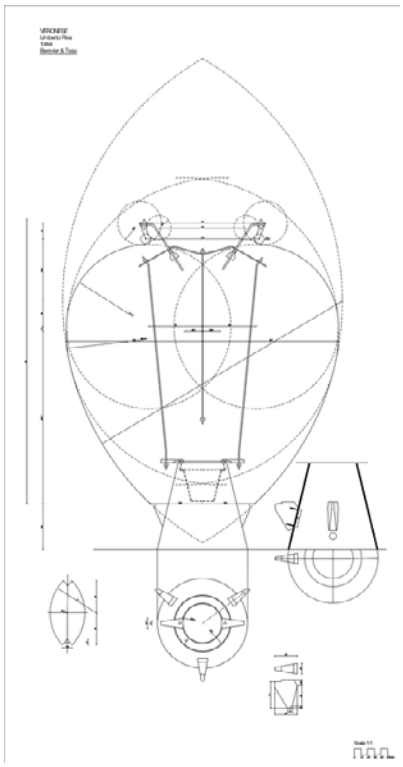

Fig. 3: U. Riva, Veronese Lamp, 1984 (drawings by the authors).

elements (Fig. 4). It can be stated that the design of the lamp derives from the synthesis of the latter. To further integrate the methodological approach there is another founding principle: in details lie the essence of the project itself and the final form can be interpreted as a system of in-depth analysis. A careful observation that goes beyond the concept of the artifact, allow us to glimpse new interpretative possibilities that bring out symmetries between architecture and design. An attempt to connection between these two worlds was made by us, trying to reinterpret one of the constructive elements from the project of "Casa Insinga", bringing it to a totally new use related to lighting industry.

The VIRA lamp is a table lamp of dimensions 80x37x16cm made of a system of folded sheets metal tops. Entirely made of rough iron, to underline the elegance of simplicity, the purity of materials represents the adherence to the founding principle of low-tech. Its production largely follows that of E63 and DILEM because made of 3mm thick sheets obtained by die-casting, folded thanks to the press equipped with hydraulic arms. Made the base structure, of dimensions 49x5x10cm, on the sides two covers are welded, keeping the structure opened, shaping the characteristic "C" section. This part relates with the arm, made of the same material, thanks to a "Double T" joint which allows the rotation to direct the light according to the user's need. From here the upper part of the body is connected, made by a 20x7x2.5cm arm, also in iron, which will

Fig. 4: U. Riva, Detail of a window system, Casa Insinga, 1987 (De Curtis, A. (2015), Dialoghi con Umberto Riva. Figurazione. Alla ricerca della forma, Milan: Christian Marinotti, p. 175). (created by author)

be free to rotate around the axes. The joint relating the arm and the lampshade occurs through a tubular element, fixed to the arm itself. The lampshade is obtained by laser-cut from an iron plate of 3mm, then bended to a diameter of 5cm to obtain two parallel walls next to a semi-circumference. This procedure takes place by “bending” around a cylindrical section mold, similar to the folding of the E63 plates. The E14 bulb socket will be fixed inside this cover. In both joints, to avoid tearing due to friction between the structure and the joint itself, there are protective rubbers at the intersection of these. The inclination is guaranteed by blind nuts which, by tightening, block the arm in the desired position. As a roof, a 15x25x0.2cm slab overhangs the structure: welded to the shell, it not only allows the articulation of the upper part but also protect the user from possible glare, hiding the luminous bulb from the view. It can also shield the top from the surrounding light pollution, being able to concentrate the light beam coming from the shell (Fig. 5).

Fig. 5: VIRA Lamp (Design: A.N. Dionisio, A. Semeraro, L. Zagalolo; Supervisor: V.P. Bagnato).

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Innovative Processes: Cities

[IP:C/01]

Ultra-residential
Architectural Explorations in the Roman Countryside

Lina Malfona[1]
1. Università di Pisa, Largo Lucio Lazzarino, 56122 Pisa, Italy

In the eighties, the Californian writer Alvin Toffler envisioned the home as a place of residence, work and entertainment at the same time. Anticipating the digital revolution, he affirmed that new systems of production were beginning to take workers out of factories and offices, putting them back to the home or rather, toward "the electronic cottage," a new idea of suburban living supported by teleworking. Even today, according to Rem Koolhaas, suburban space is where the most radical transformations are taking place. In recent years indeed, widespread drone use increases aerial transport, eliminating the need to live in the city center. A number of companies have begun to use unmanned aerial vehicles to produce shipments. Amazon uses drones to place large packages inside factories and to deliver mail to residences, Google is experimenting drones for medical aid, and Facebook wants to use them to spread Internet in the parts of the world that are not yet connected to the physical web.
Looking at these precedents, this paper investigates peripheral architectures which reaffirm the value of the countryside within a technological and digital society. In particular, this research reports a vision for an archipelago of single-family houses, designed and built in the countryside north of Rome from 2010 onwards. These buildings introduce an innovative ultra-residential house typology: a suburban villa which combines private and public realm, at a time when not just business but also collective life takes place at home, once again. This design implements a symbiotic relationship between architecture, engineering and digital technologies in order to create low-cost, energy-saving, and self-sufficient residencies, almost disconnected from any kind of public network, and equipped with devices that allow drones to land and to be encapsulated within the dwelling-place.

keywords: Alvin Toffler, Reyner Banham, Suburbia's Separatist Geography, Collective Individualities; Drones

1. Introduction

Due to the current recession, Italy may risk to implode as some of the most ancient states in Europe. In this country the notion of Western universality has been even questioned by economic and social conditions before architects can challenge it through design. Cities are no longer safe, corruption and mafias undermine Rome like the birds which are taking over the city, flying over the garbage on street corners and gathering on the top of roof terraces, in a way anticipating a future like the Hitchcock movie "The Birds". This paper tells the story of an archipelago of villas, designed and built from 2010 onwards, when a high number of families started to get away from the capital city toward the countryside of an unpredicted *upstate* Rome. Considering the large number of families, we must view this voluntary relocation outside the capital as a social and economic phenomenon—one that is somewhat unexpected and goes against the contemporaneous trend of population explosions in big cities, and one that must certainly also be analyzed through the lens of Rome's inefficient public services. These families moved to the suburbs in order to raise their offspring and indulge in passions and hobbies far away from the frenzy of the city. Also, they accept an enormously inconvenient commute in exchange for a range of advantages: a house surrounded by a pleasant landscape, away from the city's pollution and located in an environment that meets their needs and expectations—which include essential services, schools, gyms, cultural centers, restaurants, and agritourisms. In the suburbs they live a lifestyle that, while comfortable, is also devoted to concentration and a kind of enlightened isolation based on total immersion in the landscape. These assets are not mere compensations for the distance from the urban center; rather, they are viewed as an antidote to urban stress. But although, on the one hand, isolation from the city is synonymous with a voluntary rejection of urban corruption, on the other it reinforces a kind of elitist culture. This two-sided nature of suburban living has been read as a starting point

for the design process, which has been carried out according to different strategies—explained in the following paragraphs—and bringing up to the development of three design proposals.

Fig.1 Lina Malfona (Malfona Petrini Architects), An archipelago of villas in upstate Rome, 2018

2. Collective Individualities. Overturning Suburbia's Separatist Geography

Thomas Jefferson defined the villa as a place for an ideal suburban society, far from the city's corruption. In the neo-Palladian house he designed for himself in Monticello, he sought the development of a new type of society derived from the model «urbanity without urbanism», the potential of this model was later recovered by Frank Lloyd Wright through the residences he built in Wisconsin and Arizona (Koetter, 1987: 11).

The process of construction of single-family houses in the landscape helped to build up a new idea of suburban sociality, which involves a private as well as civic dimension. In the framework of an ongoing process of *homification*[1]—when social interaction moves inside home, bringing up certain old ways of coexisting—this research deals with a designed and built utopia. This vision gave rise to an innovative house typology, an *ultra-residential villa* which combines private and public realm, bringing not just business but also collective life at home, once again. In *upstate Rome*, privacy means security and it is intended as a way to control[2]. Here towering laurel hedges, separating villas with pools from the street, are the status symbol of wealthy Roman entrepreneurs, artists, actors, showmen and singers residing in the luxurious suburbs to the north of the city since the Seventies. However, in the suburbs, home is the place where people usually gather, where they start their own practice, the privileged place where conversations with neighbors, friendly meetings as well as formal dinners take place. Following these social practices, a collection of villas has been created: each of them has a collective area, which allows the residence to be used as a private-collective property, in order to increase the number of amenities in the suburbs. The result was the construction of a series of *ultra-residential villas*, among which a guests-house, a weddings villa, a house-restaurant, a house-studio and a child-minding home, located a short distance from each other. Due to the current economic instability and the gradual reduction of Italian family members—consider the high number of young people leaving Italy for studying and working abroad—the design and transformation of the villa into an ultra-residential house typology turned out to be very fruitful. The new spirit of sharing economy together with the production of architectural innovation has proved to be a profitable entrepreneurial strategy for many families who had to address the issue of reinventing their own structure.

1. I use this term in order to explain a practice—which is very common in the suburbs—according to which people start their practice at their own home, or they launch their own business in buildings which were used to be residences.

2. About the relationship between privacy and architectural devices to ensure security, see Malfona, L. (2018) Building the Landscape. Residential Pavilions in the Roman Countryside, Siracusa: Lettera Ventidue, chapter I.

Fig.2-3 Lina Malfona with Yuzhen Zhang, Formello Urban studies: property lines; fences, 2018-19

3. Architecture and Technical Thought. A holistic perspective

The gradual detachment from the conception of architectural space as a physical place has led to the negation of the traditional conception of space itself, projected instead toward a virtual dimension. Along with the loss of space physicality—caused by the development of emerging technologies, computer science, telecommunications, and bioengineering—its uniqueness has also been lost, as an effect of a globalization. If, at one time, buildings were an integral part of the space for which they had been executed, because the uniqueness of the place exalted the meaning of the work, today architectural design follows the demands of a fluid and volatile society, who feels at home in so many places and in no one in particular[3]. In this way, architecture becomes less and less site specific, aiming for a global dimension in all cases. But a language that wishes to become immediately global without passing through the local dimension often risks becoming an inefficient fusion of languages, an incomprehensible Esperanto, no longer capable of reaching the heights it needs in order to become global. These changed conditions of design have led to an opening-up of the conception of the building as a flexible contraption, which reflects the «dichotomy between taking root and moving across» (Malfona, 2018, 33). Located beyond fixed, static frames of reference, architecture acts as a devise that is still in the process of becoming and that, despite its formal configuration, preserves the possibility of transformation.

In the preface to *L'habitat pavillonnaire* (1965), Henri Lefebvre explained how applying technical-analytical modes of analysis to architectural and urban questions had reduced the idea of inhabiting a place to mere issues of residing somewhere, through the concept of *habitat*. According to Lefebvre, this kind of positivism rejects the Western idea of depth in order to tend toward a superficiality that is «accepted, desired, and proclaimed as such, and identified with the dominance of technical, economic, and scientific questions» (Lefebvre, 1965: 7). An enormous gap separates this technical thought from Gaston Bachelard's *poétique de l'espace* or the fusion between constructing, living, and thinking proposed by Martin Heidegger. According to Lefebvre, the obsession with measurements and calculations had obfuscated the tectonic and poetic components of dwelling, and, in so doing, had also obfuscated

3. About the concept of liquid and volatile society, see Bauman, Z. (2000), Liquid Modernity, Cambridge UK: Polity Books.

the centrality of the subject in the creative process. Even today, technical-analytical thought dominates the intellectual landscape, especially in the American context. This mode of thinking proposes a specific analytical model

Fig.4 Lina Malfona, Private/collective space: Slot House, 2012-17; House in the Woods, 2015-; La Villa, 2011 lines; fences, 2018-19

which no longer dwells on writing processes and instead explores investigative fields beyond the architectural domain or the design boundary conditions: the architectural design's context, its social, political, economic backgrounds and its implications. Form, too—understood as an authorial product—is considered irrelevant in and of itself, and almost autistic if it is not supported by a philosophy that legitimizes it and whose foundations are ideally located beyond the borders of architecture. Scientific, engineering, and technological innovations foreshadow an epistemological rupture, whose scale is affecting the whole design processes[4]. How can design culture join technical thought? And how can architectural form be legitimized by technology?

Fig.5 Lina Malfona (Malfona Petrini Architects), Houses for Drones, Model A; Etruscan tunnel, Formello (Roma)

The designs presented here focused, at first, on the form of the house, considering the art of building as a plastic art that works, sculpts, and models its material. But the satisfaction that derives from making form as a final product was not enough. Then reflection began on the need to produce low-cost artifacts, introducing economy into the form. For this reason, the house was conceived as a local product: it was built by a local workforce with local goods and materials, and thus it was also conceived as an economically sustainable product. When these dynamics had enhanced the features of these structures, the need to make them flexible and technically advanced

4. The concept of epistemological break is by the French philosopher Gaston Bachelard, and it was later reformulated by Louis Althusser and Thomas Kuhn.

became a priority. Thus, experimentation on the house moved in the direction of enhancing its technological devices, through the Reyner Banham's rereading of Le Corbusier's concept of the *machine à habiter*. Whether the house is handmade or mass produced—according to Banham—the house, like the car, is a sophisticated object. To enhance the house's form, then, is not merely to insert technological devices to make it flexible; instead, a holistic integration of these devices must occur during the very production of the form. A double roof responds to bioclimatic needs, but—through the use of the shell, seen as either a filter or an open-air room or porch, as the public frame of a private object—it also provides a solution to the passage from the house's core to the surrounding landscape. A chimney is a necessary source of heat or aeration but it is also the house's formal unifier, its fulcrum, its womb. The portico is a technological device that provides shade, but it is also an element that can be used in different ways, as a framework to access the house but also as a space from which to gaze.

Fig.6, 6.1, 6.2 Lina Malfona, Houses for Drones, Model C, 2012-17; Twin Houses 2009-12; Sketch House, 2011-16 (photo by Matteo Benedetti)

In each of these cases, these devices would be pointless if they did not conform to new needs of the houses' inhabitants and, in general, with the emergent needs of the digital age. Then, only when housing innovations anticipate the needs of a budding society can we claim to be producing a new residential model.

Each of the houses outlined here has high energy performance because architecture is merged with engineering, thanks to the combination and synergy of different techniques, including those related to the construction of the building envelope. In each of these houses, passive systems, such as the solar greenhouse and ventilation chimneys, have been used together with technological systems (underfloor heating, heat pumps, water recovery and purification plant, photovoltaic panels, solar thermal and artesian wells), managed by home automation. Houses are detached from any type of network except the electric one because experimentation in the field of energy accumulators fed by the photovoltaic system—which could replace the use of electricity—has not yet produced excellent results in terms of price performance. One of the sharpest critic of American culture, Reyner Banham wrote the text *A Home is not a House* (1985), where he reported that thousands of Americans had already shed the deadweight of domestic architecture and live in mobile homes. But the truly innovative compass of this phenomenon, according to Banham, is the disconnection of mobile homes from any network, a result which has not yet been achieved so far:

> *«if someone could devise a package that would effectively disconnect the mobile home from the dangling wires of the town electricity supply, the bottled gas containers insecurely perched on a packing case and the semi-unspeakable sanitary arrangements that stem from not being connected to the main sewer—than we should really see some changes». (Banham, 1965: 74)*

4. The Off-Line House. An Archipelago of Villas in Upstate Rome

In the 1980s, the Californian writer, futurist and businessman Alvin Toffler formulated his utopian vision regarding the "third wave" of development for communication systems, which began with the advent of new forms of self-help technologies that allowed spatial and temporal barriers to be overcome. Among other things, he proposed a new and systematic reflection on the home, understood as a place of residence, of work, and of entertainment at the same time. Anticipating, in a way, the digital revolution, Toffler affirmed that new systems of production were beginning to take workers out of factories and offices, putting them back in the home—or rather, toward that which Toffler termed "the electronic cottage," a new idea of the home based on teleworking. His proposal would implicate a complete transformation of all institutions, from family to school to the organization of labor:

> *«The new production system could shift literally millions of jobs out of factories and offices into which the Second Wave swept them and right back where they came from originally: the home. If this were to happen, every institution we know, from the family to the school and the corporation would be transformed. [...] Yet this is precisely what the new mode of production makes possible: a return to cottage industry on a new, higher, electronic basis, and with it a new emphasis on the home as the center of the society». (Toffler, 1980: 27)*

This cozily domestic utopia has a follow-up in some of the most recent writings on peripheral dwelling and suburban settlements. In January 2018 the Dutch starchitect Rem Koolhaas wrote the article "The future is in the countryside," published in a special issue of *The Economist*. Koolhaas notes a lack of research on the countryside, which is changing much more radically than the city[5]. According to Koolhaas, today's suburban spaces are locations for innovation, where the most radical transformations take place. Today, the countryside is the place where «minimalist reorganization occurs, where we can see a proliferation of settlements that are growing with unstoppable cartesian rigor» (Koolhaas, 2018: 153). Workers from other countries—ready to revitalize abandoned or previously uninhabited areas—are starting to populate these communities, thanks to new government policies. All this results in a radical and all-encompassing transformation of suburban spaces, according to Koolhaas.[6]

Looking at all these precedents, the design's real challenge appears to be creating a peripheral architecture that can reaffirm the value of the countryside within a technological and digital society, so that living outside the center can become the premise for a new community, rather than mere *disurbanism*. Even today, companies like Amazon deliver goods to one's house, and in the future technological development and widespread drone use will increase aerial transport, eliminating the need to live in the center in order to have necessary services nearby. Each suburban periphery will be central, as long as houses are supplied with devices that allow drones to land and to be encapsulated within the dwelling-place. Soon, then, the city will be able to be disconnected from road networks, since exchanges will take place through drones and aircrafts, which will probably become residences in a not-so-distant future. Thanks to the development of technologies for long-distance transportation, the world's geography will shift away from the congested center of the city. Far away, in the countryside, workers will be able to live in a serene environment, no longer weakened by the restlessness and stress of the city. The possibility to carry out manual labor, such as taking care of green spaces and making one's own house, will increase human beings' creativity. Also, workers' productivity will increase, since everyone will develop interests outside of their fields. Without neglecting the reasons of context and collective memories[7], the houses figured here take these premises into account and consider the latest innovations in the field of drones and unmanned aerial vehicles as a way to place technical thought in the design process.

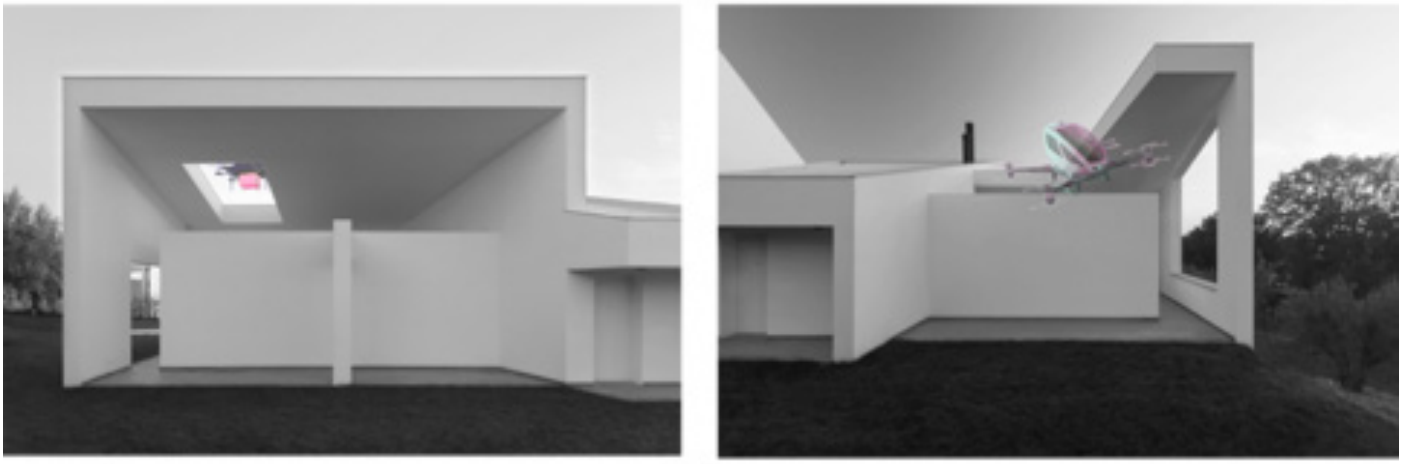

Fig.7 Lina Malfona (Malfona Petrini Architects), Houses for Drones, Model B (photo by Matteo Benedetti, postproduction by Lina Malfona)

5. See Rem Koolhaas, "The future is in the countryside", in "The world in 2018", special issue of The Economist, January 2018, 153.

6. Rem Koolhaas is currently working on an exhibition, entitled "Countryside: Future of the World", which will be launched in February 2020 as a collaboration between OMA and Guggenheim.

7. About the concept of collective memories, see Halbwachs, M. (1949) La mémoire collective, Paris: Presses Universitaires de France.

5. Design n° 1. Houses for drones

This residential complex, made up of three villas in the Roman countryside, rereads the idea of the pavilion as a lightweight structure that supports a butterfly roof (from the Latin *papilionem*, 'butterfly'). The inspirations for these three houses are the open-air exhibition pavilion, the little theaters and small buildings that can be found in parks, like the newsstands, kiosks, shrines, and aviaries that frequently pop up in Rome's Villa Borghese. Each house has been built around a central nucleus or core, surrounded by a structure that envelops it, or shell. Like in the Basilica Palladiana in Vicenza, the shell gives the house a public and civic dimension, and elevates the house as the place where collective individuality is formed. Shells allow the three houses to transcend their physical bodies, making them seem lighter, almost ethereal. If, on the one hand, a house's closed walls remind us of a confined, private domestic space, the frame-shell, on the other, frees and invites us to contemplate this space.

Fig.8 Andrea Palladio, Palazzo Chiericati; Lina Malfona (Malfona Petrini Architects), Houses for Drones, Model A

But here the shell cannot simplistically be described as a portico, because it does not only describe the space in front of the house, but also the space above it. The shell, thus, is rather a technological device that allows the house to be accessed from the sky through home automation. Also, these three pavilions utilize perforated roofs to grants access to drones transporting goods to the residence. If it is true that in the age of global connection the concept of periphery no longer exists, and every place is both central and peripheral at the same time, then aerial networks must be strengthened so that the countryside can enter these new global circuits. Birds fly in the sky over Rome, drones land onto the roofs upstate Rome.

Fig.9, 9.1 Lina Malfona (Malfona Petrini Architects), Houses for Drones, Model A, detail; Houses for Drones, aerial view

6. Design n° 2. Slot House. Theoretical Model

The single-family residence in the countryside has been primarily intended as a place from which to observe the surrounding landscape. It functions as a camera through which one can frame specific perspectives and, in certain conditions, it will be furnished with telescopic cells that will be able to rise up in order to see farther. These residential pavilions will have no fences because global surveillance systems, made possible thanks to the digitization of maps, will eliminate burglaries everywhere. Each pavilion will, in essence, be made up of a canopy, held up by

pillars and conceived as a terrace. It has one defining characteristic: its length.

Later, beneath this terrace – so, within this shell – the residential cell will be set up, organized spatially in a way that will recall the model of the Greek temple in its postmodern version, with its assembly kit of parts: the crepidoma, the cella, its covering, the peristasis made of columns. But the slot house can also be made up of a number of different cells that, like the slot of a motherboard, can occupy the spaces underneath the above-cited covering, while still allowing emptiness to prevail over fullness. The house – broken down into a series of pavilions, assembled beneath the covering – rests on a foundation of reinforced concrete, cast in place. This foundation is a kind of podium that houses the pool basin, stairs and ramps that allow access to the foundational slab itself, a water-collection basin and spaces for technical structures within it. Three sets of components are located above the foundational slab: the "solar greenhouses", or free-standing residential cells; the "residential walls" that contain also the bedrooms; and the large perforated covering resting on the walls, which is an accessible part of the residence. This covering or terrace is intended to be both a technological device and a way of accessing the house from the sky. Thus, it can be furnished with current collectors, or it can be perforated to allow aerial transportation devices (for products and for people) to enter the residence. In the future, this terrace can also function autonomously as a landing pad or as a refueling station for the flying house, the last piece of the assembly kit. At that point, the Slot House will become a kind of stationary residential platform, while the flying module will be both a mobile residence and a means of transportation at the same time. The flexibility to which this ideal house is referring, and its dual role as vehicle and residence distances it from traditional beauty standards, opening to new expressive possibilities.

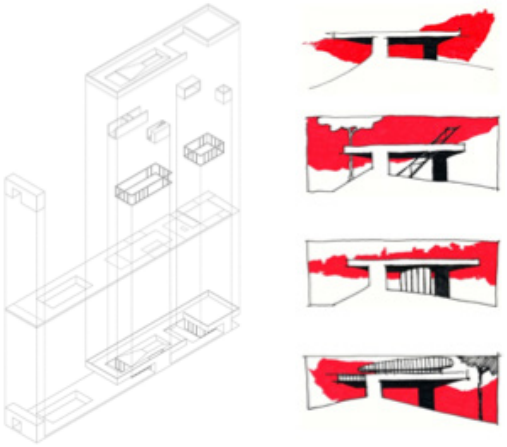

Fig.10. Lina Malfona, Slot House, theoretical drawings.

7. Design n° 3. Slot House. Built Prototype

The *Slot House* prototype has been built in the Roman countryside, but in this case the theoretical model was consistently modified, due to the fact that it needed to be adapted to certain building regulations. The point of departure was a farmstead in need of repair and recovery. The idea was to preserve the farmstead as it was, and to build a framework around to protect the house. Over time, beneath this framework, additional residential modules would be erected to expand the house, according to the theoretical model of the slot house. However, in this specific case, building regulations required that this house retain the original dimensions of the farmhouse. Thus, it could not be extended except through the construction of local "accessories" for the house, such as a toolshed, a pool, a locker room, a greenhouse, and an open-air kitchen. At this point, it was decided to plan the house's expansion through these accessory spaces. They were conceived, then, as utilizable in a temporary, shape-shifting manner; in other words, they were designed as typologically flexible models. In addition to these, the covering/landing pad was added, on top of which, in the future, the flying module will be able to land.

These enveloping framework for completing, extending or re-cycling existing buildings, like the number of rural structures which dot the Roman countryside, as well as the whole Italian landscape. For this reason, it is deemed suitable to transform this architectural device in a building rule, in order to recover ancient buildings often abandoned, ruined or no more occupied. At this point, this design could not only be an isolated model, but a reproducible strategy in order to construct more or less extensive villages of single-family residences. *Slot Houses* can be arranged, then, according to blueprints for various sites, and the resident can also determine certain possibilities for additions or groupings, according to a number of possible combinations.

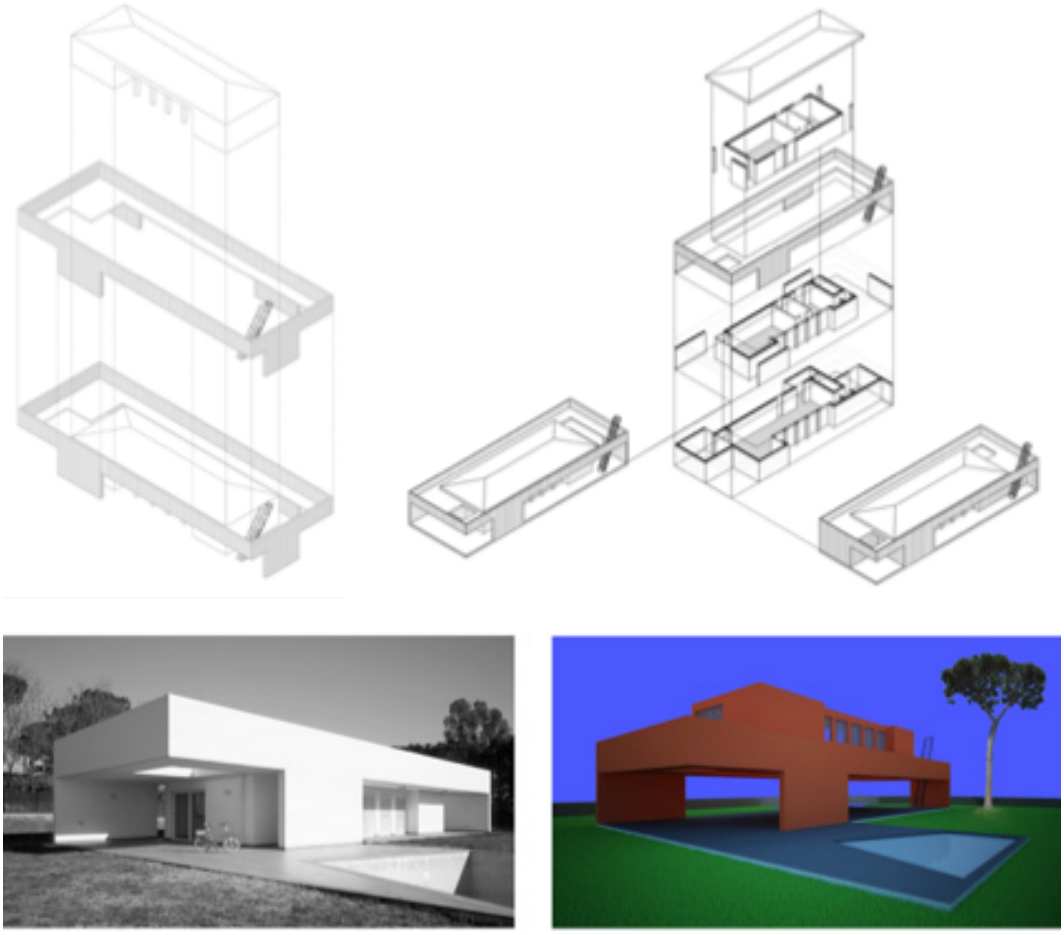

Fig.11, 12, 13, 14 Lina Malfona, Slot House, design ad extension, axonometric views; built house and future extension

8. Postscript on the End of the City and the Flying House

At the height of the advancement of studies and experiments on drones and unmanned aerial vehicles, urban growth will stop, cities will become immense ruins and roads will be transformed into green tongues. The image of the city will not be able to be anything other than the new version of Piranesi's Campus Martius, a territory without any urban trace.

The geography of the world will gradually shift away from the congested center of the city. Architectural projections will be centered around the suburban villa. There will no longer be any train stations or airports but every house will also be a station. Because of this, the strengthening of the individual's residence will be the fulcrum of architectural experimentation and the house's cover, in particular, will be the very location of transformation. It will be the landing pad of individual transportation, and later the landing pad of the house itself.

Residential cities will be demolished by walking factories – enormous neighborhood-grinding-machines that will carry out urban 12tural activities, and entertainment areas.

In the areas outside of the city there will still be the possibility to acquire lands where one can erect new buildings, which will be thought of as future landing pads for drones.

The countryside around the city will be punctuated by these residential pavilions, whose basic unit is a protective structure covering it, which is conceived as a terrace from which to look out at the countryside.At first, these terraces will function as covers to residential pavilions, which will be built beneath them. In the future, the terrace will become a landing pad for the flying house. The flying house will be a mobile residence and a means of transportation at the same time. There will be several different typologies of the flying house. Initially it will be a cabin, a modular capsule to be inserted on an aerodynamic installation that will allow it to fly. This installation will be able to unfasten the capsule and then be used as a vehicle, functioning as individual public transportation. Later, the flying house will be perfected and will adopt a form that integrates the capsule and the shell, in order to become one single airplane. The issue of parking will no longer exist: if the house is a drone, it will be able to choose where it lands!

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Captions

Fig.1. Lina Malfona, An archipelago of villas in upstate Rome, map, 2018.

Fig.2. Lina Malfona with Yuzhen Zhang, Formello Urban studies, property lines, 2018-19.

Fig.3. Lina Malfona with Yuzhen Zhang, Formello Urban studies, fences taxonomy, 2018-19.

Fig.4. Lina Malfona, Diagrams showing the private/collective space in three projects designed by Lina Malfona (Malfona Petrini Architects): Slot-House; House in the Woods; La Villa, 2013.

Fig.5. Lina Malfona (Malfona Petrini Architects), Houses for Drones (Model A); Etruscan tunnel, Formello (Roma). Photos by Lina Malfona.

Fig.6. Double Roof, Houses for Drones (Model C), 2012-17. Design by Lina Malfona (Malfona Petrini Architects), photo by Matteo Benedetti.

Fig.6.1. Chimney, Twin Houses in Formello, 2009-12. Design by Lina Malfona (Malfona Petrini Architects), photo by Matteo Benedetti.

Fig.6.2. Portico, Sketch House, 2011-16. Design by Lina Malfona (Malfona Petrini Architects), photo by Matteo Benedetti.

Fig.7. Houses for Drones (Model B). Design by Lina Malfona (Malfona Petrini Architects), photo by Matteo Benedetti postproduction by Lina Malfona.

Fig.8. Andrea Palladio, Palazzo Chiericati; Lina Malfona (Malfona Petrini Architects), Houses for Drones (Model A). Photo by Matteo Benedetti.

Fig.9. Houses for Drones (Model A), detail.

Fig.9.1. Houses for Drones, aerial view.

Fig.10. Lina Malfona, Slot House, theoretical drawings.

Fig.11. Lina Malfona, Slot House, concept.

Fig.12. Lina Malfona, Slot House, design, axonometric view.

Fig.13. Lina Malfona, Slot House, extension, axonometric view.

Fig.14. Lina Malfona (Malfona Petrini Architects), Slot House, built work and future extension, 2012-17. Photo by Matteo Benedetti.

[IP:C/02]

Sustainable guidelines for an energetic and social improvement of a suburban area

Michele Di Sivo[1], **Daniela Ladiana**[2], **Martina Di Bugno**[1], **Maria Ruschi**[1]
1. Dept of Energy, Systems, Territory, and Constructions Engineering (D.E.S.T.e.C.), University of Pisa, Pisa, Italy
2. Dept of Architecture, University G. D'Annunzio of Chieti-Pescara, Pescara, Italy

This experimental study is focused on the energetic and social improvement of a suburban area in order to start an urban renovation by the retrofit of a school building. The aim of this research is to relate energy improvement to urban life quality by creating social gathering places, sustainable mobility, environmental sustainability and cultural activities for the neighbourhood. This kind of approach represents a new vision of an urban renovation, starting from a single building and its surroundings in order to have social benefits to the neighbourhood itself. Starting with this aim means that it is necessary to have strong guidelines, because we are dealing with a multidisciplinary architecture project. This study focuses to these kind of guidelines, mixing many different themes in order to have a complete project guide. A base model is given from green building certification tools, because the certification mode is based on guidelines about energy efficiency and sustainable sites, but how is it possible to use them according to the aim of social implications? This study has started from a specific application in order to investigate that question, by analysing social and urban issues first, and then finding architecture solution. This process is supported by the analysis of green building certification programs in order to find the most suitable one. Since the case study is situated in Italy, the research focused on international and national certification programs such as LEED, ITACA and KlimaHaus-CasaClima to identify possible project guidelines. The main issue is to find a connection between the building refurbishment and the public space design; the suggested approach is to extract different requirements from the analysed protocols in order to create the most suitable guidelines for the research purpose. Thanks to this study is possible to follow guidelines that bring to urban and social renovation starting from the retrofit of a school building.

keywords: Energetic and social improvement, suburbs, school, urban renovation, green buildings , refurbishment process.

1. Introduction

One of the biggest issue of our time is how to face the deep decay of the suburban areas.. This is a recovering theme in urban planning, especially for planning redevelopment of urban structures. In fact, there are many forms of urban degradation, generally located in the suburbs of many big urban centres, and in small and medium cities as well. This phenomenon in Italy is very marked, especially in social housing areas. During the time those kind of suburbs had developed characteristics that had led to negative connotations, so they may have been separated from the rest of the city, assuming the character of a ghetto closed in on itself, without any connection with the rest of the community. The lack of integration, social mix and sense of community are often praised by wrong urban planning, such as lack of connections, services and public areas. But how is it possible to identify such critical areas in order to plan a redevelopment intervention? What are the strategic points on which to concentrate the resources and the interventions of renewal of the district?

Only a deep analysis of the urban system allows us to understand which are the sensible areas of an urban site; historical stratifications, roads and infrastructures margins are primary morphological indicators. Secondly, urban parameters such as infrastructures, mobility, public greenery, services to the citizen and meeting places allow us to understand the potential criticality of the place. It is necessary to identify the starting point for a "urban rebirth", that could be a public which are of fundamental importance for the community or which in any case present its potential; in this scenario are placed the school buildings for their educational role in citizens first years of life. Schools, for the fundamental role they play, represent a point of contrast to the phenomena of degradation

by exercising a training function that at first involves children, but that can potentially extend its benefits to the remaining demographic slice of the neighbourhood (Capanna 2013). The social contributions that a modern school open to the community is able to bring to an entire district area have been the subject of studies and monitoring in numerous episodes (Menesini, Arcieri, Nocentini 2014). It is proved that the guarantee of a high level of education is a reason for attracting the middle classes to the neighbourhood itself, thus promoting integration and social mix. In this way it would be possible to trigger a circle of attraction of investments and retraining that could contribute to an increase in the quality of life for the whole community; so it is clear that spending resources in children's' future will improve the urban and social status of the district itself. However, the validation of these benefits can be found in interventions of requalification both on residential buildings and buildings used for services (schools, sports facilities, commercial, religious, etc. ..).

Retrofitting local schools is the way to improve the social perception of the neighbourhood itself, increasing the living standards, as well as economic benefits. The school is a fundamental part of a social housing district, and it very often had been built at the same time as the construction of social housing, so it is deeply rooted in the urban structure. Whenever the neighbourhood presents a situation of degradation and difficulty, the design of a retrofit of school buildings is particularly necessary, as these are a possible place of and aggregation for the entire community, not only with the task of educating future generations of citizens, but also involving parents and relatives act across the board on social hardship.

Therefore, the aim of this study is to identify practical guidelines to be used in the technological retrofit of a school building, so as to have positive repercussions on the surroundings. This is particularly relevant in contexts that present a situation of difficulty and general degradation.

2. Method of project approach

The growing demand for reducing the environmental impact of public buildings is one of the most challenging issue of these times. Technological building retrofit is part of a precise vision of architecture, not only for the restoration itself, but also for considering existing buildings as an opportunity. So when we talk about "retrofitting" we are not dealing only with a "building" anymore, but we are considering the building and its surroundings, plus all the relative social and urban implications.

Energy efficiency is a recurring issue in new buildings while is underestimated in urban regeneration. How can a building be redeveloped in such a way as to pay attention to these aspects? As previously said, it make sense to define a retrofit strategy which can be applied to a specific building, with all the environmental implications that follow. This study is aimed to define this strategy as a multidisciplinary approach, which combine sustainable design, urban improvement and building refurbishment. Since the main theme are being defined, it is possible to write down a general checklist to be improved during the project design:

- Site Sustainability requirements
- Public spaces redefinition
- Building Refurbishment strategy

According to the first point, it is reasonable to analyze international certification for environmental sustainability as a checklist of requirements. Those mentioned tools are LEED protocols as well as Klimahaus certification. The methodology used is to analyze and compare these tools; Those protocols are designed to examine all the various aspects concerning a building intervention: from the choice of the construction site and the services available on site, to the conditions of healthiness and comfort of the internal spaces. Many requirements are referred only to the building envelope, defining the performance standards without considering the surroundings. The environmental sustainability certification, on the other hand, provides for an analysis that investigates not only the energy aspects but also those related to the site of construction and the impact it has on the urban and environmental system in which it is located. In addition to the requirements that are also present for energy certifications, there are requirements regarding the choice of the construction site, mobility, services, social aspects, topography, hydrology and soil protection and non-entropized areas. It is important to define this strategy, in order to have some design project guidelines; after that is it possible to think how to improve public spaces by retrofitting a chosen building. Being a relatively recent approach, retrofitting is a realm that is still open to new areas and possibilities for development. Starting from a private courtyard of a public building is it possible to create to a new public space, opening to the community, offering new chances for social integration.

3. Case study and results

The specific case study concerns a school complex composed by two schools, primary and secondary, located in the Varignano district of the city of Viareggio. Varignano was founded in the first half of the twentieth century as a working-class neighbourhood, and over time it has developed itself as a result of numerous interventions of social housing. Those phenomena rise to an isolation of the neighbourhood and a social hardship, which combined with urban degradation has led to an overall situation of hardship. The life quality feedback given by the inhabitants define a general sense of inadequacy with regard to safety, environmental quality, services, cultural initiatives. On the other hand there is a deep desire to participate in social life and community public events, which is not particularly encouraged initiatives within neighbourhood. In this context, schools play a basic role in defeating social degradation, because of their strategic position in the neighbourhood and their educational potential. As a result of the numerous critical issues identified, following redevelopment guidelines, it has been possible to focus on social needs and then to define an experimental project, based on a simple but strong concept: the opening of the school garden to the neighbourhood. The implication of this action are many and the most important thing to reach is the balance between public and school functions. Creating new public space cannot be a reduction of school garden, but it will combine public functions and school activities, with the possibility of having a separation as it needs. First of all the areas to be assigned new functions were defined, and then proceeded by unifying the school gardens and integrating the adjacent public green spaces into the project. The importance of the school complex for the district was the basis for developing a line of project that aims to implement the social factor; the garden of the two schools, due to its shape, has the potential to create an experience of sharing activities and spaces between school and district.

. The project has been developed according to the exposed guidelines: the opening theme, building refurbishment and the environmental sustainability. This last aspect has been applied on the basis of energy and environmental sustainability protocols present on the national scene, paying particular attention to cycling and pedestrian mobility, water management, the maintenance of native vegetation and the energy efficiency of the buildings themselves.

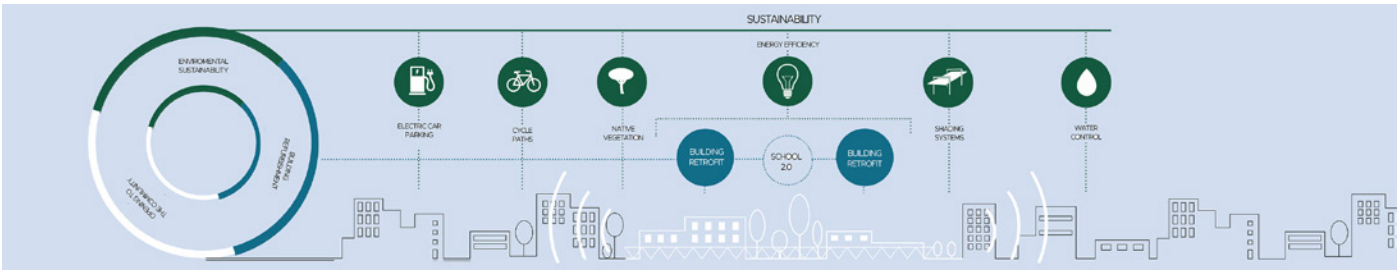


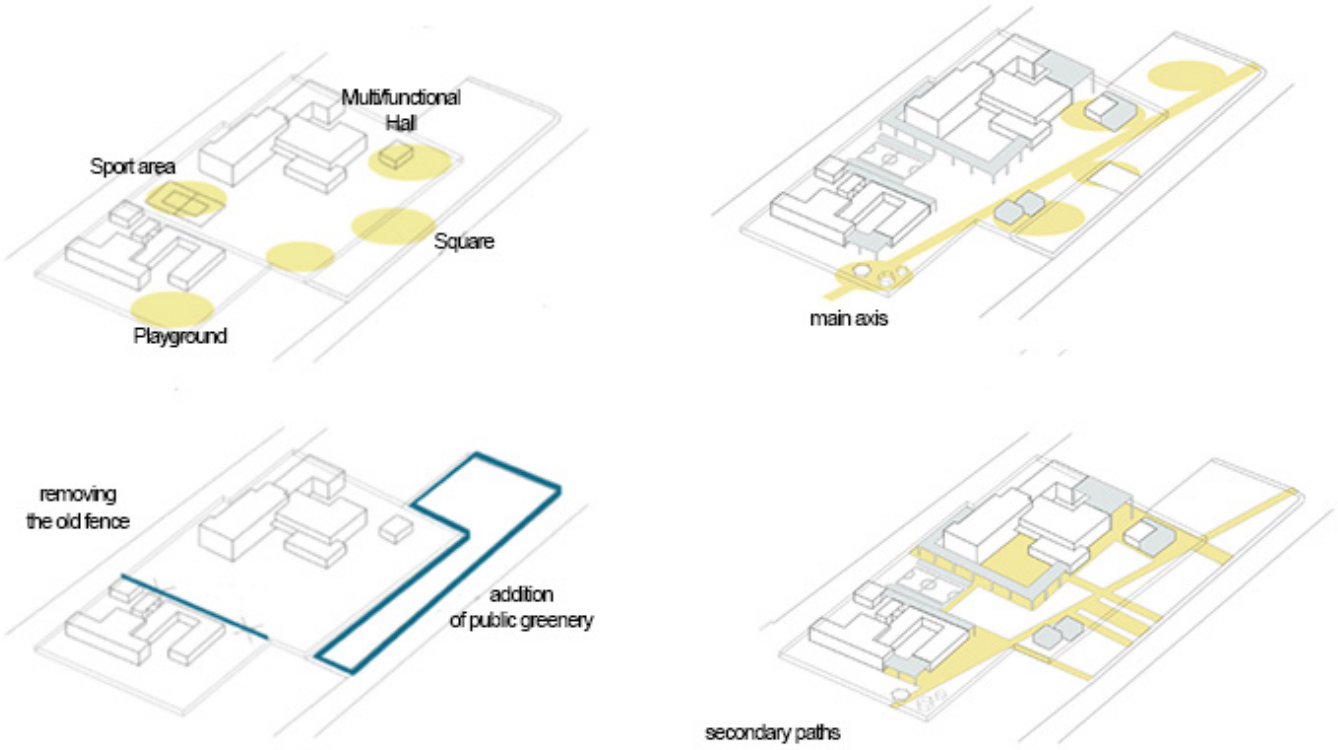
Fig.1 Guidelines scheme

According with the requalification of the external areas strictly linked to the functions of the schools, the school park was opened up to the neighbourhood, identifying routes, points of interest and integrating part of the green areas outside the school perimeter into the design. The sharing of the garden with the community means to remove the strong limit made by the fence, so the space became permeable and offering the possibility of improving sociality and people integration. The focal points on which the opening strategy has been developed are:

- the creation of a greenhouse with urban gardens;
- the improvement of the existing conference room
- the creation of a public square;
- the creation of a playground;
- redevelopment of the sports area

The garden area located on the eastern side of the lot and bordering with a public green spaces has been identified as suitable for realizing the opening to the neighbourhood; At the same time it was necessary the contextual reunification of school gardens and the adjacent green area. After an initial definition of the thematic areas of interest, including the greenhouse, the playground for elementary school, the sports area, and the multipurpose room created from the former conference room, a “strong axis” was traced, in order to reconnect the entire lot. In the project design this axis creates a pathway as a connection of all points of interest located along the garden fence. For reasons related to the security of children, new integrated green spaces of the school and the district must be maintaining the boundaries of the school perimeter; the permeability of this margin is sought through the creation of three openings towards the outside area and the design of the new perimeter fence. In order to

connect school building to the new pathway, the main axis is cutted by secondary paths that connect on the one hand the schools, on the other hand the neighbourhood. In that way it is possible to create a social space that through shared activities allows to develop a sense of sociality and integration.



In order to relate the two buildings with the axis of opening towards the neighbourhood, several paths intersect in a perpendicular direction the main one, matching the gates created along the boundary fence, as a direct connection between the school and the public spaces in the district. This way allows to define all of the garden areas, characterized by the alternation of vegetation and paths, in order to create an area of sharing and sociality with places of interest and recreation, both dedicated to the school and to the neighbourhood. Particular attention has been paid to the use of materials, according to the ease of installation, maintenance and color compliance with the design lines of the garden as well. The most of the paved areas are made of a compound of aggregates pressed with sand color, which presents the functionality of concrete nature combining the functional aspects with those color and architectural design. Where possible, gravel flooring is used for its characteristic draining properties, while wood has been proposed for secondary paths, seats and installations on the ground.

This ground installations create a good contrast between solids material and the structure lightness of covered paths, and porticos, made of painted white steel. Meanwhile, after defining architectural and social design, the project should pursue the requirements of environmental and energy sustainability previously analyzed. During the design process, through the guidelines application we can combine energy efficiency of the buildings with the environmental requalification of the external spaces. These main themes have been developed according with what was foreseen at an architectural level, focusing on the following sub-themes and achieving significant results.

Fig.3,4,5 Project views

- Location and transportation

This theme deals with the forecast of sustainable mobility such as electric car parks, bike stations Cycling equipment has been placed within the school perimeter, while parking spaces for electric cars have been placed outside, next to the sidewalk.

- Site sustainability

This requirement is made to preserve as much as possible the areas of the site not yet entropized, the geomorphology and hydrology of the site. In particular, the results obtained are: Insertion of native vegetation, Preservation of a minimum of 40% of green area, Forecasting of spaces that promote social aggregation (greenhouse, public square, sports area, playground and multipurpose room). Contrast of the heat island effect through a system of covered pathway, in order to have shading solutions.

- Environmental loads

By measuring enviromental loads we can quantify the waste of water, so there are measurements that indicate the reuse of rainwater. This can be the supply for gym showers, obtaining an improvement in the water impact compared to a standard building of 75%. Soil permeability: The project was developed taking care not to compromise the permeability of the garden soil, net of the imprints of the buildings, was then calculated the percentage of permeable surface area compared to the entire lot, taking into account the coefficients of permeability for each accommodation. Water supply for irrigation: it was prepared and sized the volume necessary for the collection of rainwater to be used for irrigation of the garden, covering the entire need.

3. Conclusions

This study is mean to be a guide to the methodological approach for retrofitting school or other public buildings, which are about to be transformed from simple places for education to landmarks for the neighbourhood; where the school system proves to be effective, inclusive and open to the community, the neighbourhood will receive benefits in terms of improving the perception and attractiveness of the middle class, promoting the mix of people and social integration. Finally, the technological retrofit action developed in this way makes it possible to achieve considerable savings over time on the cost of managing the energy resources of the building and ex-

ternal areas. This approach brings considerable benefits to the school complex and, through careful planning and management, is configured as a possible pilot project for many other schools. The school's openness to the urban structure also allows users to be educated and trained on sensitive and often underestimated issues, such as environmental sustainability and the benefits it brings. The technological retrofitting action, set up according to the guidelines of certifications and protocols of energy and environmental sustainability, allows to obtain, over time, considerable savings on the costs of managing the energy resources of the building and of the external areas, at the same time favouring sociality and aggregation.

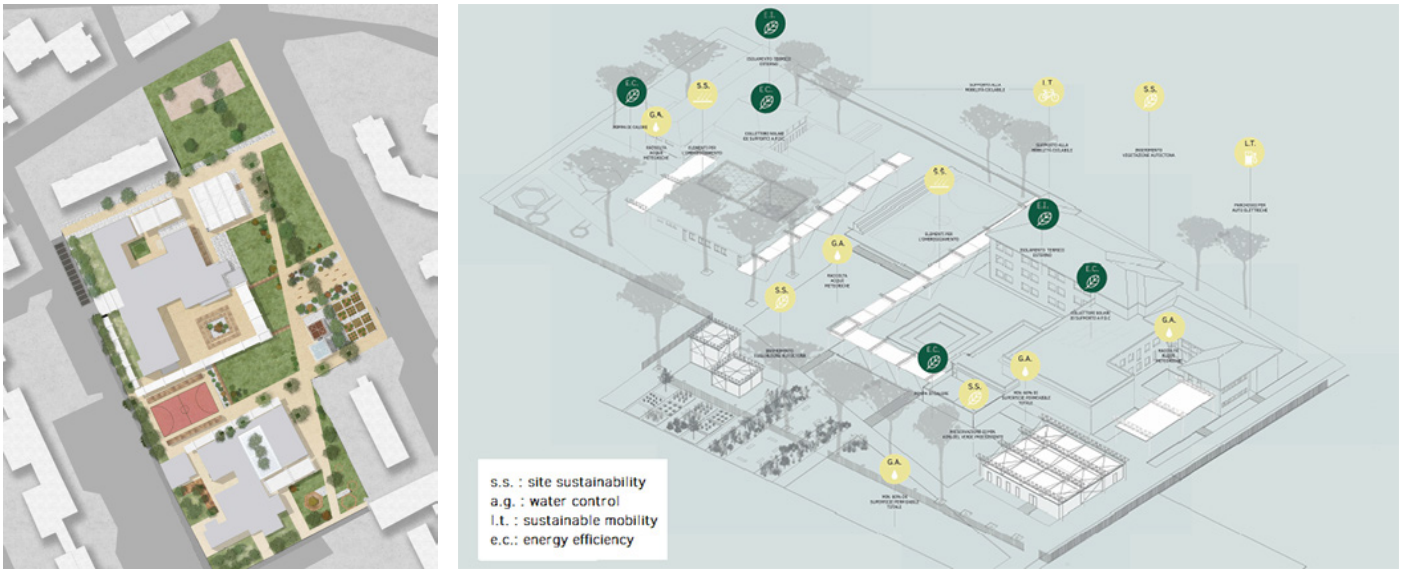


Fig.6,7 Project masterplan - an open garden; Map of sustainable guidelines application

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[IP:C/03]

Innovative processes of urban regeneration through integrated strategies of retrofitting

Michele Di Sivo[1], Daniela Ladiana[2], Lediana Rrjolli[1]

1. Dept of Energy, Systems, Territory, and Constructions Engineering (D.E.S.T.e.C.), University of Pisa, Pisa, Italy

2. Dept of Architecture, University G. D'Annunzio of Chieti-Pescara, Pescara, Italy

This experimental study on the renewal of post-World War II suburban areas addresses the theme of the technological retrofitting of buildings, focusing on typological features, construction techniques and, more in general, of all aspects that fail to meet the needs of contemporary living. An initial examination of Italian and international case studies shows how much the static and permanent dimension of the house, which guided the post-war reconstruction process until the 1970s, is now an obstacle, an element of resistance to the process of transformation that is affecting societies. This new scenario requires a reflection on the project, in particular on the theme of the technological and functional flexibility of housing.

The research method allowed to highlight the fundamental aspects of intervention that are the basis of the design guidelines for the optimization of urban renewal activities. The guidelines were tested by applying them to a case study: a 1950s-era neighborhood in the city of Pisa. The lack of maintenance of this type of building makes it necessary to carry out seismic adjustments. The question that has been asked is how to enhance the potential of consolidations and static adjustments, improvement of energy efficiency, also from an architectural, functional and spatial adaptation point of view and then how to integrate them with the existing building.

Through additions to the facade, the accommodations have been reformulated to respond to users who are varied and indeterminate in terms of age and culture.

The study aims to test the resilience of buildings following their seismic, energy and functional updating, including sociological and environmental psychology assessments, with particular attention to vulnerable users, in order to find solutions capable of promoting social inclusion. The suggested approach is that of a circular economy, which helps to reduce the impact on the environment.

keywords: Urban and social renewal, Social housing, Integrated retrofitting, Efficiency improvements

1. Urban and social regeneration

Statistics show that around 75% of the European population currently lives in urban areas, a number that is expected to increase to 80% by 2020; the number could exceed 90% in as many as seven Member States. Furthermore, since the mid-1950, the total area of urban areas in the EU has increased by 78%, compared to a population growth of only 33%. According to the UN-Habitat 2016 World City Report, 70% of urban land is occupied by housing. Thus we are witnessing an evident acceleration in the enlargement of the dimensions of cities; this modality of expansion, defined by experts as the "occupation of decoupled land", is attributable to profound changes in lifestyles and to the obsolescence of housing, which is no longer capable of fitting in with new paradigms of contemporary housing (Di Sivo and Cellucci 2014), rather than to population growth. It is, therefore, apparent that urgent and critical action be taken to slow down this phenomenon, beginning with the modernization of the existing building stock. There must be a shift from the tendency towards the indefinite and relentless expansion of cities (Latouche 2012) to that of urban renewal, not only, as often happens, of the historical town centers but also of the parts that have grown up in more recent times, of those early suburbs that have been subsumed by the rapid expansion of recent decades (Landolfo, Losasso and Pinto 2013).

Within this problematic framework lies an important area of work that has been identified as a priority for intervention: the social housing built throughout Europe in the period after the Second World War. Built following the destruction of the war and the subsequent steady urbanization of the population, it is unthinkable that this housing can be demolished on a large scale (Giacchetta 2012) and, although it must be adapted to the changed

housing standards and the new energy/environmental constraints, it may prove to be an important resource for residential policies. This building stock, often connoted by high-quality architectural and urban planning projects was, however – given the post-war emergency conditions – often built utilizing inferior materials and slapdash construction techniques. The modern implications of all this is that the significant functional and technological obsolescence of these structures is also accompanied by marked and evident physical deterioration. Moreover, this housing stock is obsolete with regard to changes in the use patterns of users, inadequate energy and service features, and no longer complies with regulations that have become more attentive to the impact of buildings on the environment. In particular, social changes with regard to the composition of households and the age of the occupants, together with changes in energy availability and technological progress, tend to modify the uses and habits of residents (Jacobs 1961) and accelerate the process of obsolescence. It therefore seems appropriate that research in the field of technological and environmental design aim towards determining possible approaches, methods, and tools to facilitate the optimization of urban renewal activities for these settings. This involves implementing strategies, policies, and interventions aimed at increasing urban *resiliency*, by adapting city systems so that, under variable conditions, these are capable of systemic adaptation and flexibility so as to render it possible to simulate behaviors and alternatives of response (Habraken 1998). An experimental research initiative is underway at the University of Pisa, where a working group coordinated by Prof. Michele Di Sivo is carrying out studies and projects in a neighborhood of Pisa with the aim of coming up with a valid approach for the types of building found mainly in post-war Italian housing that characterizes the earliest suburbs of Italian cities.

2. Method of project approach

The research began with a study of the current housing stock, making a thorough examination of the buildings – including the typological features, the construction techniques – as well as on the building stock in Italy and in Europe, upon which qualitative/quantitative assessments were made of the technological and energy deficits encountered. See Table 1. An assessment of these experiences confirmed the necessity of taking an integrated approach that takes into account the object as a whole and makes use of all the elements available to enhance its potential. The traditional approach of making timely interventions aimed at responding to individual problems, whether structural, energy-related, or functional in nature, is in fact not completely effective in terms of reformulating building features and architecture.

The aim of retrofitting is to renew the building system in question by operating both on the environmental and technological sub-system utilizing an architectural project capable of

implementing, enhancing or improving (depending on current needs) the energy, structural, seismic, and functional features of the building.

Retrofitting, in contrast to a restoration or enhancement of the original features, consists in the introduction of new features not included in the original project phase or, in any case, not provided (Ascione and Bellomo 2012).

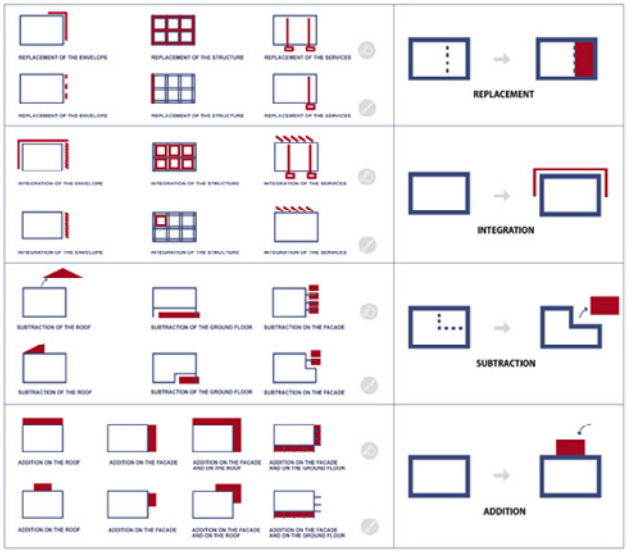

Fig. 1 Summary of project strategies extrapolated from the assessment of Italian and European case studies.

Retrofitting may involve the entire building or only certain parts of it; it may be superficial or volumetric depending on the elements involved; it may involve integrating or replacing the shell, the structure or systems, or removing or adding entire volumes or parts of the building. Utilizing retrofitting strategies brings various types of issues into play that are found in the operational practices of multiple technical fields such as *feedback* and adaptation through the application of innovative solutions, new technologies, new integrative elements or in the modification of physical and functional characteristics and the features of existing elements.

Being a relatively recent approach, retrofitting is a realm that is still open to new areas and possibilities for development. Implemented mainly to achieve the improvement/updating of energy and functional features, more recently it has kept in stride with the progress of increasingly less-standardized market offerings (Di Sivo and Angelucci 2012), moving towards *custom-fitting*, in attempt to respond to the specific needs of users. This implies greater attention towards the final user of the "improved" product which adds not only to the technological connotations of retrofitting, but also to social ones aimed at increasing the quality of the housing.

The retrofitting approach, aimed at the upgrading of the features and characteristics of buildings through the use of innovative technologies, is of particular interest for its social and environmental repercussions, and operates within the logic of a circular economy. The issue of retrofitting underscores the importance of this approach not only to enhance or extend the life cycle of an individual building, but also as an important opportunity to reconstruct new urban quality starting from its elementary components, the buildings.

In the case of work on post-World War II public buildings, retrofitting should be grasped as a powerful opportunity not only to remedy the physical and social deterioration found in the intermediate suburbs, but also to operate with critical capacity, combining the energy-related, seismic, and functional renewal of the buildings, in the dialectic between conservation and innovation of architecture within the logic of an economy that works in harmony with the environment.

3. Design experimentation

In order to carry out a preliminary experiment on a category of building commonly found throughout the municipal territory, we mapped out the residential areas of the city of Pisa and performed a detailed analysis of the distinctive character for each of these areas.
The neighborhoods were classified by year of construction, size, types of buildings and property developer. The morphological layout, number of floors above ground, the construction technique, and the type of users were identified. This preliminary analysis showed that the prevailing type was the three-story condominium built with load-bearing walls. These considerations led to the selection for the case study being the neighborhood of Ciro Ravenna, a block consisting of six almost identical buildings. See Figure 1. The examinations allowed the areas for renewal to be defined: social, technological, energy, and architectural. It

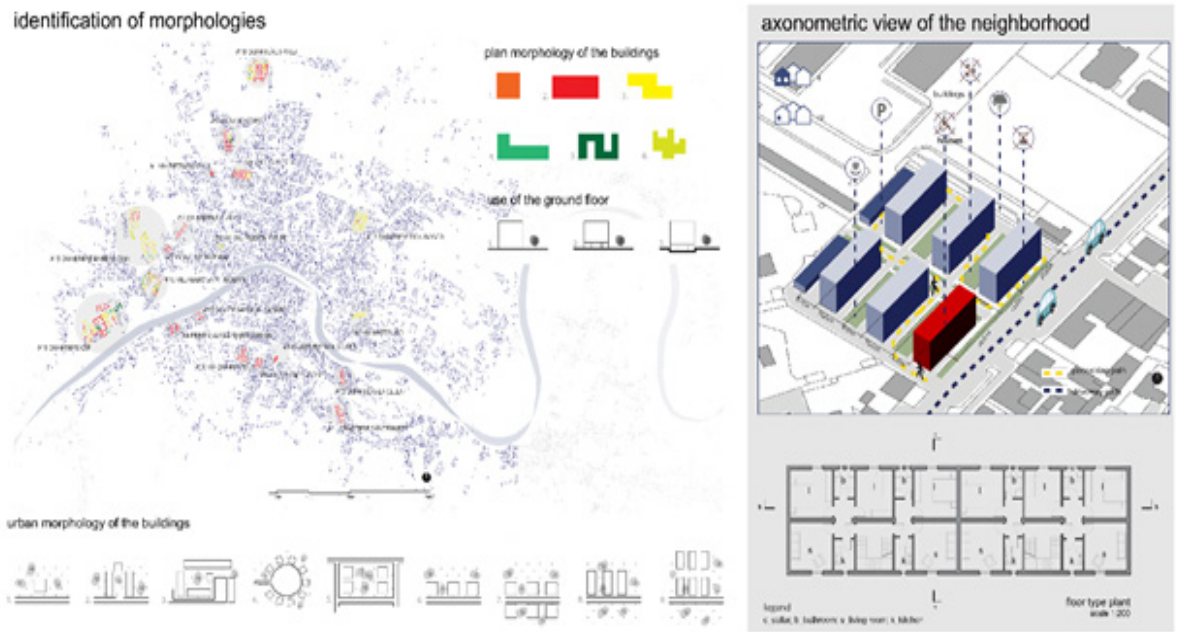

Fig. 2 Preliminary study on the types of buildings and households

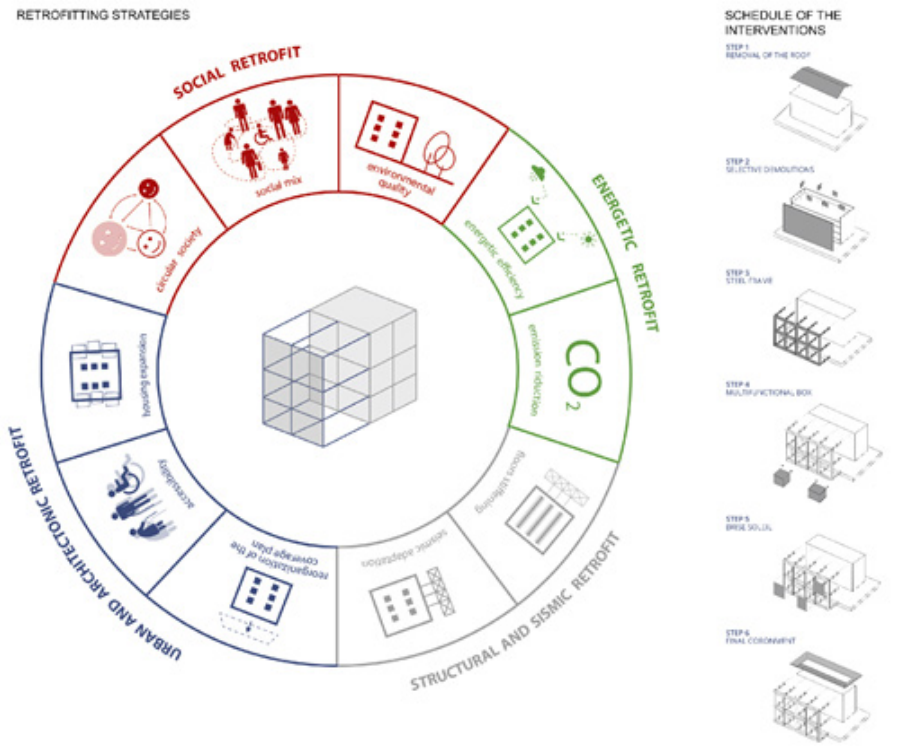

Fig. 3. Retrofitting strategies and work diagrams.

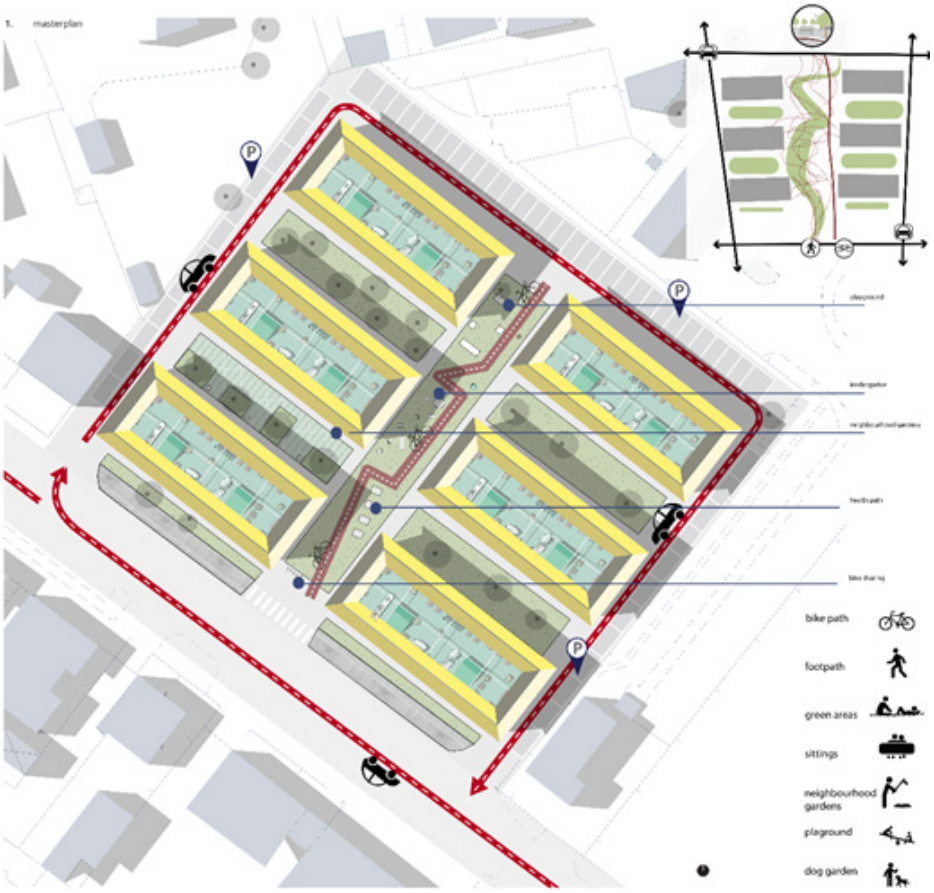

Fig. 4 Masterplan

was on this basis that the work schedule was planned. See Figure 2.

As for the outdoor spaces, the entire parcel was redesigned to encourage soft mobility through the inclusion of a cycle path and rest areas. Three recreational areas have been set out in the green spaces that meet the needs of three different age groups: the elderly, young people, and small children. In order to create green spaces that are also educational (Stein 2010), it was decided to make one of the existing green spaces a place for gardening. A driveway was created with parking areas surrounding the block, creating a green, pedestrian center. See Figure 3.

Since the inhabitants are at present mainly elderly people and some immigrant families (Regione Toscana 2017), the social renewal will include the integration of other types of users, such as students and young couples. There are, therefore, "4 different sizes" of residence that have been designed: XS, S, M and L. These may be combined in different configurations to meet the needs of the newer and older resident user types. Furthermore, study of the relationship between the organization of the residential layout and the furnishings made it possible to render the space more open and flexible. Particular attention was paid to vulnerable users (those with disabilities or the elderly), in order to ensure their autonomy with the provision of home automation systems. See Figure 4.

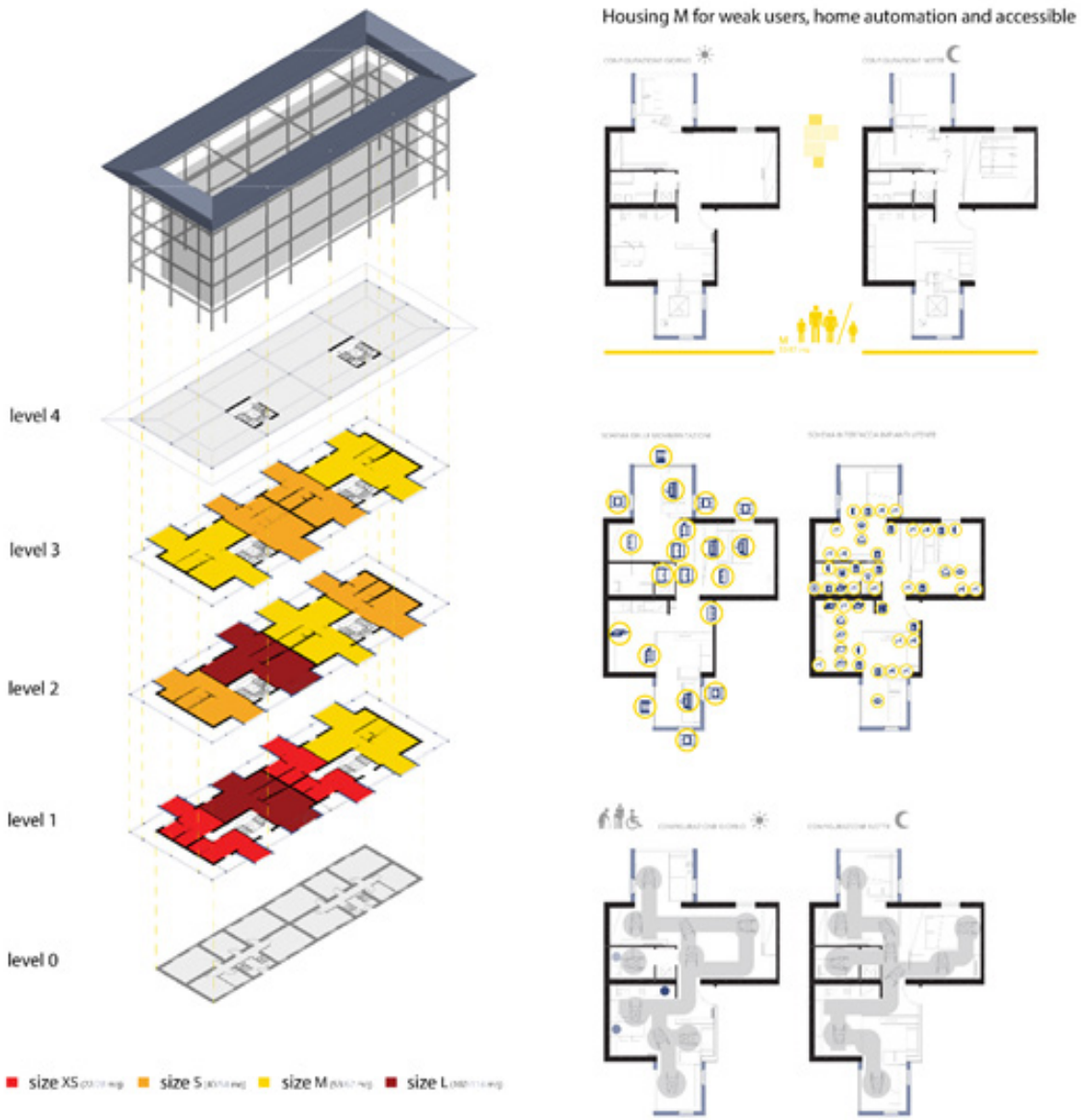

Fig. 5 Different configuration of "4 different sizes" of residence that have been designed: XS, S, M and L.

Fig. 6. Structural reinforcement techniques. Layout of exterior spaces.

The structural safety of the building has been ensured by installing a steel exoskeleton with floor and wall braces. This structural solution was enhanced from a functional and architectural point of view: in order to better integrate with the existing building (Muselli, Tartaglia and Di Pasquale 2017), a box was created, a sort of pre-fabricated wooden building prosthesis. This multi-functional volumetric addition can take on different functions, depending on the different times of the day and the type of user. The external structure, in addition to ensuring the safety of the building, serves to support the integrated solar panel and photovoltaic panel crowning system for the production of energy for use in the residences and outdoor spaces.

The roof has been refurbished as a meeting place to encourage socializing and social integration for the whole building; to this end, it will include an outdoor kitchen, a relaxation area, and a central “agora” as a multi-purpose area. See Figure 5.

In order to increase energy efficiency, the external facades have been integrated with insulating panels of different materials depending on the exposure (north with rock wool and south with wood fiber). These additions made it possible for the building to achieve Class A rating. Rainwater is planned to be collected in a collection and purification tank located in the basement for use by the residences or to service the outdoor spaces.

4. Conclusions

The technological research process in the retrofitting project described that included the addition of new technologies and new functionalities to a group of public housing buildings in order to prolong their life cycle will require further in-depth research to explore the definition of the realization costs, which are not only economic in nature, but also environmental and social, in order to be able to evaluate the feasibility and advantages that this approach offers. This is why the application of circular economy policies aimed at limiting waste and environmental costs, as well as the reintegration of waste materials into the production cycle play a fundamental role.

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Itineraries of Mediterranean design: The production of the lamp betweent craft processes and industrial production

Giuseppe Del Frassino[1], **Federica Lorusso**[1]
1. Polytechnic of Bari, Italy

The paper aims to investigate the elements which characterize the production of the lamp, in the artisanal as well as in the industrial dimension, within the framework of the concept of 'Mediterranean design'.
There are no fields in which it's easy to give a correct definition of Mediterranean design and this is even more true in the ambit of product design. But, on the other hand, it's true that many authors like, between others, De Fusco, Maldonado, Sennett and Micelli, as well as a lot of reviews and recent publications, have identified in the word 'Mediterranean' a topic for the contemporary design research. This hap- pens because, in spite of the impossibility of identifying common aesthetic aspects and/or recurring forms in the artifacts referred to this geographical area, there is with no doubt a common ground that is in a system of aspects that can be summarized in the idea of 'plurality'.
The paper offers an interpretation of the Mediterranean design drawing an itinerary within the traditional domestic lighting design systems, analyzing their historical and technical background and focusing on the relationship between forms, materials, artisanal processes and industrial production.
Furthermore, as a deepening, the paper presents a study on the lighting design works of the Catalan architect J.A. Coderch de Sentmenat: the artifacts are investigated in detail considering the original drawings, the first and actual productive systems and technologies and, most of all, their relationship with the traditional domestic space.
Finally, a design experimentation tries to give a contemporary interpretation of an old traditional system of domestic lighting.

keywords: *Lamp, Artisanal, Industrial, Lighting Design*

1. Understanding the Mediterranean

Mediterranean means meeting, confrontation, sometimes clash between peoples, transmission of knowledge, uses and customs, exchange of goods and knowledge. At the same time a factor of union and division, where geographic distances may seem shorter today than in the past, the Mediterranean is strongly characterized by cultural distances that are difficult to fill: and it is precisely in this rock that all attempts to impose forced globalization break down and and that it is not compatible with the societies of these places.
The differences and the affinities that can be found in the places of the Mediterranean are decidedly varied: from an arid and bare "lunar" landscape one passes to a luxuriant forest, but as a common trait, there is always a morphology from the evident presence of strong warm lights and light tones, with the presence of the water element. To understand this complexity, it is necessary to use historical data and enter into the thematic area. The importance of being the Mediterranean the "cradle" of Western civilization is not a fact to be underestimated, because here different cultures have participated in the development of trends that over time have built a condition on which the dialectics between the populations that build they have occupied for millennia: a flow of fragments of knowledge and customs in which everyone takes and leaves his or her own contribution without exception.
Looking at the continuous development and the constant growth of globalization and, consequently, of the consumer society, not only the Mediterranean, but the entire planet is following the path of linguistic, cultural and economic equality. It should not be understood as a unification or a fact, but we must take into consideration the consequences that it entails. Although the situation continues to evolve, there are those with determined interest who continue to oppose the aspects belonging to the consumer society, those who try, consciously or not, to remain anchored to the roots of their own land. What keeps the concept of belonging alive is precisely the presence of contrasts between those who live there. Traditions, cultures and craftsmanship are held together by the specific participation of certain people.

Thanks to the craftsmanship, the inhabitants hand down ancient methods of working, the local identity and, through art and expression, we know stories and past. This contamination, which has been and will be produced by the continuous movement of peoples and people, is also (and above all) a source of wealth for those who live in the Mediterranean, generate knowledge and culture, enrich the mind of the traveler and the host. What one can encounter in studying this area is the clear architectural closeness that has kept its cities for centuries, resembling ones, however, in the enormity of the differences found there. The urban layout varies from city to city, from region to region, dictated by climatic and environmental requirements, and consequently it results in a selection of materials used for the construction of building works. Materials that characterize entire living areas and also flow into different fields of application, including design.
You can also think of the structure and size of the Mediterranean city and focus on the typical streets of the ancient area, present in the vast majority of cases, which form an almost perfect mixture, gather and perfectly match to form a mosaic made of houses and buildings. It is important not underestimate the social dimension that is present within these areas and shape them at will; in fact, the street, the house, the shop, the workshops, the school and places of worship, to which the buildings of the political-administrative institutions will later be added, are basic elements, will form and shape the aspect of the Mediterranean city.
We can define the idea of the Mediterranean as a physical, unidentifiable and constantly changing concept. In fact, more than a geographical area, land and sea with defined frontiers, the Mediterranean is the creation of a mental state. This means that the Mediterranean is a unity characterized by its plurality, a huge tangle of cultures, trends, styles, languages that are united within a word, but that preserve enormous differences.

2. Mediterranean Design

Analyzing the two words taken individually "design", which in English means "project", but which undergoes various distortions depending on the field of application: for example in Italy, the word "design" is commonly associated with industrial production, design that aims to reconcile the technical, functional and economic requirements of mass-produced objects, so that the resulting shape is the synthesis of this design activity, but we may also come across graphic design, interior design, web design and any other field of application of the design action. "Mediterranean" instead, from the Latin *mediterraneus*, composed of *medius* «medium» and *terra* «earth» indicates, from the geographical point of view, the sea that washes the southern coasts of Europe, the western ones of the front Asia and the northern ones of Africa, or as an adjective belongs to or refers to cultural, spiritual and historical facts developed in the lands bathed by the Mediterranean.
The term "Mediterranean design" refers to the world of industrial arts, craftsmanship, production techniques, furnishings or materials and colors.
Recovering the traditions and technical skills of a place, developing new forms of dialogue and knowledge, promoting its heritage and enhancing its richness, are some of the strategies aimed at recovering the heritage of material skills and local craft techniques and at the same time enhancing/to innovate local craft production, both with a view to safeguarding traditional skills and increasing market opportunities.
Analyzing the phenomenon of production, we note that over the years there has been a substantial increase in industrialization and a clear decrease in the artisanal dimension. The culture of design is affirmed with quantity, which is indispensable in order to reduce production costs, quality encourages demand precisely by quantizing it; but both components are not realized if the price of the product is not accessible to the largest possible number of consumers. In doing so, the low cost calls into question the theme of consumption, of that phase which ultimately sanctions the success or failure of each product.
The industrial product is produced in less time and in greater quantities. And the benefit for users translates into affordable prices, automation through control systems, automatic machines for mass production, new product management systems. In the idea of Mediterranean design, however, artisanal product and industrial product actually have many aspects in common: for example, both have recourse to two essential production factors, namely labor and machinery, but the structural relationship and the incidence of costs in the two contexts are inversely proportional.
Another element that can characterize the idea of Mediterranean design is constituted by the so-called "traditional" materials. The most common materials in production in the Mediterranean area are essentially five: glass, wood, stone, metals, and ceramics. These are materials with different histories, processing methods and fields of application, but they characterize the Mediterranean area since the earliest age, when the Egyptians used metals for their tools, the Etruscans used stones for their homes, up to get to our days and understand the use of a certain material for the bio-medical field or another for the construction of cars.
Contemporary materials investigate novelties and experimental research, but nevertheless those of tradition are continually studied and studied to lay the foundations for innovative research, through the understanding of certain artisanal and industrial processes. It should be emphasized that the material itself, without human action, is strictly connected to the environmental and naturalistic sphere, just think that the vast majority of them are derived from the land in which we live; and this is another important aspect to consider in the analysis of the geographical area. Passing through certain areas of the Mediterranean, certain materials can be found,

passing through others one finds oneself in front of different naturalistic scenarios and this involves a different preference. The material and materialistic culture of the "low Europe" is a set of influences that lead us back to the initial interpretation, namely that according to which the unity of the Mediterranean lies essentially in its plurality**.**

3. A master of Mediterranean design: José Antonio Coderch

José Antonio Coderch de Sentmenat (Barcelona, 1913 - Espolla, 1984), was a key figure in Spanish post-war architecture and design. He is the author of a series of buildings, houses, offices and urban plans in Catalonia, where he learned to synthesize the contributions of Catalan modernism of Jujol and Gaudì with elements of modern architecture. During his life he tried to combine architecture and design, designing different objects to be inserted in domestic environments that he himself created: among these, the DISA and CISTER lamps are particularly significant.
Despite the cultural restrictions imposed by the Franchist regime towards Spain in those years, in 1930 in Zaragoza the *Grupo de Artistas y Técnicos Españoles Para la Arquitectura Contemporánea* was established, aiming to promote new building materials and disseminate architectural themes of modernity, with particular attention to the question of the Mediterranean and popular architecture. It was the very idea of Mediterranean that came out of the reflections of the Group that marked Coderch's path and defined his interpretation of the concept of tradition and the relationship between design and architecture.

4. Design and architecture in the work of Coderch

In the field of Mediterranean design research, of which this paper is an excerpt, we frame the study of some design objects designed by Coderch, expression of the already highlighted relationship between architectural space and industrial product.
The objects of Coderch are conceptually inseparable from its architecture, since they share the imaginative substratum of its technical and artistic activity, dealing with heat and light (of fire or sun), both in its physical and thermodynamic sense as well as in its archetypal sense, linked to the anthropological phenomenon of living. In some projects of the 1940s, Coderch and his colleague Manuel Valls define furniture pieces that combine with other artefacts extracted from the repertoire of current furniture production. Certainly influenced by the pages of the magazine AC (Actividad Contemporánea) written by GATCPAC (Grupo de Artistas y Técnicos Españoles Para la Arquitectura Contemporánea), which they read since they were students, they are particularly interested in utensils and popular tools for everyday use (e.g. chairs and folding chairs, canvas, wicker or cane seats, rocking chairs and sun loungers, etc.) reinterpreting them into their projects. Among these furniture without date and without author, expression of what we would define today "objects with anonymous design", there are some that have ingenious solutions, like the little chairs that are obtained by cutting the legs of the back of a normal wicker chair that is thus reduced and with the seat and the backrest inclined.
The original sketches of Coderch show a way of working based on systematic doubt, as well as in the instinct to refine previous results. Never a prefiguration, neither global nor fragmentary, never an overbearing gesture, no direct result, always a path made of reflections that connect up to the achievement of the final result.
And finally, photography, a fundamental tool for understanding places, architecture, the environment and space. Coderch and Valls were strongly attracted by a modernity that integrates a Mediterranean culture with formal aspects of different origins.

5. The Coderch's lighting design: some examples

Disa, the first lamp designed by Coderch in 1957, is the only one to have been manufactured while the Catalan architect was alive. The Disa lamp is a light source that radiates energy and heat, is charged with humanity and is evocator of the essence of architecture understood as a house-shelter. In accordance with the words of José Antonio Coderch: "*The essential problem for us was to draw a lamp that would return a natural. Once realized, it was seen that the light it produced gave intimacy and resembled the fire of a chimney*". The fundamental aspect of this lamp is the naturalness with which its design interprets the idea of time: an absolute, dilated, slow, permanent time, in which converge cultural and iconographic historical references that confer to the Disa lamp a semantic valence of a real reservoir of the memories. From Balenciaga advertising to Chinese lanterns, from the lighting of trees during the Espolla festival to the Elche Mystery, from King Baltasar's turban to Ottoman clothes, to the clothes of the Swiss Vatican guards, Disa summarizes and synthesizes a set of references that converge in the artifact with the same modality of the modernist tradition, but with an abstract and essential aesthetic typical of modernity. The lamp was born as a prototype: thanks to its sinuous, "timeless and eternal" design, it is one of the most complete expressions of the lighting design, since it transforms the electric energy in a serene heat with reddish tones. The wood foils surrounding the light source are fixed on black steel supports, meticulously studied by Coderch through a huge series of sketches that have subsequently become fifteen different solutions, today kept in the archive of Coderch.

In the use of materials, in the shapes and in the control of the light effects there is a certain Nordic influence: in fact, Disa seems to remember the lamps of the architect Poul Henningsen, from which inherits a "contemplative" idea, a respect for the essential values of man and the environment that surrounds them, which translate into Disa in characters like the intimacy domesticity, the abstraction of the image, the timelessness of the forms, the filtered light, the translucent, the elasticity and flexibility of the materials (Fig. 1).

A second example is the CISTER lamp. There is no prototype of this lamp directly produced by the same Coderch,

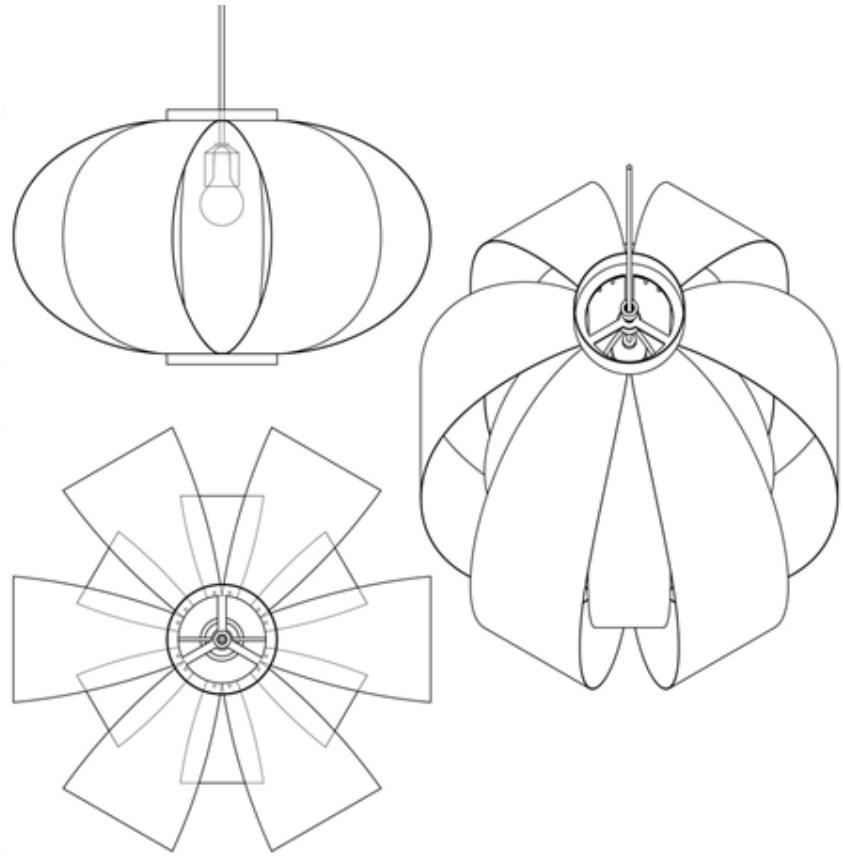

Fig. 1: J.A. Coderch de Sentmenat, DISA Lamp, 1957 (drawings by the authors).

because it was produced only years later by TUNDS, managed by Coderch's nephew. As Rafael Salvador, founder of the company, explains: "*13 years ago my aunt, José Antonio Coderch's sister, left a paper towel on the table with a freehand pencil sketch of a lamp based on concentric cylinders and with a name. It was about the Cister. I had found a treasure. The sketch in consideration was estimated of the years'50. I think that piece of paper asked me to save it from that lethargy. Therefore TUNDS was born almost as a game and is driven by a huge passion. With the support of the Coderch's family, the interpretation of the paper towel has begun. We only have a sketch without further details but, years later, other helpful sketches seemed to determine the definitive proportions of its creator*"
It is estimated that the Cister lamp was designed by Coderch between the years 1950 and 1970 and that it was part of a collection of various lamps. The executive plan began in May 2004 when Rafael Salvador, the nephew of Coderch, found a handmade sketch of which at that time the author was not known; then he began to work on the development of the drawing, firstly only with the aim of understanding its shapes. Later a model was developed that gave life to a lamp composed of three concentric cylinders and after two years it was possible to define its feasibility through the construction of some "final" prototypes.
In the archive of the architect/designer were later found other sketches, patterns and drawings, some of which were drawings of a lamp that the same Coderch called "Cister". This led to continue studying the design of the lamp and consequently the design of some variants of the first model (e.g. the suspension lamp) and the creation of a company to put them in production: Tunds, with the precise purpose of developing and realizing artifacts designed or even imagined by Coderch, trying to interpret as faithfully as possible its design philosophy.
Currently the Cister lamp is produced in the following models: Cister Large, Cister Column, Cister Wooden Foot and Cister Methacrylate.
The wooden version includes the use of pine, according to the original indications of Coderch. Pine comes under the

category of soft woods, along with the spruce and balsa and this confirms the why of its choice for the realization of the foils of which the lamp is made, which are continuously subjected to traction. Moreover, compared to other soft woods, it is the one that contains the greatest number of grain; however it is very resinous to the touch, even if it lends itself very well to an easy working and to processes such as gluing and painting. The pine trunk shall be subjected to a specific type of cut, called "quarter sawn" or "French", which is used to obtain a certain directionality in the grain: it is a type of cut that is carried out on a quarter of the trunk, as the name indicates, and is used to obtain wood sliced with striped and parallel grain. In the moment of cutting the false quarter submits to the cutting process in the direction of the smaller side, the blade has always a parallel movement to the diameter of the trunk, thus perpendicularly crossing the concentric veins of the plant, in order to obtain sheets with a texture composed of striped and parallel veins.

Subsequently this phase of processing of the veneer, the foils obtained are shaped according to the size required by the project and covered with a layer of paint that protects them from wear and tear over time. In the case of the Cister lamp, the rectangular wood foils are bent to form semi-circular sections and then joined together by bonding with certain plastic and aluminium joints placed between the foils. Instead, in the Disa lamp the wood veneer is initially shaped like an elongated leaf and then inserted on the twelve pins, welded on both rings, thanks to the two holes that the wooden foils have at each end. The wooden foil is flexed until its curvature allows it to be inserted into the pins, thus taking advantage of the elasticity of the wood that blocks the whole. In the assembly phase the external sheets are inserted first, placed between two pairs of fasteners and then the internal ones, so that each of them is superimposed on the two adjacent exteriors (Fig. 2).

6. The Coderch's lighting design interpretation: a design approach

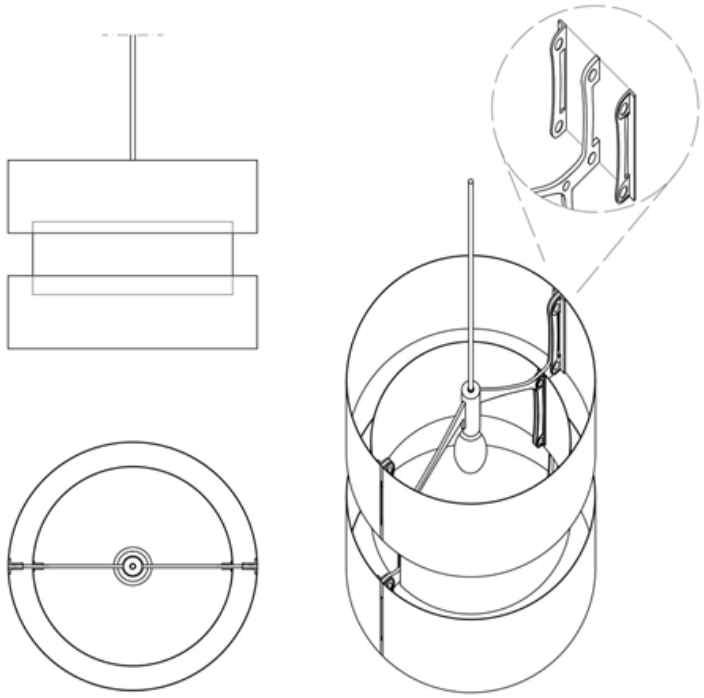

Fig. 2: J.A. Coderch de Sentmenat, CISTER Lamp, 1950 (drawings by the authors).

The study of Disa and Cister lamps has highlighted the design philosophy of José Antonio Coderch, which on the one hand combined the meticulousness of craftsmanship with the rules of industrial reproducibility in a deep "Mediterranean" conscience, on the other hand, unites tradition and modernity through the use of simple forms and a continuous look at the historical-cultural memory of the society of its time. This analysis leads us to broaden the knowledge of the work of Coderch through a design experimentation, that is not of an "inventive" nature but "reinterpretative", starting from the Disa and Cister lamps.
As we have seen, these lamps are based on the combination of several elements, whose semantic value lies precisely in their coexistence within a single artifact. But there is more: the warm light bulb, the hidden internal frame and the wood foils with an extremely thin thickness, make the idea of being inside a living place heated by the warmth of a wood burning fireplace. This interpretation is perfectly compatible with the idea of a Mediterranean living space, in which it was the custom to use a fireplace that produced heat to heat the house and to spread the light at the same time.

Fig. 3: Foculus Lamp (Design: G. Del Frassino, F. Lorusso; Supervisor: V.P. Bagnato)

The Foculus lamp, the object of the design experimentation, was born from the development of the idea of the lamp as "fireplace" that tries to reinterpret an object of popular tradition in a contemporary design object, maintaining its characteristics of transportability and interaction with people. An object invented to heat (the brazier) is also used to illuminate certain areas of the house and can be freely transported and placed, both on the ground and suspended, depending on the needs of the user.
The thin sheets of veneer used in the lamp give an effect similar to that of a blazing brazier, iconographic Mediterranean reference. The lamp was designed through the realization of a prototype made of cherry wood veneers and a "modern" material (plastic) which, combining craftsmanship with industrial production, explores the possibilities of a "co-productive" approach to the artifact realization process. The sharing of two production methods is therefore a very important aspect and is at the basis of the aesthetic-formal choices (Fig. 3).

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History and Theory: Instruments

Moderators: **Skender Luarasi and Valerio Perna**

How does history and theory of design affect design, today? How does Tirana as a particular place with a wide range of problematics help us address this question? It is the ambition of this paper & poster session to deal with these questions. There is an uncertain relationship between history and theory on the one hand and design practice on the other, in history. It is the hallmark of modernity to imagine such this relationship in terms of crisis. Twentieth-century design, in its different disciplinary forms and manifestations, relinquished both history and imitation of nature by emphasizing functionalism, the machine, and mass-standardization. Upon close inspection, however, it appears that its normative positions were indeed rooted in history, particularly in the organicist theories of the nineteenth century, and while nature as a model may well have disappeared, the model as nature did not.

Sessions Design in the Twentieth Century: *The first session Design of the Twentieth Century invites paper abstracts that deal with such relationship, and also how it changed under the emerging conditions of personalization, mass-customization, and non-standard technologies.*

Modernity in Albania: *The second session Modernity in Albania invites abstracts that register different manifestations and developments of modern design in Albania in the last century, and today. Looking at modernity in Albania reveals that modernity was never a large monolithic Style, but rather consisted of different approaches, expressions, and styles.*

Non-normativity: Such multiplicity leads us to the third topic: *non-normativity. Looking at Tirana today, at its frenzied building development and speculation on the one hand, and the merciless destruction of the memory of its modernity on the other might suggest us to propose a rather philosophical somersault: the normative is indeed the exception, while the non-normative is the norm. This session invites abstracts that deal with such reversal.*

Sprawl versus Growth: *The fourth session Sprawl versus Growth serves as a case study to focus on the idea of non-normativity. It invites abstracts that deal with the expansion of the city of Tirana in the last thirty years. Is this expansion a sprawl or a growth? What is their difference? How does such difference help us better imagine, perceive and design cities? What is the history of sprawl and growth? When did 'growth' become 'sprawl'? And when do these metaphor end?*

Pedagogy: *And last, the fifth session Pedagogy invites papers that deal with the role of history and theory in design pedagogy. How do we teach design and theory in design? Should we teach them at all and why? How might history and theory change design, and help us better imagine and articulate design for the present?*

Round Table Discussion

Discussion about the upcoming book of Andi Papastefani: A 100 Sketches for a 100 years Capital.

[HTH:I/01]

The non-normativity of public and private property

Francesca Vanelli[1]
1. Institute for Housing and Urban Development Studies (IHS)

Transitional countries in Central and Eastern Europe have experienced a radical shift, from enclosed regime to market-based economy. This turn has had repercussions on the cities' development, causing social inequalities, especially in peri-urban areas. In Tirana, the delegitimization of the socialist system has resulted in a drastic reversal in the understanding of property rights (Bardhoshi 2011). The marketization and excludability of urban poor from public spaces and services (Nase, Ocakçi 2010), the growth of self-organized informal settlements with differing tenure conditions, and the invasion of public property contribute to what is known as the tragedy of the commons (Pojani, 2010b). In this paper, the theories underpinning the evolution of conceptualization of property explain what has become the urban normativity and what the non-normativity. Bandelj (2016)'s theory of Post-Socialist Capitalism explains how global societal transformations are reflected in individual attitudes. Since the beginning of the '90s, the private-led expansion of Tirana has established new norms; the idea that everything that was non-private was "nobody's property" (Acioly et al. 2003) is clear in the morphology of the informal settlements. However, against speculation and in order to build a democratic cohesive society, the need to redefine the bundle of rights in a new conception of public and private, where they both become part of a mutual dependence dynamic, calls for strong interventions by different disciplines. Today the city, an outstanding stage for the best architectural practices, uses design to deal with the fragmentation of public space and the belittling of collective consciousness. Different philosophers and planners (among others, Goodsell 2003, Mason 2010) promote a vision of the public sphere as a key-point to revert the individualistic normativity. An effort to the public spaces can help cities in building social cohesion and a just equitable society.

keywords: property, informality, post-socialist, public space, democracy

1. Background

After the fall of the USSR, transition economy countries in Central and East Europe (CEE) have experienced a radical shift, from enclosed socialist regime to a market-based economy; this transformation has had repercussions on several theoretical and practical matters. From a point of view of governance, the shift has challenged the public institutions to embark in a different role, from main stakeholder to secondary, and many local institutions are still adapting to co-operative processes to improve their performance. On the other hand, during the transition phase, public institutions assumed a "laissez-faire approach towards planning and policies" (Tsenkova, 2011: 85), where the under-management led to increasing spatial inequalities, exacerbated in peri-urban areas. The adoption of neoliberal theories have also played a role. As explained by Harvey (2013), the global trend of adoption of free-market and capitalistic principles consider the city as a place of social and geographical concentration of surplus products. "Capitalism needs urbanization to absorb the surplus products it perpetually produces" (p.5). The consequences of this process on the global economy have been huge, benefitting the small portion of wealth and privilege population, able to influence the development of the city, while hitting low-income and vulnerable groups, not to mention the environment. It has generated a socially unjust redistribution of resources; in this panorama, urban poor fight for the right to the city, against dispossession and displacement, revealing the political dimension of urban development. Neoliberalism has also led to the private control of this surplus, boosting globally the growth of privatization trends.

Albania is still trying to find its identity, moving between residual socialist arrangements and a market-driven economy, living different transformations. Firstly, the concepts of individual property, rights and the role of

institutions underwent a drastic overturn of meaning (Bardhoshi, 2011; World Bank, 2007). The post-socialist city has delegitimated the previous system, by setting clear definitions of individual rights, while belittling collective interest (Bakllamaja 2013, Barhoshi 2016). As different scholars (Bardhoshi 2016, Nase, Ocakçi 2010) claim, the idea of private interest resulted in a process of de-collectivization of property, that largely affect the trend of land occupancy. This process was facilitated by the government, who lacked financial, institutional and planning instruments, and generated rapid and impactful privatization all over Albania, strong enough to boost economic growth and competitiveness (Tsenkova, 2011).
However, this unequal economic development caused fragmentation of properties, land claims, marketization and excludability of public spaces and services (Nase, Ocakçi 2010), growth of social inequalities and overall poverty in the country (Felstehausen, 1999; Tsenkova, 2011). Consequently, the effects of this process are visible today in the changing role of the public and private agents. Individual rights prevail over the collective and that is reflected in the stakeholders' actions (Prato 2017); the institutional landscape tends to favour the private sector to the detriment of the public, especially in the context of land development and infrastructure provision (Tsenkova 2012). Former planning instruments have been adapted ad hoc to private interests, and, since the 2000s, legalization of illegal structures has become a legitimization to build, notwithstanding permits and norms (Tsenkova 2012). Due to a lack of municipal administrative and financial capacity, other agents have set the rules of both private and public land development (Pojani, Maci 2015, Toto, Allkja 2018). The attempts to revert the public laissez-faire attitude are moving today towards participatory and strategic planning, trying to push towards an overall vision of rehabilitation of collective interests (Hirt, Stanilov 2009). Aliaj et al. (2003) testify the challenge to build trust among communities' members and to revert the trend of individual-oriented behaviour.
Secondly, the fall of socialism has resulted in major social issues. The major cities began in the '90s to receive enormous migration influxes, mainly from the rural areas of the country, looking for economic opportunities. The under-management of the settlements have resulted in different degrees of tenure status in peri-urban areas (Deda, Tsenkova 2006), invasion of public property (Prato 2017), compactness in spatial patterns and lack of public spaces (Mele, 2017). Major distress comes from the lack of infrastructure, social segregation and poverty. In this context, the municipality decided to start legalization procedures in peri-urban areas at the beginning of the '90s (Halilaj, 2016). Within the democratization phase, the process of construction of civil society is still struggling. As Dauti (2017) claims, the decentralization that took place after the fall of the Soviet Union, has not enhanced participation in decision-making by the community. Due to lack of trust, awareness and willingness to participate in the political life, citizens are still conditioned by the perception of forced participation and control of the socialist regime (Krasniqui, 2018), reacting to this by reducing the engagement in their own ethnic community. The diversity of the new migrants in Tirana heightens the conflict for the right to the city, while neighbourhood connections have shifted to a more anonymous and individualistic behaviour (Pojani, 2010b). Specifically, Pojani (2010b) claims that social relations are less valuable among informal settlers, due to the increase of wealth, comparing to their previous conditions in the rural side of the countries, rivalry and loss of respect of collective spaces. Accordingly, Nientied (1998) reports how these irregular urban development niches, not based on community- ties but rather according to accessibility criteria, have hamper the creation of strong cohesive neighbourhoods.

Lastly, the economic transition has generated strong exclusionary social structures, where unemployment and social isolation play a major role in impeding the development of social cohesion (La Cava, Nanetti 2000). Moreover, new migrants experience social segregation and stigma, generating "social partitioning" (Nase, Ocakçi 2010, p. 1857). As reported by Gëdeshi and Shehu (2012), ethnic segregation represents a vicious circle that impedes the efforts of certain groups to escape poverty. Specifically, Roma and Egyptian communities are among the most segregated groups, and national strategies are in place to increase especially Roman inclusion and improve the overall living conditions. Even if both are the poorest ethnic groups in Albania, the Egyptian, although geographically segregated, are better integrated in the society. In terms of social protection, Albania has been taking steps forward in tackling social exclusion, particularly for vulnerable groups, and exclusion from education, decent housing, and formal employment. In conclusion, the construction of civil society and democracy in Albania still struggles with the ghosts of its past.

2. The evolution of the city

In the case of Tirana, the expansion of the last century has resulted in huge expansion of the city. In the '90s over 800.000 people converged on informal ghettos within the administrative boundaries (the "yellow line") or without, on public-owned agricultural land, generating the so-called "dual city" (Pojani, 2010a: 65).
Due to lack of planning and mistrust towards the law, the informal settlements were self-organized mainly on public-owned land, with a mix of formal and customary land occupancy systems (Bardhoshi, 2011).
Scholars agree on the definition of a continuum of tenure system, where the bundle of rights of some might be limited by social constructs (Durand-Lasserve, Selod 2007).
The differences in legal status, subdivisions and rights, from "informal unwritten agreements to formal contracts" (Durand-Lasserve, Selod 2007, p. 4) results in different ownership patterns, and source of law, often mixing customary, religious and statutory regimes (Payne 2002).

The development of informal structures in post-socialist countries requires an explanation of the socio-economic changes that happened in Eastern Europe. Bandelj (2016) defines the countries' transformation as a simultaneous combination of "privatization, deregulation, democratization and neoliberal globalization" (p. 90), using the term of post-socialist capitalist. The author considers capitalism, following the Weberian sense, as a "set of interrelated social institutions, understood as formal and informal rules and practices, yielding a particular social, political and moral organization of economy" (p. 90). In this political panorama, three main features appear recurrently:

- Lack of state autonomy
- Legitimation of self-interest
- Persistence of informality of modus operandi

The three reinforce each other: the morality of informality in different sectors and a variety of self-centred practices, legitimized by capitalism, affect the state authority, which mutually increase the parallel informal structure and greed behaviour. Informality in transitional countries has risen as a secondary economy, a parallel system that ensures that the "collapse of the formal structures of the socialist regime does not result in an institutional vacuum" (Stark 1993 in Bandelj 2016, p. 96).
This has resulted in the development of two distinct spheres, where informal is a-way-to-doing-things, in terms of livelihood, economic and political attitudes. The Albanian case reflects the occurrence of the post-socialist capitalistic vision of Bandelj (Andoni 2007, Hirt, Stanilov 2009, Bardhoshi 2016, Dino et al. 2016).
The expansion of Tirana began with the increasing demand of housing, due to high migration, and lack of housing and land accessibility. The absence of a performative response in the governments' actions generated densification outside the formal sector: "the informal construction activities in the city have overwhelmed the public sector's ability to control the development" (Nepravishta, 2004: 2).
However, Andoni (2007) and Nase and Ocakçi (2010) claim that the Albanian case has peculiar conditions comparing to the other CEEs. On one hand, although the industrial development has globally signed the kick-off of the rise of informal or illegal dwellers at the beginning of the XX century, some other post-socialist countries, as Serbia and Croatia have experienced informal sector growth from the '60s, aided by the high demand for housing and a lack of supply. On the contrary, Albanian informal settlements started to appear at the beginning of the '90s, as a consequence of the political and economic transition, mainly in the capital city. As the densification of the inner city wasn't enough to accommodate new migrants, Tirana has also expanded in peri-urban areas; the outcomes are sprawling low-density suburbs and a compact inner city (Pojani, 2010b).
The criteria of choosing the land to settle in has been ruled by accessibility and tenure condition: " if it is collective land, it is nobody's property" (Acioly et al., 2003). According to Pojani (2010a), the adaptation between the residents and the new migrants has originated new models of living: the disappearing of traditional communities, the "commercialization of social relationship" (p. 487), the lack of respect of public space, which resulted in weak neighbourhood relationships, and strong conflicts for the right to the city. Moreover, the spatial dimension of the city has changed: from uniform service distribution, different degrees of tenure and housing provided by the central government, to polarized gentrified areas, a predominance of individual owners occupancy and speculative residential development (Tsenkova, 2011).

3. Individualism vs. collectiveness

Urbanists have assessed in different occasions the role of public spaces in building public and collective culture (Amin, 2008). Historically, the size, the morphology and the spaces of the cities were clearly set; the urban sprawl and expansion over the borders, in addition to huge movement of people, have generated polycentric urban agglomeration, with mixed cultures and traditions. The use of public spaces has also lost importance due to increased use of social media and online sources. The lack of strong presence of the central State has led to have the neighbourhood scale taking a high-priority in determining a sense of place identity; the dispersive urban scale hardly represents citizens' sense of belonging. Globally, as stated before, privatization and commodification of land has generated the erosion of public space, and that's also visible in the periphery of Tirana.
Inclusion versus exclusion, individualism versus collectiveness, private versus public. The normativity – the accepted rules, norms and tendencies of urban development - has become the focus only in the private land uses, while belittling the open-access ones. Scholars talk about the tragedy of the commons, when, in case of little cooperation in maintaining collective resources, the individualism prevails and the shared spaces are physically and conceptually left aside (Fehr, Leibbrandt 2011).
The understanding of commons has met some shared conceptualizations by different theorists. Firstly, the meaning has shifted from the perception of environmental rural resources, as air, forests or waterbodies, to a broader sense, including urban spatial manifestation and practices: natural resources, parks, public spaces, transportation, sanitation, public services and streets (Gidwani, Baviskar 2011).
Secondly, commons are strictly related to communities able to create, protect and maintain them (Siefkes, 2009). Thirdly, many scholars have analysed the concept in opposition of private property (Davy, 2014; Moss, 2014; Needham, 2005). The definition of spatial commons by Davy (2014) explains the common as "shared land uses

typical of cities and other human settlements" (p. 475). Davy (2012), in his book "Land policy: Planning the spatial consequences of property", identifies eight typologies of shared and restricted land uses, each one with its own property rules. This mono-rational point of view is actually quite distant from reality, where they not exist purely, but a in "balance between, on the one hand, a simple dichotomy of private and common property and, on the other hand, a multitude of singular arrangements no one can understand or map" (p.480), which he defines as poly-rational theory. Equally, Blomley (2004) summarizes the mono-rational idea of the predominance of private property in the ownership model, where there are only two ranges of ownership: public and private. The two don't collide, the majority of land is privately owned, and the hierarchy is clearly set, as common property is nullified (Table 1). Moreover, the ownership model excludes other tenure manifestations, such as customary and religious systems. However, as Needham (2005) argues, the ownership model goes across an ideological misconception. When it comes to land and buildings, the bundle of rights is highly diversified (Blomley, 2004; Needham, 2005). If this dichotomy was ever true, the "complexity of modern capitalism" (Blomley, 2004: 13) has contributed to break and recombine the bundle, generating the death of the classical liberal conception of private versus public property.

	Private Property	State Ownership
Title	Clear – no prior or competing claims	Clear – no prior or competing claims
Owner	Single identifiable owners	Vested in the State as fictive individual
Priority	Anterior and superior	Secondary – guarantor of private rights
Property rights	Consolidated bundle (alienation, use, exclusion, etc.)	Rights presumptively inferior to those of private owner
Spatial organization	Clearly fixed by objective boundaries	Spatially delimited and finite
Spatial archetype	Private, detached house	City park or street

Fig. 1 The ownership model. Source: Blomley, 2004

Furthermore, Enemark et al. (2014) and Moss (2014) follow Davy's conceptualization (2014), assessing the dependence of private property on collective material and non-material spaces. Therefore, the simplification of the urban land uses of a city in private versus common is hardly true. "Spatial commons are a prerequisite of private property" (Davy, 2014: 476), they have a mutual relationship, as the value of the first will increase according to a proper planning of the latter; restricted spaces exists in connection with shared spaces and vice-versa.
The attitude towards the commons in post-socialist capitalism is influenced by the "legitimacy of greed" (Bandelj, 2016; Streeck, 2010). According to the authors, capitalism prioritizes the private agents and its contractual relationships with others, for a materialistic gain. Neoliberal globalization, the new conception of private property and its freedom of exchange in the economic market has legitimized the individual greed and self-serving behaviour, in opposition with the previous regime. The run for the maximization of gain degenerates in the depletion of commons resources, as they become a collateral "product of the self-interested pursuit of private goods" (Streeck, 2010: 13). As Stanilov (2007) claims, in CEE countries, the restitution of properties has generated the reduction of public space, especially in peripheries; private development has taken place over community resources, with little concern of public domain. The transformation described so far is set on a multi-level scale: from ideological conceptualization, to governance, to spatial manifestation and sense of identity.

4. Design for the collective city

The previous analysis leads to a clear scenario. In the last decades, a global trend towards economic laissez-faire, capitalistic theories, the increase of development needs of cities and the public sector lack of resources and ability to deal with a sudden growth have increased the role of private entities in cities' management. The normativity has become the prevalence of the private sphere, which, clearly, does not benefit the urban poor and vulnerable groups. What then is the role of public space in building the democratic city? In this uncertain relationship with the private sphere, would it able to produce a sustainable urban growth? What ideological overturn is needed to accomplish this shift, especially in the case of Tirana?

Public space is relevant in community building, in increasing social cohesion, hence, to build just society and reduce social exclusion, poverty and isolation. A fruitful relation between social cohesion and governance would create social justice, equal redistribution of resources and democracy (Maloutas, Pantelidou Malouta 2004). As highlighted by Goodsell (2003), philosophers, architects and urban planners have a different perspective regarding its role . Democratic philosophers, such as Hannah Arendt, recognize public spaces as place of expression of public action, democracy, citizenship, social relations and solidarity. Juergen Habermans considers the public as

a mediating space between public and private, where communication and exchange should be free to happen, especially in a neoliberal environment. Contrarily, urban planners, such as Manuel Castells, present a different angle: nowadays, the glorious role of public space is limited by the media, which have generated the "informational cities" (Goodsell, 2003: 365), where Harvey's fight for the right to the city has turned into "controlling networks, not territory". Moreover, architects perceive the public space as part of a public building. Their aim is to generate a feeling of representation, symbolic identity or, contrarily, intimidation. Especially public buildings contribute to the construction of the image of the society, which, however, has to survive its political meaning over time.

The role of design of public spaces has been explained by different urban doctrines. Firstly, New Urbanism scholars believe that it has a clear role in reverting the norm of preferring non-spatial forms of association, especially in a society that is not only individualistic in attitude but also technological in habits. They claim the construction of a sense of community through the spatiality of the city – translated into a design manifesto, that promotes the integration between private and public spaces (Talen, 1999). All the elements of the city have a role. The land use should be mixed, to encourage encounters. Streets are not seen only as void between buildings; on the contrary, roads become safe spaces for pedestrians, places for gathering and social relations. Using these spatial expedients, neo urbanists try to convert the neo-liberal individualism into socialization, and to gain social cohesion among residents. Secondly, the environmental sociology of Parson highlights how physical layout of buildings, as well as demographic features of neighbourhoods, may constrain social behaviour. Some concrete examples are the following: according to Talen (1999), the position of doors or presence of porches already play a role in "communing" and in the perception of the exterior. Mason (2010) proves that people living close to open access land uses, such as parks, have a higher level of trust than people living in a monofunctional land use area. Furthermore, high density, car-free areas, furnished open areas and proximity to different types of services increase social interactions. Lastly, the decentralization of public space in the city (Hein, 2012) can be part of a multidimensional response to social exclusion. To conclude, it is not only a widespread, inclusive public space has to be constructed, but also, the mentality towards the public sphere has to develop.

Clearly, the spatial materialization of these theoretical values have to be contextualized in space and time. In the case of Tirana, the central Skanderberg Square represents today an open space, where different users may find their representative space in the city. The square has expressed over history the city's political evolution and vision: "from an Ottoman market and prayer space to a scenography colonial display [...]; to a monumental communist parade ground; to a post-communist anarchic marketplace; and finally to a traffic roundabout surrounded by [...] no human-scale spaces" (Pojani, 2015: 89), to lastly a unique public space in the city. The attention should be turned now to the periphery, when public spaces are mainly private – the "third spaces" (Pojani, Maci 2015), such as bars and clubs, or the small pockets of residual spaces in the compact urban fabric. A combination of public interventions, such as traffic and parking management and preservation of ecological corridors, and bottom-up citizens' involvement in design and maintenance is required, in order to solve the dual city dilemma. Small interventions can generate a snowball effect and trigger larger changes.

5. Conclusion

Urban sprawl has increased isolation and decreased residents' social capital (Mason, 2010). The construction and development of a just civic society goes through a just redistribution of spaces, with a balance between public and private sphere. Globally, the major trend of shrinking of importance of public spaces, comparing to an increase of private ownership, has caused the worsening of social cohesion among citizens. To revert the process, an equitable governance attitude should be pursued: respect and legitimacy toward the public actions by citizens, more possibilities for them to influence public policies, balance between private and public interests, a clear legislative framework and awareness among citizens. Moreover, the design of both public and private spaces can become a key to revert the individualistic mindset: instead of conceiving the public as extended private space, cities planners and architects should consider the private as extension of the public space, and a mediation between the two should be find. The public institutions should be the one addressing and monitoring this balance. The normativity should become the democratization of the public spaces, against the competition for the profitable use of public space (Bodnar, 2015). Equitable distribution, accessibility, inclusivity, "a minimization of barriers, unofficial as well as official staging, and an attempt to create conditions favourable to deliberation" (Goodsell, 2003: 381) should be on the agenda of city managers to design a collective city. An extra effort on the public spaces can help cities in building social cohesion and a just equitable society.

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Studies on the structural performance of historical buildings, designed during Italian influences in Tirana during the period 1920-1929

Case study, "Assessment of the Tirana Municipality building"

Nikolla Vesho[1]

1. Department of Architecture and Engineering, Polis University, Tirana, Albania

This study will focus on the context of Tirana's historic buildings, designed during the 1920-1929s. 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. Since then a long time has passed, now the architectural-structural vision of modern Tirana is changing but preserving the most valuable part and the beauty of old architecture.

Referring to the buildings in the study we can say that they are "neglected" in their structural aspect. These buildings, being the main axis and the capital's identification, have been constantly restored to their façades in aesthetic terms, mainly in painting and plastering. There has never been any structural restoration or anti-seismic retrofit.

The main difficulty in rehabilitation of historical monuments is the dominance of ambiguous but compelling values of the structure that comes across with the transparency and ease of structural techniques in reducing seismic hazard risk on buildings. The gap between these two different classes of issues is similar to the gap between art and science and reconciliation can be achieved only based on morals.

In this work the peculiarities of the global response of old heritage buildings are shown with the aid of a simplified non-linear element model, realized with AM Quake v6.0 software, able to reproduce earthquake damage to masonry buildings and failure modes observed in experimental tests. The application of this method to Albanian heritage masonry typologies points out the difficulties related to existing buildings.

At the end of the study, the target is an assessment of the structural performance, also some suggestions for the improvement and modernization of these buildings related to urban plans in the future.

keywords: Preservation and rehabilitation of cultural heritage, Heritage, URM-typology, Static linear Analysis, Structural Safety

1. Introduction

The historical and architectural heritage of Tirana is located along the main axis and the main boulevard of the city. The municipality building represents features of Italian architecture. Italian interventions changed the image of old Tirana, giving it a Western-style decor and decoration. 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 shells[1] 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.

Albania was struck by about ten serious seismic events during the last three decades. All of these had a magnitude greater than 5 Richter scale [2]. Important damage and loss of the architectural heritage was induced by the

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.

earthquake in Shkodra magnitude 8 Richter scale (18 Apr 1976), Tirana (09 Jan 1997), Librazhd-Diber (30 Nov 1967). A return period of 10 years of a destructive earthquake, in Balkan region seems to be an optimistic expectation.
Prevention and rehabilitation can be successfully accomplished only if a diagnosis of the state of damage of the building has been formulated. How structural damage can interact with the performance of the structure to all the environmental actions and vice versa is not yet really completely known. From the point of view of the structural stability, the first concern for the conservation of a historic building should be a reliable diagnosis, to state its safety. Several unsuccessful results have underscored the need for adequate assessment prior to any restoration or rehabilitation. In fact, when neither the real state of damage nor the effectiveness of repairs are known, the results of the intervention are also unpredictable.
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 methodology [3] 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 action[4]....
As 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 spectrum [5] according the Euro code 8. According the methodology, it is used the static linear analysis [6] and the masonry of the building is modeled with nonlinear behavior [7].

2. State of the art

Case Study 1: "Seismic performance of historical buildings based on Discrete Element Method, An adobe church" (Mendez, et al., 2018)
The authors have proposed the application of the Discrete Element Method for evaluating the seismic performance of historical buildings. Furthermore, the out-of-plane behavior of an adobe church with thick walls, in which the morphology of the cross-section can have an influence on the response, was evaluated by the Discrete Element Method. The performance of rigid and deformable blocks models was compared, and the sensitivity of the numerical model to the variation of critical parameters was investigated. The results allowed the identification of the most vulnerable elements and a proposal of recommendations for reducing the seismic vulnerability.
Case Study 2: "Seismic Protection of Italy's Historic heritage using the Seismic Isolation Approach" (Parducci, 2000)
In this case author have proposed the opportunity of some important initiatives recently promoted by the Italian

2/The Richter magnitude scale is a scale of numbers used to tell the size of earthquakes. Charles Richter developed the Richter Scale in 1935. His scale was based on the seismogram measured by a particular type of seismometer at a distance of 100 kilometers (62 mi) from the earthquake.
3/Albanian technical code and Italian design code (1920-1940)
4/Shaking and seismic frequency activity.
5/ Elastic spectrum represents a series of synthetic equivalent earthquakes summarized in one.
6/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.
7/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.

Government after the seismic "swarm" that struck central Italy in 1997 and 1998. These earthquakes damaged many ancient structures in the Umbria region, including some important artistic buildings and many typical construction of the historic environment. The specific effectiveness of the Base Isolation when it is applied to masonry structures of the ancient structures is then underlined. The results of some demonstrative designs are discussed to emphasize the high seismic performance that can be achieved in this field, taking into account the specific criteria that must be fulfilled in Italy to design the rehabilitation and the restoration works of the historic architecture.

3. Methodology

At the structural and architectural scale, the study provided a systematic collection of relevant data on the building techniques, brick materials and finish, state of conservation and seismic restoration. Interest was focused on the four main technical elements of these buildings, as walls, ground floor slab, wooden doors and windows. Meanwhile, in 2001 a partial restoration of the building was made, also a new structure was added in the back of the existing building. The typology of the new building is RC frame systems [8] and was connected to the old building on the joints of floor dividers, exactly with the slabs. Between the two objects there is a narrow space to allow the structures to work separately.

3.1 Case study "Structural evaluation and seismic performance of municipality building, Tirana" (Dhimgjini, et al., March, 2001*)*

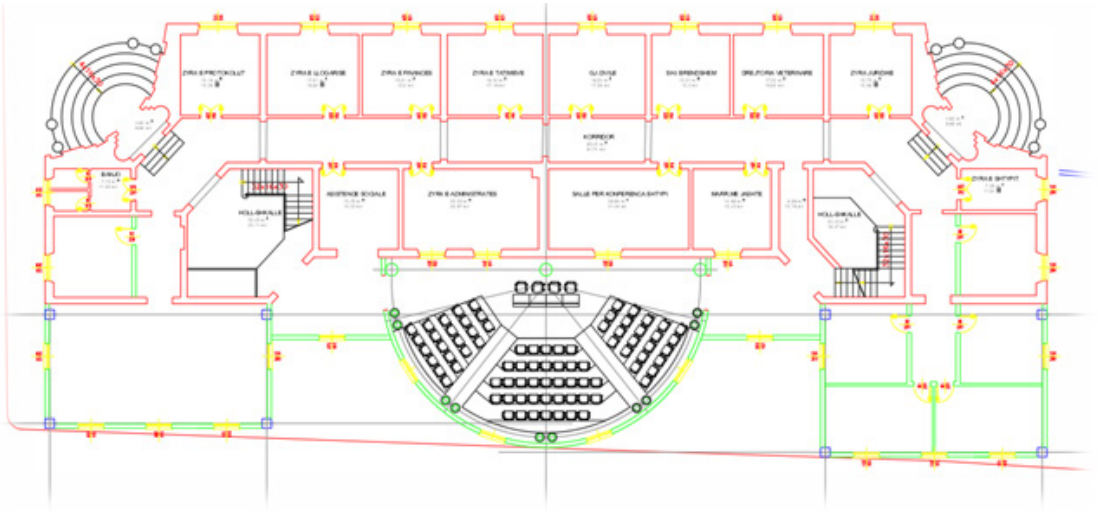

Fig. 1 Municipality of Tirana, Updated ground floor plan after restoration (Dhimgjini, et al., March, 2001)

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) [ ].
Use of FEM [ ] interpretation of the crack Pattern and their distribution
The assessment of seismic performance of URM buildings [ ] requires the identification of the collapse mechanisms and masonry local damages step by step activated by the synthetic earthquake (elastic demand spectrum) [ ]. 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,

8/Reinforced concrete (RC) frames consist of horizontal elements (beams) and vertical elements (columns) connected by rigid joints.
9/Second level mostly used for designing civil structures based on seismic performance levels [Eurocode 8]
10/The finite element method (FEM), is a numerical method for solving problems of engineering and mathematical physics
11/Unreinforced masonry building typology, without reinforced concrete frames.

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 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)

Below is presented the object to be analyzed, the municipality of Tirana building after interventions. The constructive project and technical specifications for this building are taken from the technical archives of Tirana. According the reconstruction and extension of the building we are based on the design project data and additional files. (Dhimgjini, et al., March, 2001)
The typology of the existing building is a masonry structure. In the object there are 4 different masonry thicknesses, 60cm at basement level, 52cm, 34cm, and 17cm. The last thickness is mainly used as a separating wall between rooms.
The nonlinear analysis Pushover, methodology is able to define capacity curves with performance point, the shear resistance and collapse mechanisms. It is able to combine different mechanisms for global seismic performance

Fig. 2 Municipality of Tirana, Updated view after interventions (Dhimgjini, et al., March, 2001)

Stone Masonry structures have large masses due to heavy construction materials. Dead loads consist of the fixed weight of structural members and the weight of any permanent fixtures attached to the structure (superimposed loads). Dead loads always remain on the structure and affect the structure throughout its lifetime.

12/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.
13/ pier = column, spandrel = beam. Both piers and spandrels are equivalent panels constructed of shell elements, showing the element way of work according the static concept.

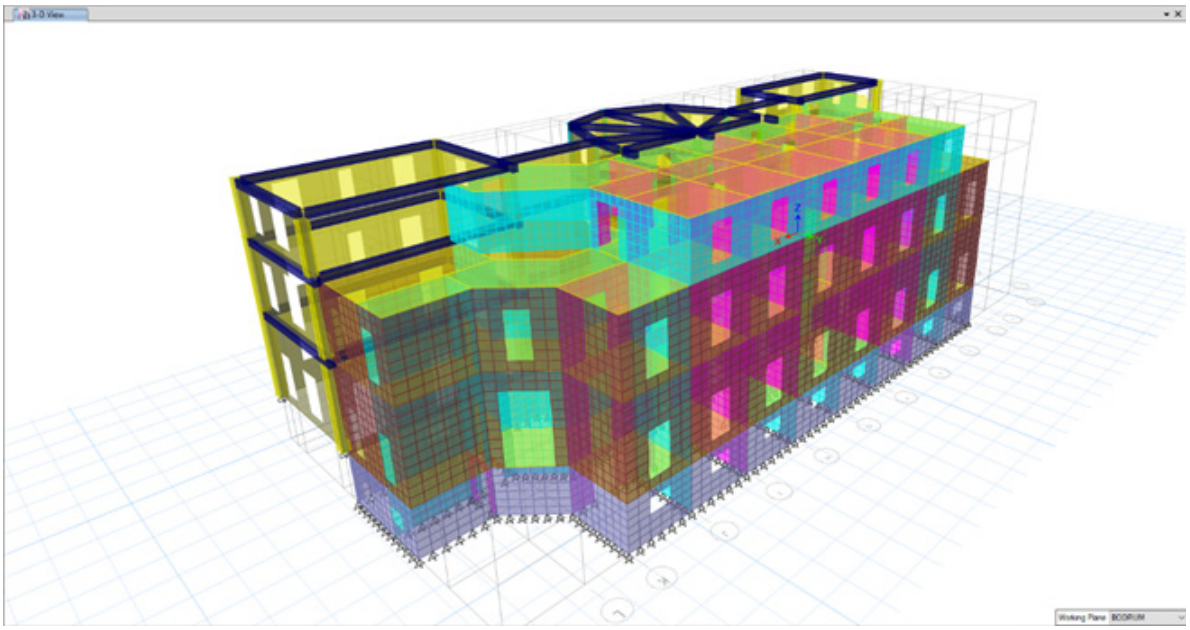

Fig. 3 The municipality building, worked on ETABs v16.2.0 (June 21, 2019)

General Mechanical Properties of Brick Masonry (Mosalam, et al., October 07, 2009)

Material property data	Stone masonry
Directional symmetry type:	Orthotropic
Weight per unit volume:	16 kN/m3
Mass per unit volume:	1631.546 kg/m3

Material mechanical property data: (Jurina & Peano, 2009)

Modulus of Elasticity:	E1=4167 MPa, E2=4167 MPa, E3=4167MPa
Shear Modulus:	G12=1811MPa, G13=1811MPa, G23=1811MPa
Poisson's ratio:	U12=0.15, U13=0.15, U23=0.15
Coefficient of thermal expansion:	A=0.0000081 1/C

Timber mechanical property data: (Halicioglu, et al., 2014)

Modulus of Elasticity:	E=10.5*10-6 kN/m2
Mass density:	5 kN/m3

Material parameters on ETABS are set to the current state, with a lower percentage of parameters considering degradation over the years.
The masonry behavior is modeled by two different layers accompanied by stress and strain characteristics (Tomazevic, 2007). The layers represent the vertical stresses S11, S22 horizontal stresses and shear stresses S12. It is very important to predict the best possible stress - strain graph for each direction (Baballeku, 2014).

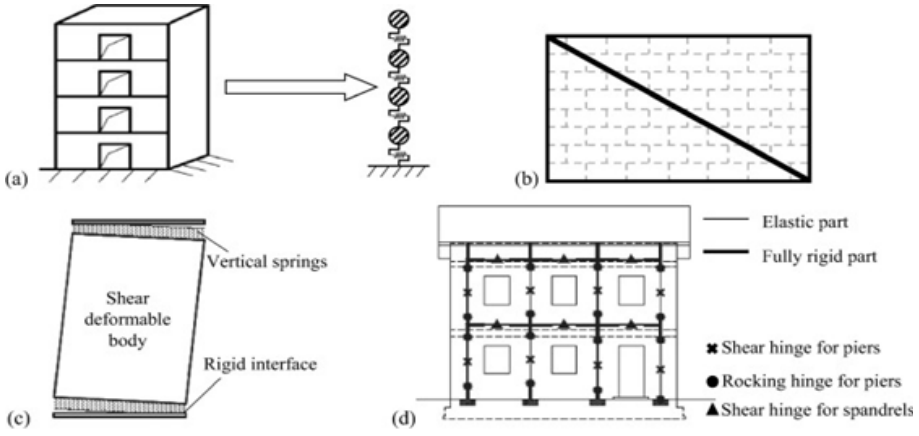

Fig. 4 A unified model for the seismic analysis of brick masonry structures (Xu, et al., 2018)

analyses of buildings with sufficient regularity and limited height, and take into account the type of connection among the structural elements.

4. The concept of the foundations

The foundation is continuous, with stone masonry, on two levels. The first level is in the depth of -2.7m and the second in the quote ±0.00. The foundation is realized using two models: Theoretical model according to Timoshenko and Euler; and the physical model, understanding the case study.

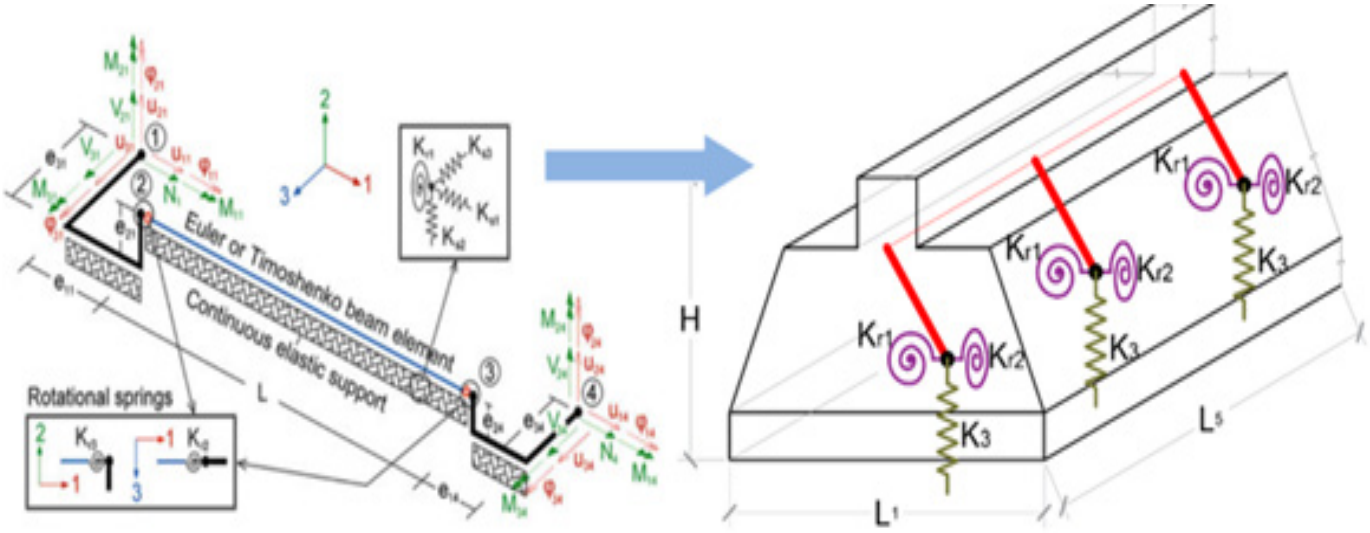

Fig. 5 Theoretical model referring to Timoshenko and Euler (left), our case physical model (right) (Vesho, et al., 2019)

5. Seismic Parameters

Since the objective of this research is to evaluate the seismic performance of the building and improve it, we have to show below the elastic response spectrum[ ] parameters (CEN Eurocode 8, 2008).
Eurocode 8 have a detailed specific way to calculate the seismic spectrum. In this case it depends on several factors: peak ground acceleration PGA[ ], 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: B
- Spectral acceleration: ag/g = 0.3m/s2
- Direction: Horizontal
- Behavioral factor: 2.6 (the spectrum is elastic)
- Damping factor: 5%

14/ A response spectrum is a plot of the peak or steady-state response (ground acceleration) of a series of oscillators or earthquakes of varying natural frequency, that are forced into motion by the same base vibration.

15/is equal to the maximum ground acceleration that occurred during earthquake shaking at a location. PGA is equal to the amplitude of the largest absolute acceleration recorded on an accelerogram at a site during a particular earthquake

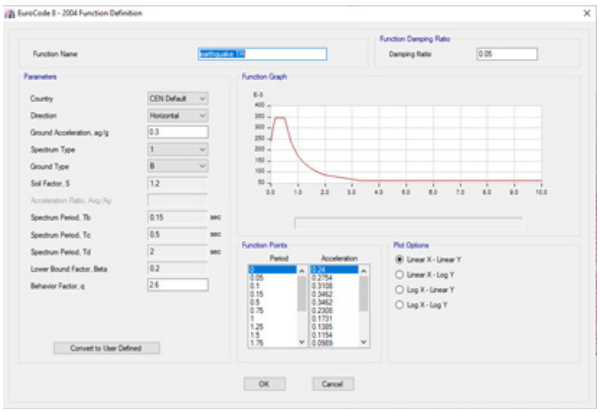

Fig 6 Elastic demand spectrum, referring Tirana ground parameters (ETABS, 2019)

6. 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.

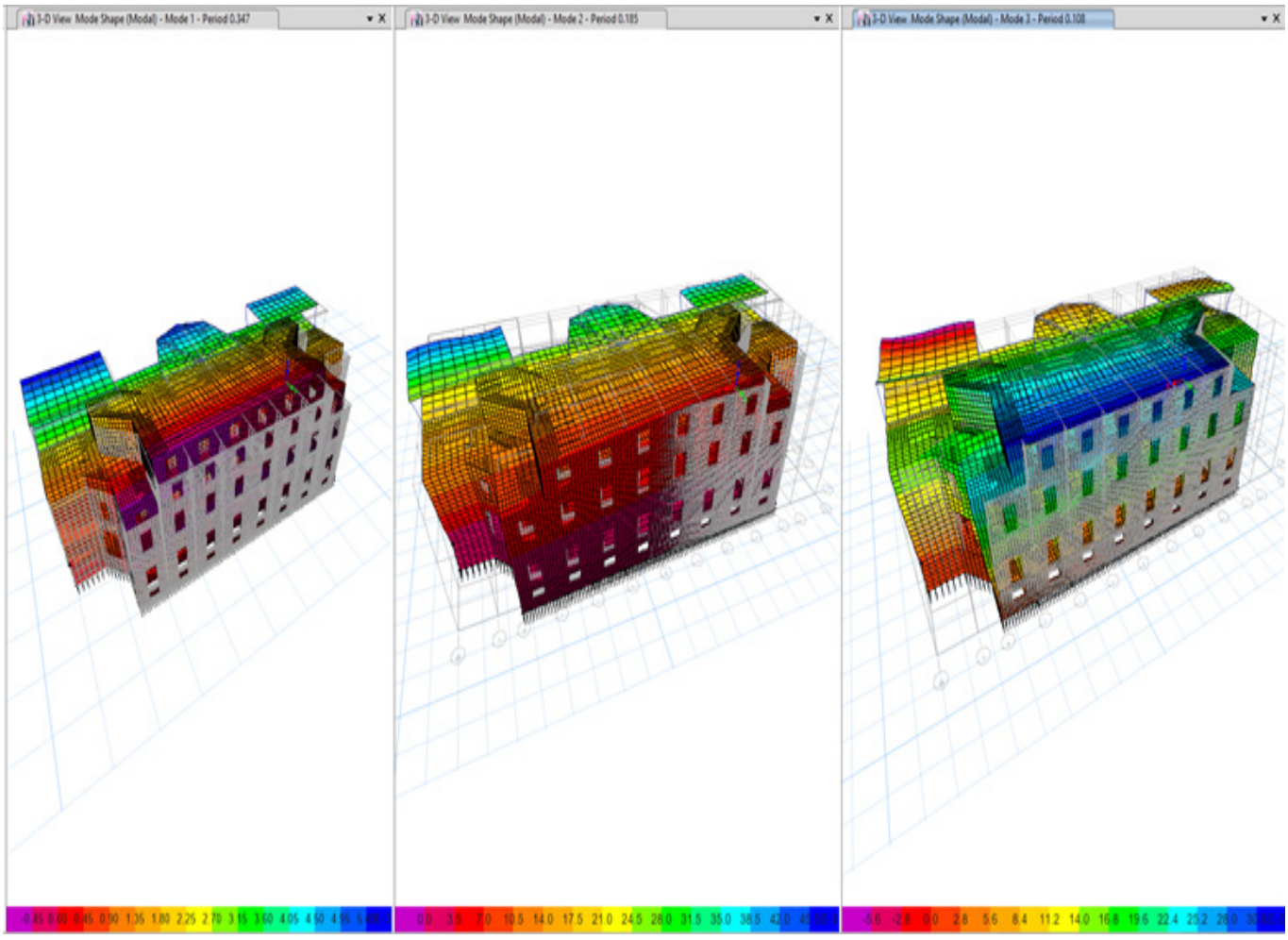

Fig. 7 The first 3 modes of vibrations according the modal analysis (CEN Eurocode 8, 2008) (ETABS, 2019)

Table 1. Modal data, frequencies and seismic parameters (ETABS, 2019)

Case	Mode	Period sec	Frequency cyc/sec	Circular Frequency rad/sec	Eigenvalue rad²/sec²
Modal	1	0.347	2.882	18.1108	328.0028
Modal	2	0.185	5.396	33.9019	1149.3412
Modal	3	0.108	9.235	58.0232	3366.6951
Modal	4	0.085	11.783	74.0376	5481.5605
Modal	5	0.07	14.224	89.3739	7987.7019
Modal	6	0.063	15.793	99.2294	9846.4803
Modal	7	0.051	19.567	122.9435	15115.0969
Modal	8	0.049	20.278	127.4076	16232.6878
Modal	9	0.044	22.872	143.7103	20652.664
Modal	10	0.037	26.736	167.9883	28220.0566
Modal	11	0.037	26.851	168.7113	28463.5004
Modal	12	0.036	27.791	174.6176	30491.2961

Allowed period (CEN Eurocode 8, 2008): [T]= 0.075 x Hb ^ 0.75
First mode: T1=0.347s > [T] Translation move on Y-direction
First mode: T2=0.185s Translation move on X-direction and problematic torsion
Third mode: T3=0.179s Pure torsion

The most problematic part founded above in modal parameters is a considerable torsion of the structure in global plane in the second mode of vibration. This phenomenon is problematic for masonry structures in general and also in our case can bring additional problems in the joining part between two buildings.

7. Local stresses and strain analysis

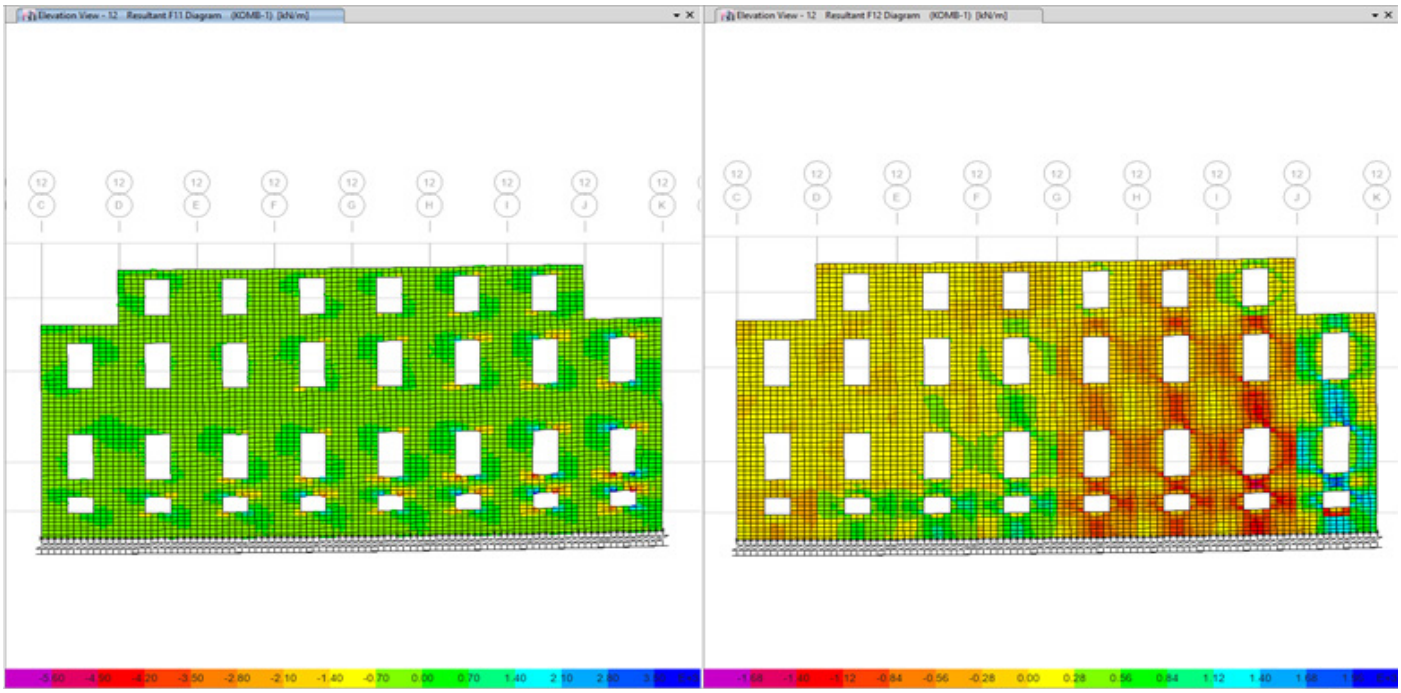

Fig. 8 Resultant Shell forces on main facade, f1-1 and f2-2 (ETABS, 2019)

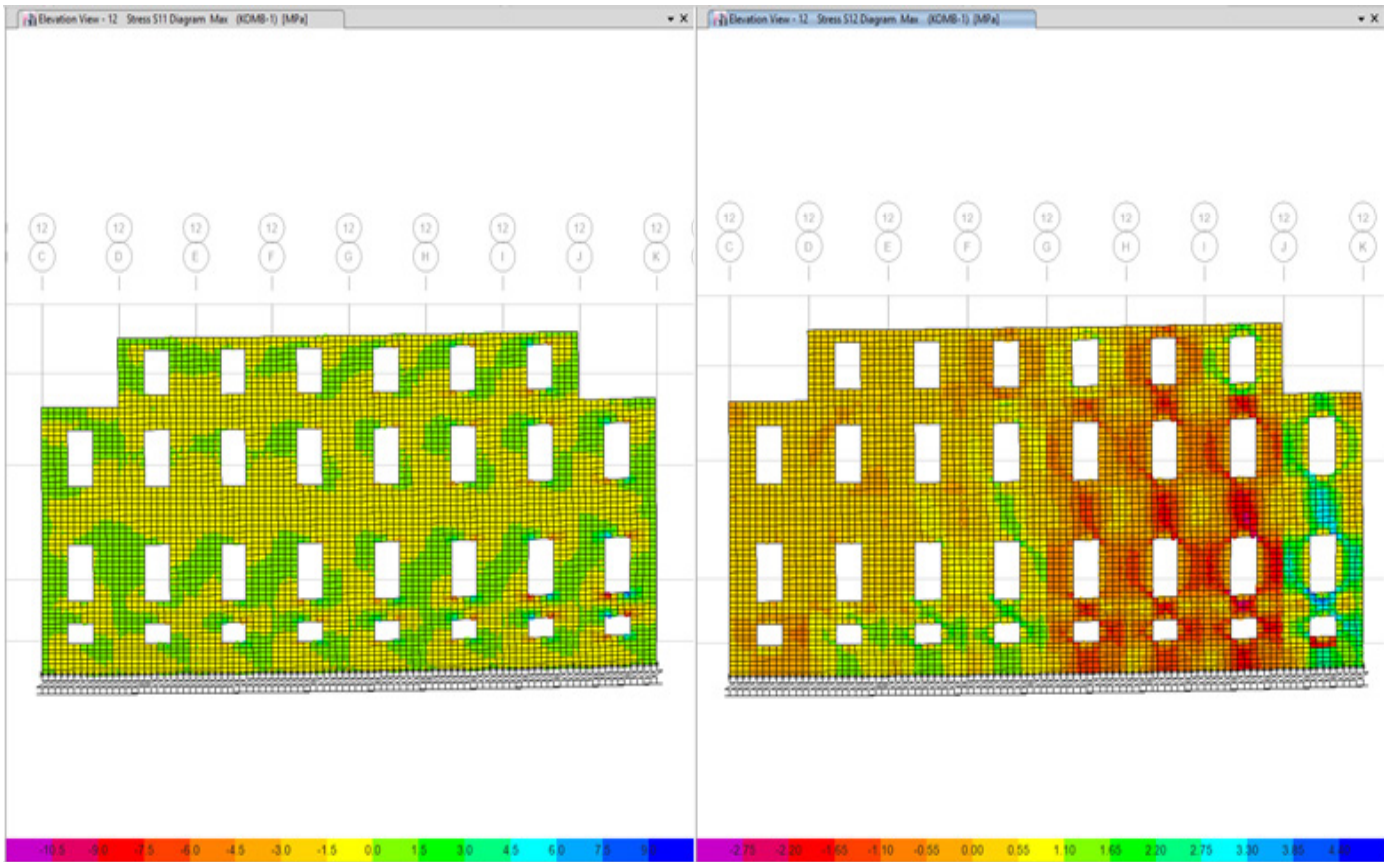

Fig. 9 Resultant shell stresses S1-1 and S2-2 on the main facade (ETABS, 2019)

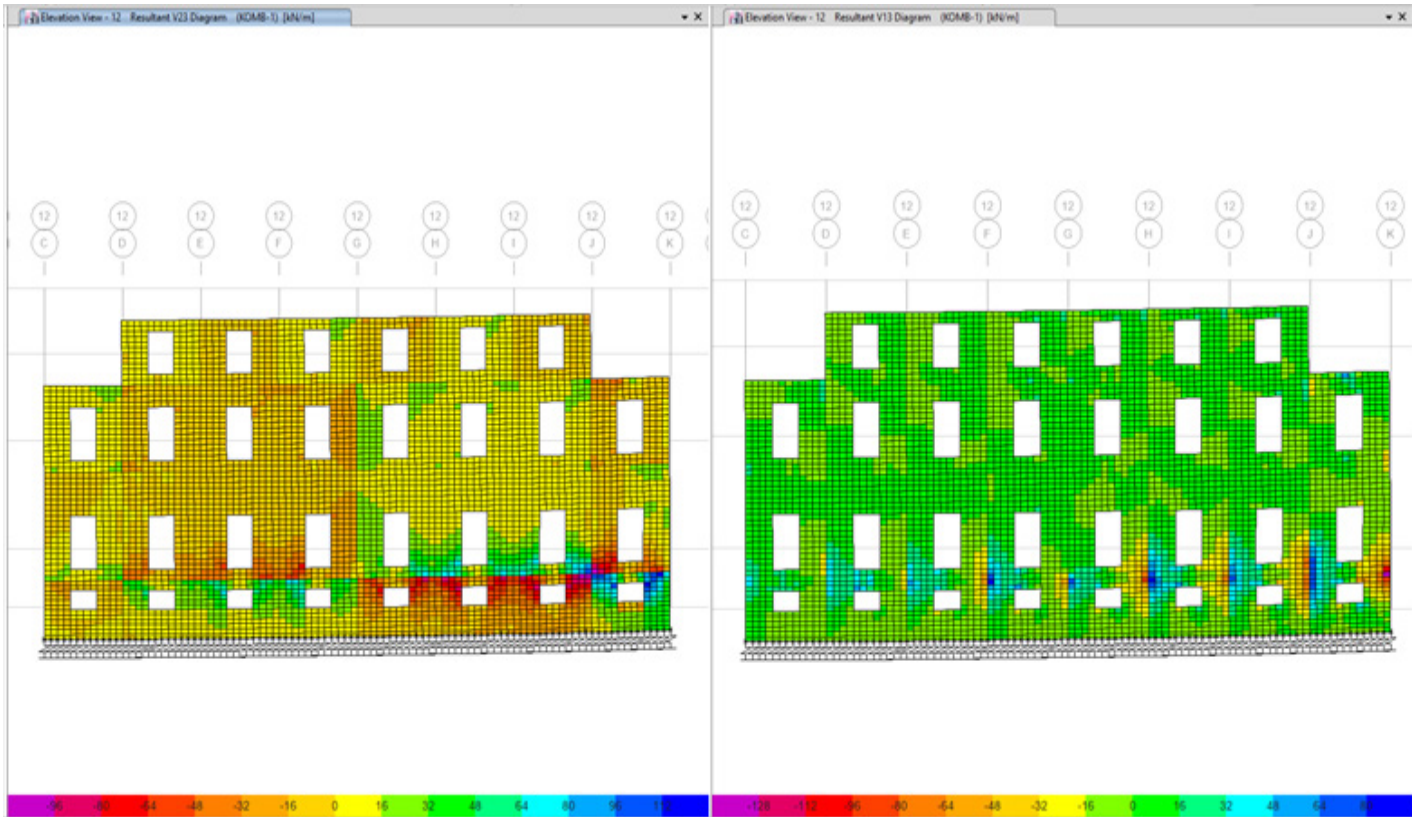

Fig. 10 Shear force distributed on 2 directions, V1-3 and V2-3 (ETABS, 2019)

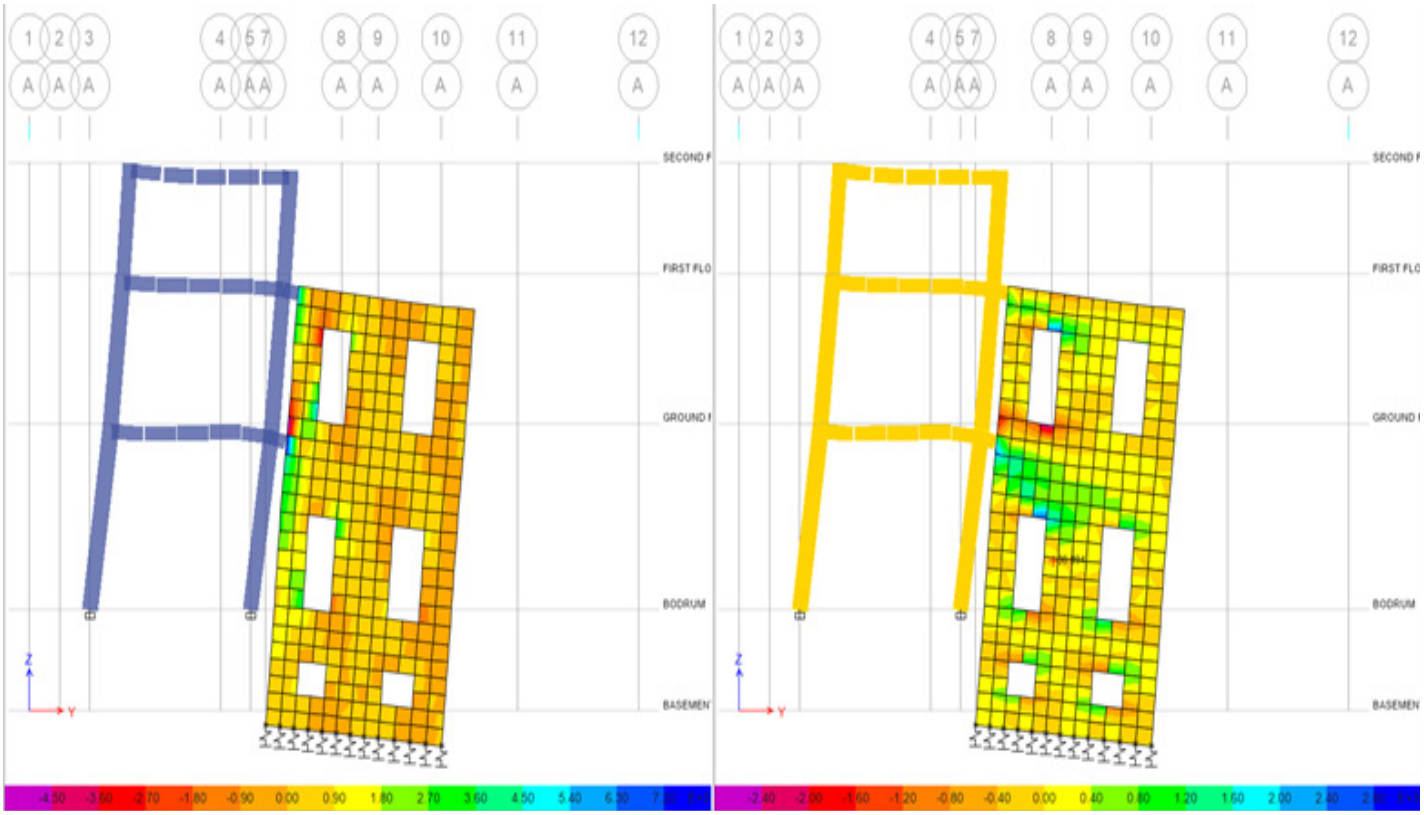

Fig. 11 Resultant shell stresses in the area when the new frame system is linked with existing wall (ETABS, 2019)

Minimum principal stresses amount to about 7.13 MPa and they occur in the transition zone between the ground floor and the upper floor (figure 7,8). Maximum principal stresses amount to about 9.67 MPa and they occur above the top of the ground floor and at the first floor wall panels. Maximal displacement according combination 1 is 38.3mm on X-direction and 59.8mm on Y-direction. Is noticed that the structure has problems with the displacement and the creation of plastic hinges on the joints in the areas where the beams merge with walls, exactly in the meeting point between the new structure and the old part. There are also problems in the area when basement wall with 60cm width merge with foundation.

8. Summarized conclusions

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 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 behaviour 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 ground floor and first floor, also the area where the old building is connected with the extension new structure. The most critical stresses calculated during the static analysis occurred at the connection joints between old structure with another typology and the new frame building, also where the basement is linked with the upper structure and slabs. Results show that the node interaction between the supports and the walls plays an important role in the dynamic behaviour of the structure. It may be considered as risky in terms of creating structural stability problems. The results also show that structural problems and damage to these houses generally occur in the critical stress parts, and these results prove accuracy of the numerical approach, by verifying the problems that were identified on site.

The addition of the new structure has positively influenced on reducing the period of vibrations and the bending momentum in global aspect, but on the other hand increases the shear force on the base. Increases stresses on the facades of the building which were problematic even earlier and also promotes an increase in carvings and cracks on the façade. Most visual and more pronounced is the damage of the old building in the area where it joins the new object. This is evident from the seismic performance analyzed above in the ETABS.

These findings show a significant reduction in the seismic performance of the building, judging the structure of two different types of construction.
The findings of this study can serve as a model for other similar cases in historical villages.

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The lighting design in ancient context between form and memory

Valeria Massari[1], **Maria Rosa Scarciolla**[1], **Filippo Trazzi**[1]
1. Polytechnic of Bari, Italy

The memory preservation and the tradition valorization are the topics developed in this investigation which aims to study the relationship between lighting design and ancient context. Starting from the definition of the concept of memory, not consid- ered in terms of deposit of information but as a dynamic engine able to activate processes of individual and collective 'remembering selection', the study analyzes the relationship between the physical common historic tradition of the old town of Gravina in Puglia (Italy) and the social identity of its urban environment. In particu- lar, the paper focuses on the small squares in the historical centre of the city inter- preted as 'open rooms' in which there is a well-established use of the space by the citizens and where the morpho-typological characters of the constructions, together with the natural sunlight, the shadows and the private artificial light coming through the windows, are put into a deep relationship with the public artificial light.
If the idea of 'open room', as well as that of 'domestic hearth', already exists in the Greek mythology through the figures of Hestia (patron of home and guardian angel) and Hermes (patron of the door), in the contemporary age these two conditions tend to blur and overlap, creating a new dimension in which objects, space, archi- tectures and people together have a role in the 'construction of the social living place'. In this mark, light (natural and artificial) is fundamental to read the cultural characteristics of these places and to comprehend the way people use to live in: as a consequence, the design investigation starts from the analysis of the environment to reach the definition of new objects which have semantic and cultural sense and, as Alberto Bassi said, become elements of a language in which the form is strongly linked to the memory of the past.

keywords: *Places' Identity, Resilience, Diaforentity, Changing Strategies*

1. Memory, tradition and identity in the lighting design

Being is the result of experiences that accumulate in the path of life, and binds deeply to memory without which it would lose its consistency. Memory must not be considered a repository of information, but a motor that activates a dynamic process of selection of memories relevant to the individual and to the community to which he belongs. The most relevant is that linked to the preservation of traditions, which are common to all the members of a community. Men therefore share memories and re-elaborate past events that allow them to recognize themselves in a common history. The objective of this research is to enhance certain places, cultures and social hubs by recovering the value of the past, of uses and customs in their relationship with technological innovations, in the sphere of the lighting design project. The study begins with the comparison between the language of the objects of the past and the contemporary ones, without uncritically aspiring to lost techniques and languages, but in order to understand with what languages, means and tools contemporary doing can still develop a cultural diversity and in what way, that diversity, may affect the system of objects. In a time in which, the barriers that divide art, industry and craftsmanship collapse, it is necessary to develop new languages and new practices that can give back to objects some of the prerogatives erased by modernity, therefore the symbolic components, the adherence to places, the decorative approach, the relationship with materials and the sense of use.

The design of memory

The access to memory occurs through the images of memory: a sensory register of the memory world is at the base of every attempt to remember, a concrete way of accessing the past. Thanks to an image, a figure, a shape or a contour, the external present is connected to the past of interiority. This theme has been widely

discussed by Alberto Bassi. An important focus in his book "The Italian light", which can be considered a starting point for reflections on the theme of the relationship between form and memory in the field of lighting artefact design, is clearly found in the chapter " Redesigning the lamps of memory ", where the author identifies those products consolidated within the typological tradition, which recall classic forms and concepts linked to folklore and the memory of the past, although characterized by the presence of new materials, new technologies and new sensibilities. Here we are not talking about designing an existing product from scratch, as Achille Castiglioni says, but the opposite: this is the use of the previous design to improve technical and formal characteristics, which links past and future, with a change from the continuous trend, without any nostalgic intentionality. The "memory lamps" to which Bassi refers are:

Costanza, P. Rizzatto (1986, Luceplan);
Glass-Glass, P. Rizzatto (1998, Luceplan);
Miss Sissi, P. Starck (1991, Flos);
Romeo Moon, P. Starck (1998, Flos);
Lanterna, M. Romanelli e M. Laudani (1998, O-Luce);
Acquatinta, M. De Lucchi (1996, Produzione Privata);
Lastra, A. Citterio e O. Low (1998, Flos);
Prima Signora, D. Pippa (1992, Fontana Arte);
Luxmaster, J. Morrison (2001, Flos);
Lid, S. Bergne (1998, O-luce).
From the analysis of these examples emerges the problem of contextualizing the connection between form and memory in a particular territory: lamps, therefore, designed according to a specific location within a given context and having aesthetic-formal characteristics directly deriving from an interpretation of the context itself. Analogy, mimesis and discretion rather than contrast and antithesis, both from the formal and technological point of view, taking into consideration also the social dimension, that is the human relationships that a specific solution can stimulate, determine or recover. The birth of the LED has led to many excesses, both in quantitative terms (excessive number of lighting bodies), and in qualitative terms (excessive lighting, inappropriate use of advanced technologies): the current need is instead to preserve the "human dimension" of lighting, which translates into a more humanistic and "everyday" design of artificial lighting artifacts.

2. Natural light vs artificial light

The oldest relationship that man has ever established with an object is that with light, natural light. The two have power over each other: on the one hand the light has, with the alternation of day and night, the power to control the circadian cycles of man, which regulate waking moments, and the power to influence even his mood; on the other hand, man shapes its form through architecture, and controls it, avoiding directing it towards the sky. If man is able to do this with natural light, he can hope for much more with artificial light.
Artificial light intervenes to integrate natural, day and night light, or in its absence, and in this respect, assumes the role of an architectural attribute. An attribute that, in the history of humanity, has become increasingly important, while social life has been contaminated and permeated by artificiality.
This predominance of the artificial has posed the problem of integrating lighting in the context of architecture and has opened a new front of design, the so-called lighting design, where integration is not only of a plant-engineering type, but directly involves the relative aspects to environmental comfort and visual communication. The main obstacle is recognizability: the designer finds himself in the balance between technological innovation out of context and the often meaningless imitation.

3. From the fireplace to the "open room"

Throughout history we have witnessed an evolution from the "fireplace" to the "open room". Two figures that appear in Greek mythology are Estia and Hermes, the first protector of the fireplace, of the house, the second of the door, of the outside and of the movement. In the past they had distinct roles, in actuality the exchange with the world becomes essential, the concepts merge, and intermediate spaces are born.
The space is the place of the body. Man governs architecture, and in the voids that it generates he moves, traverses them, contemplates them and redefines them. So if in the past man assigned a function to every place, with the advent of modernity he chose to free himself from these constraints and allow the internal spaces to go out, the external ones to enter. man has succeeded in building his habits, his own history, personal identity and that of his community in hybrid places. With his actions and ways of experiencing space, is the man who defines the meaning of a space and in this he performs an act of great modernity. The shell opens to the outside, the limits collapse, and the old man who moves a chair on the sidewalk turns the street into his living room.
A recurrent void within the historic centers is called court, a space that included among the few housing units in which the small community of residents built micro traditions, therefore activities aimed at strengthening social

relations. What is the court? In the Lombard plain, court or court house, it is that space surrounded by clusters of buildings where several families of agricultural workers are housed, belonging to a single company or owners of small rural businesses independent of one another. In its simplest and most ancient form, it can be defined as the single-family space, of regular shape, characterized on the shorter side by an entrance portal, by an inner courtyard, by a building with a unique environment and by a backyard small garden, nettle for the needs and delights of the family. It is evident that in this typology the family is the primary nucleus, the pivot of social and economic life; more contiguous families linked by good neighborly family relationships, kinship or common interests evolve into more complex settlement relationships such as the multi-family courtyard house. The court house evolves as social relations evolve, from the smallest productive and administrative unit they slowly transform into larger population centers, new social classes emerge and the urban fabric is enriched with new building types such as palaces, churches and monasteries but also hypogeum mills, shops and small factories. The courtyard house for its characteristics, diffusion and peculiarity represents an emergency not only from the historical and cultural point of view, an architectural heritage to be recovered and enhanced but also a still valid housing and social model based on the common space, on sociality, on exchange and sharing. The court, in its definition, is too tied to the concept of a fence that is subordinated to a single housing unit. But the types of courts present in our territory are among the most diverse, in fact some are extended extensions of roads, others are open spaces of passage, in others more streets converge, and so on. The element that unites them is connected to the use made of them, therefore by the people who lived there. The activities carried out within these spaces were mainly aimed at strengthening the social relations between the small groups that lived in the houses that faced. In fact the vegetable garden was cultivated for everyone, the parents of the children felt safe to let their children play, and in the evening it was a meeting point to tell stories and spend time together, like a family made up of many families. But if man defines space and the value associated with it, the meaning of the court becomes unsuitable and replaced by the concept of an open, more intimate, familiar room. The open room is identified as that emptiness included by a series of dwellings, a fixed space that can have different qualities. So in a lighting project, the considerations that can be made about it, are both related to the room of a house and to an outdoor space.

4. The open rooms: a study on the city of Gravina in Puglia (Bari)

This research has analyzed some "open rooms" in the historic center of Gravina in Puglia, different in morphological characteristics (or in terms of the type of access, number of entrances, geometry, size and use) but united by the way they are lived by the inhabitants . Excluding the main squares and those marked by the presence of "catalyst" buildings (schools, churches, etc.), among those that can be read as simple domestic places of social sharing, there are:

Via Pasquale Cassese: dwellings located around an open space of regular shape, defined by the presence of two arched passages located to the north-east and north-west; to the south-east a street.
Calata San Giovanni Battista: downhill road that has a first space of irregular trapezoidal shape with houses facing west.

- Cavato Sant'Andrea: nucleus of different housing unions characterized by a small square with three entrances made up of stairways located to the east (Fig. 1).

Fig.1: Cavato Sant'Andrea, Gravina in Puglia, Italy (Photo by the authors).

- Calata San Giovanni Battista: downhill road that has a second living space outlined by houses located on the sides of the road, to the north-west, south-west and south-east.

Or each "open room" identified, for the purposes of experimenting with lighting projects that take the environment into consideration, an analysis was carried out on the shadows that the facades of the buildings facing onto the basin project onto the plant during the moments of transition from one astronomical season to another: solstices and equinoxes. The word "equinox" comes from the Latin "equi noctis" that is equal night and refers to the two moments of the year in which the duration of the day is equal to the duration of the night: March 21, and September 23.
The word "solstice" comes from the Latin "sol stat" meaning "the sun stands (still)", in fact during the winter solstice and in summer the sun seems to rise and set in the same position on the horizon, it seems to stop. During the winter one sees the shortest day of the year, in fact the number of light hours is the lowest of the year. In total opposition the summer solstice, the day when the number of daylight hours are the greatest of the year. Looking at the sky for a year, we notice that the sun is making higher and higher arches on the horizon, as the summer approaches and lower as winter approaches. This daily variation of the height of the sun, measured in degrees, starting from its position on the day of the equinox is called solar inclination and is a consequence of the inclination of the earth's axis. The height of the sun at midday also depends on the latitude of the place according to these relations: on the day of the spring and autumn equinox, the inclination of the sun is 45 °, on the day of the summer solstice it is 67 °, in the winter one is 23 °. In the case of our study concerning Gravina in Puglia, a virtual simulator (Rhinoceros), through the "light" command, allowed us to identify the position of the shadow, the incidence and intensity of solar rays within the open rooms. As the sun changes its inclination, the drawings on the plan, that is the footprint of the architecture, change, move, creating illuminated spaces in the open room in shadow, light and dark, life and quiet.
During the day, the architectural volumes draw the figures on the plant, their imprint, which changes with ease as the hours go by, moves within the spaces, invades them and frees them. It runs along the floor to move up the facades, it is light that guides us inside these spaces. In the evening instead the color of the walls and the flooring, the morphology of the plant and the facades, the volumes of the balconies, is transformed. The luminous devices detected inside these spaces use a warm light, and the whole environment seems to be filtered by a yellow lens that makes the space smaller, making it more welcoming, making a connection with the architecture that surrounds it, and with the inhabitants who live there.

5. A lamp for the "open rooms": a design experimentation for the historical public spaces

Man changes as his habits and needs, so he no longer tries to close himself in traditional definitions related to "living", but tends to open up to a context that facilitates social interactions according to the rules of contemporaneity. The city thus becomes a space for collective experimentation.
The experimental design proposal on the lighting of "open rooms" is based on the desire to interpret the actions of time and to develop the potential of a new approach to the recovery of the memory of places.
Starting from the morphological analysis of the open rooms of the city of Gravina in Puglia of their relationship with natural light during the year and the evolution of the needs of modern man, we tried to define a lighting system that dynamically interpreted the condition of natural lighting and that of artificial lighting, thus designing "conceptual lines" along which the position and inclination of the luminaires have been studied. The hypothesis of a pilot project was made on Cavato Sant'Andrea, a 130 square meter court, bounded by tufa masonry constructions, sometimes plastered and sometimes left rough, and by a paving in pale stone. There are three entrances: two to the east and one to the south, all united by the presence of a staircase. To illuminate the court there are currently three wall lamps: the first at the main entrance, on the south-west facade; the second at the first staircase to the east; the third positioned on the North-West façade.

The choice of the positioning of the project lamps is based on the following criteria: Respect for the inhabitants by avoiding to direct the light beams towards the interiors; The optimization of the number of electrical catenaries, exploiting those already existing; Man's need for areas of light and shadow, and therefore for life and quiet (Figure 2).

From the morphological-formal point of view, since Cavato Sant'Andrea is a hybrid space, the designed lamp is a synthesis of simple and essential linearity, and of a domestic character imbued with historical iconographic reminiscences. These aspects are combined with the use of a simple and versatile technology, the idea of an easy and cheap production system but at the same time open to flexibility and adaptability, and finally a close

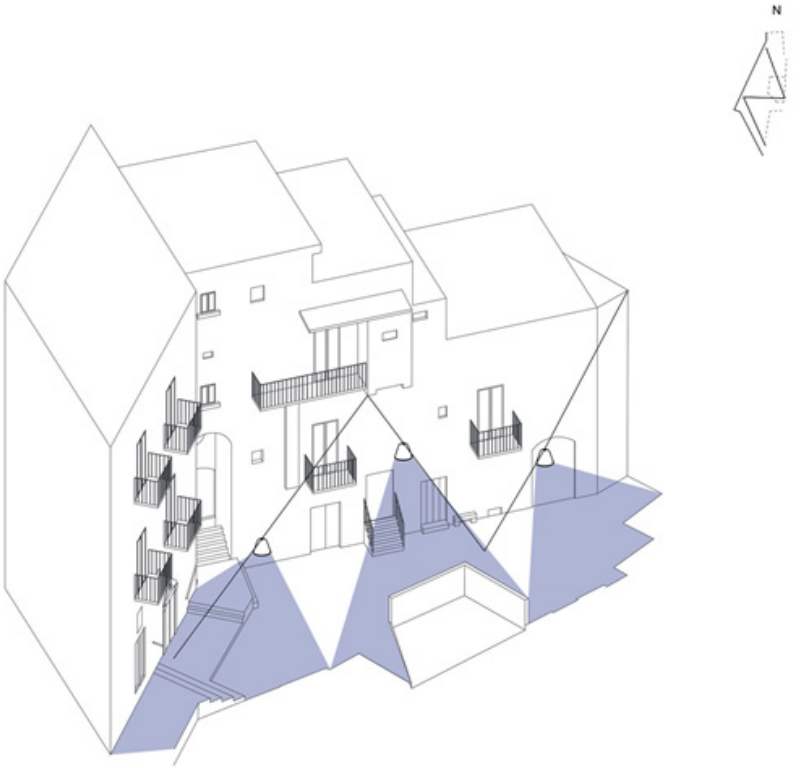

Fig. 2: Dynamic lighting system in Cavato Sant'Andrea, Gravina in Puglia, Italy (Drawings by the authors).

relationship with the architectural forms of the center context historian.
The lamp consists of an upper cap and a lower LED lighting body, both in aluminum and joined in an axis whose contact pins allow the rotation and definition of the inclination of the light beams. Rotation is allowed by a cylindrical joint placed at the top of the shell which continues at the point of attachment to the electric chain. The movements of the lamp are not totally free, but they are bound to let the light take on the same inclinations of the sun during the solstices and the equinoxes (23 °, 45 °, 67°) and are designed to allow the illumination of different spaces of the open room, deciding to vary the light in direction, intensity and depth, as was suggested to us by the study of shadows in the various seasons of the year. This allows, in addition to obtaining a familiar result such as that given by natural light, to create intimate areas in the shadowy areas (Figure 3).
The lighting system project for the open rooms of the historic center of Gravina in Puglia also includes the definition of the number, position and arrangement of the catenaries within the space, the result of a careful morphological analysis aimed at understanding the various connections between the shape of the architectures and the essential elements of geometry: lines and points. The line was broken into one or more points and then

Fig. 3: Dynamic lamp (Design by the V. Massari, M. R. Scarciolla, F. Trazzi; Supervisor: V.P. Bagnato).

divided. The choice of lamp positioning must comply with various criteria: Respect the inhabitants by avoiding to direct the light beams towards the interior; Optimize the number of electrical chains; Choose the luminous focus that in turn has two design outputs: the first is to illuminate only the entry points inside the open room, the second is to accommodate the present shadow during the day, making sure they are created of course the more intimate and less enlightened areas, and others more alive.
With light we can underline urban details and give people the opportunity to rediscover spaces and to improve the perception, the state of well-being and the reception of places. It is important that the lighting system is designed to reduce energy consumption with quality light sources and optical systems and to avoid light pollution: this means much more than simply pointing the light down. With a programmed control of switching on the light you can illuminate the places in the right way and at the right time, without wasting light so as to find the right balance between artificial light and darkness (starting from the natural situation of the night). This improves the link with the place, transforming an empty space into a vital place by defining a non-static lighting identity, just like natural light: with light that is oriented according to how people use a certain place to a certain time, respect and enhance the intrinsic character of places.
When design surpasses the superficial dimension it can reach to affect and influence man in the deep, conditioning him to change the perception of himself and of the world. Man has always kept priceless and immaterial values such as tradition and identity through memory and this is why the object of the project speaks their own language and is also immaterial: light. Following in the footsteps of the greats of the past, who first investigated the ways in which design can serve memory and learn from those who today make it the philosophy of their work, we design to preserve our values in the future.

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Human-Centered Design and Automotive: developing a hybrid concept car with Quality Function Deployment

Gian Andrea Giacobone[1], **Giuseppe Mincolelli**[1]
1. Department of Architecture, University of Ferrara, Via Quartieri 8, 44121 Ferrara, Italy

The paper reports the design process of a specific research that is integrated into a multidisciplinary project funded by Emilia Romagna Region, Italy, in the field of Automotive. The main goal of the overall project is to design the future concept of a hybrid sport vehicle through the definition of its architecture and styling. The research is divided in five macro areas in which this specific contribution is addressed to design principles and methods. In particular, this activity focuses its attention on human-centered design methodology, which utilizes the expectations of end-users to lead the entire product development process. Therefore, the contribution presents a specific user analysis that is carried out through Quality Function Deployment (QFD). It is an inclusive decision-making tool that is utilized during the conceptual phase to translate costumer demand into a desirable product. QFD is based on a bi-dimensional mathematical matrix that represents graphically the correlation between the most important needs of end-users and the product characteristics that are more significant to develop suitable solutions for solving the main problems those people. Indeed, QFD provides a qualitative design strategy that can be used within the automotive development program to obtain measurable design parameters, which successively permit to improve the overall quality of the expected final result. In the end, the outcomes derived by this practice become useful guidelines to develop the expected concept vehicle according to costumer demand.

keywords: Human-Centered Design, Automotive Design, Quality Function Deployment, Vision in Product Design, Research Methods

1. Automotive Development Process

The development of a vehicle is a complex process that requires a great amount of time and resources (in terms of people, disciplines, specialists and costs). Since the car itself is a very complex system, its development process needs an efficient ability in coordinating a large number of many different activities and processes (Bhise, 2017). Good management of those activities ensures for carmakers the successful development of the vehicle. But, although the vehicle development program is able to provide a very organized product life cycle, the difficulties in managing many constraints in that system can affect its process and consequently exceed its budget, affect its time schedule or also fail to meet the expected satisfaction of its costumer target. In the latter case, the main problems usually comes from the failure of understanding costumer demand, translating particular needs into vehicle features or wrongly assessing whether the final product properly coincides with the user expectations. If all these aspects are not faced up within proper solutions, they could create a real gap between the level of satisfaction desired by end-users and the development management utilized by the process to achieve the requested goals of the company. For these reasons, it is important to develop also an optimal multidisciplinary strategy at the early stages of the vehicle development program because it can help the process to achieve the high score of costumers' satisfaction and at the same time ensure a good quality to the expected car model.

In order to avoid negative outcomes, design strategy must managed carefully throughout its entire process. One of the useful practices that can support automotive product development is adopting the human-centered methodology. Indeed, it can act as the key tenet for the entire project, because it is able to identify users' prospective (in terms of wants, desires, needs and expectations) that can be subsequently utilized throughout the designing process to lead all activities that are referred to the project. Thanks to this human-centered approach, every need is immediately analyzed and consequently included in the project as decision-making tool for designing the

expected vehicle. The outcomes derived from this practice can improve not only the mechanical properties of the final vehicle, but also its design, including its appearance, functions, and operation, which in turn, they determine the qualitative level of the total product experiences (Hekkert & Schifferstein, 2008). In this way, all aspects of the vehicle can easily match people's desires and consequently determine both acceptance and successful of the final product.

2. The project

On the basis of the above considerations, this paper is mainly focused on the field of automotive, in particular related to the category of high-performance cars. The latter is a particular car-segment, in which engineering and technical aspects of the vehicle are maximized to provide extreme performance. Sport cars are primary intended for purely driving experience, which is purpose is to emphasize thrill of driving. For this reason, this particular car-segment is designed both for track or racing purposes, but it can refer to a urban use. Often the automotive product development of those particular cars prefers to minimize or partially exclude from its process many characteristics about comfort, emotional status or usability, in favor of technical and mechanical improvements. However, on a different point of view, those parameters are fundamental for the project because they improve the overall quality of the total user experience that the vehicle provides to its end-users during its use (Norman, 2014). In view of this, the contribution reports a multidisciplinary research based on a human-centered approach that has been utilized to define the technical properties of the final concept of the expected hybrid sport car in all its morphological and functional aspects.

This research is integrated within a wider multidisciplinary project called "Automotive Academy: a learning by doing project for innovation engineering automotive" which is financed by the Emilia Romagna Region, Italy. The entire project is mainly focused on technology transfer. The research is composed by many small-medium enterprises, research centers and four main universities, which are located on the territory. The institutions are: University of Modena and Reggio Emilia (which is the coordinator of the main project), University of Ferrara, University of Parma and University of Bologna. The overall research expects to stimulate the realization of several theoretical and practical contributes in the field of automotive and motorsport. Those solutions come from many different areas of study that usually are necessary to design the various systems that compose the vehicle itself. They must also define the product specifications (in terms of functions and shape) of the final car model. In fact, the aim of the research is to gather many engineering and design solutions that can be applied or integrated (at the end of this project) within either ongoing or new automotive researches. The project expects to produce a hybrid concept vehicle, which must be characterized by the combination of sustainable solutions and high-performance features. The final goal of the vehicle is to become a starting point that aspires to be a R&D platform and demonstrator for future technical or technological innovations that will be developed within the network in the coming years. The most useful solutions will be integrated in that platform and successively they will be independently addressed into the process of technology transfer among the various partners of this research.

Five macro independent areas of intervention form the multidisciplinary research. They are: design strategies and methodologies; propulsion and powertrain; vehicle body and dynamics; smart materials and components; electronics and drive-by-wire instruments. Taking into account the purposes of this specific contribution, the paper describes a research carried out within the Department of Architecture and Industrial Design at the University of Ferrara and the studies are focused on the first macro area: design principles and methodologies. The main objective is to give a proper vision and a shape to the overall project through defining a proper design strategy for realizing the hybrid car. In fact, design strategy expects to envision and design both architecture and style of the concept vehicle, specifically using a human-centered design approach. During the process, the expected outcomes will define functional and technical requirements of the specific sport car, which successively will be used as design guidelines to design the expected vehicle. For these reasons, the main goal of this specific contribution is to show the human-centered process that has been used to achieve the task of the first area of intervention.

3. Human-Centered Design Approach

The primary activities of this contribution are inserted within the phase of Advanced Concept Design, which is one of the early stages of the vehicle time program provided by the automotive development process (Bhise, 2017). This specific phase is a sub-part of the system engineering "V" model (Blanchard & Fabrycky, 2011) and it is utilized to translate first visions or ideas (delineated by product strategy) into the final and detailed concept solution. Indeed, in the concept phase the expected vehicle acquires its final shape while all its characteristics and technical specifications are defined in order to transform the concept into a valid product for the following engineering and manufacturing phases. Automotive design is the discipline that converges the engineering properties of the car with the aesthetic elements of its appearance. During the design process, automotive design performs its activities to delineate vehicle styling and architecture. It can be considered as iterative process of synthesis and analysis (Bürdek, 2015), in which many trade-offs between emotional goals and functional factors are simultaneously

managed while elaborating the shape of vehicle (Sareh & Rowson, 2009).

The research proposes the development of the conceptual design phase using a human-centered methodology that is focused specifically on the Quality Function Deployment model. The term of Human-Centered Design (HCD) means a particular approach that places human capabilities, behaviors and first, then designs expected solutions to accommodate those wants, needs, desires, capabilities, and ways of behaving (Norman, 2014). For this reason, a respectable success of the research, can be achieved starting the HCD process form understanding the main end-users and their wants that the design is intended to meet. Successively, it processes acquired data to find new possible solutions that can satisfy many unaware problems of people that may occur during the interaction with the product.

4. Quality Function Deployment

Quality Function Deployment (QFD) is a human-centered tool that is able to orient designing process toward the real exigencies of the end-users, as the customers' satisfaction are placed at the first place within the product development strategy (Al-Mashari, Zairi, & Ginn, 2005). QFD is an inclusive model that permits to acquire feedbacks from end-users, in order to elaborate many design specifications for the final products according to their needs (Mincolelli, 2008). The primary purpose of QFD is to ensure a qualitative product development process with a great emphasis on designing stage (Akao, 1990). Indeed, QFD is used before starting on the activities of development, engineering, and production of new artefact (Franceschini, 2001) and it is a useful management tool to model the dynamics of the design process (Govers, 2001).

The core of QDF tool is based on a bi-dimensional mathematical matrix, called House of Quality. It represents graphically the correlation between the most important needs of users and the product characteristics that are more significant to develop suitable solutions for satisfying the main expectations of people. QFD combines qualitative information derived from both users and teamwork with quantitative data provided by the analytic analysis of the QFD matrix, in order to obtain a correct assessment of the most important design specifications, which are consequently utilized during the design phase to reach the desired quality of the final product. The outputs – derived by QFD matrix – are considered as a main design strategy to develop the expected product and to take various decision among different design solutions. House of Quality (HoQ) is the core of the QFD process. It is the mathematical bi-dimensional matrix in which the user needs (called "what") are compared analytically with the product characteristics of the expected artefact (called "how"), in order to identify their reciprocal relationships. In each step of QFD, this matrix is created to transform the needs of people into internal company requisites. This match is very important, because it determines what design specifications are necessary taking into account – during the design phase of the final product – to meet the user expectations (from a technical point of view) and to satisfy their needs as well.

HoQ is composed by different areas, which are utilized to create the correct correlation and assessment of the processed data. The final outcomes are represented through a synoptic view that proffers an optimal way of unravelling the complex network of relationships elaborated by QFD matrix.

The areas of QFD that are important for this project are:

- The first area is referred to the voice of the customers (VoC), because it represents the requirements of customers-users. The source data obtained from end-users are translated in short phrases, expressed literally in their own words. Once the demanded quality is defined, the next step must rank every need according to the user preferences, as not all expectations are equally important for the research. For this reason, it is important prioritize the wants in order to understand how much they affect the degree of global satisfaction of the final product.
- The second section is dedicated to the voice of the engineers (VoE). It represents technical design requirements, characteristics, and parameters or the engineering characteristics provided by the teamwork. At least one technical characteristic should be identifiable for each customer request. The engineering requirement should proffer a description of the product or service in measurable terms (offered quality) and should directly affect customer perception concerning quality (Franceschini, 2001)and provides an interactive design characteristics ranking algorithm for prioritizing product technical design characteristics. The author explores using quality function deployment for gathering product information in a structural way by customers and design work teams, and for analyzing customer expectations and the characteristics of competitive products. Annotation c. Book News, Inc., Portland, OR (booknews.com.
- The third section is the body of the HoQ and it indicates the relationship matrix between the needs of users and the technical design parameters of the expected project. It describes how the technical decisions affect the satisfaction of each customer requirement. The relationship matrix is the most important area

of the HoQ, because the relations obtained in the matrix determine the final outcomes of the QFD process. The relationships between the customer requirements and the technical characteristics are expressed in a qualitative manner, by using a numerical scale that determines the relevance of the correlation.

- The fifth section is dedicated to the technical importance ranking and it shows the outcomes of the QFD process that are used as design guidelines in the design phase. This area indicates the levels of importance assigned to the selected product characteristic, by processing the information contained in the relationship matrix. The importance of each technical characteristic is evaluated through a mathematical calculation.

5. QFD process

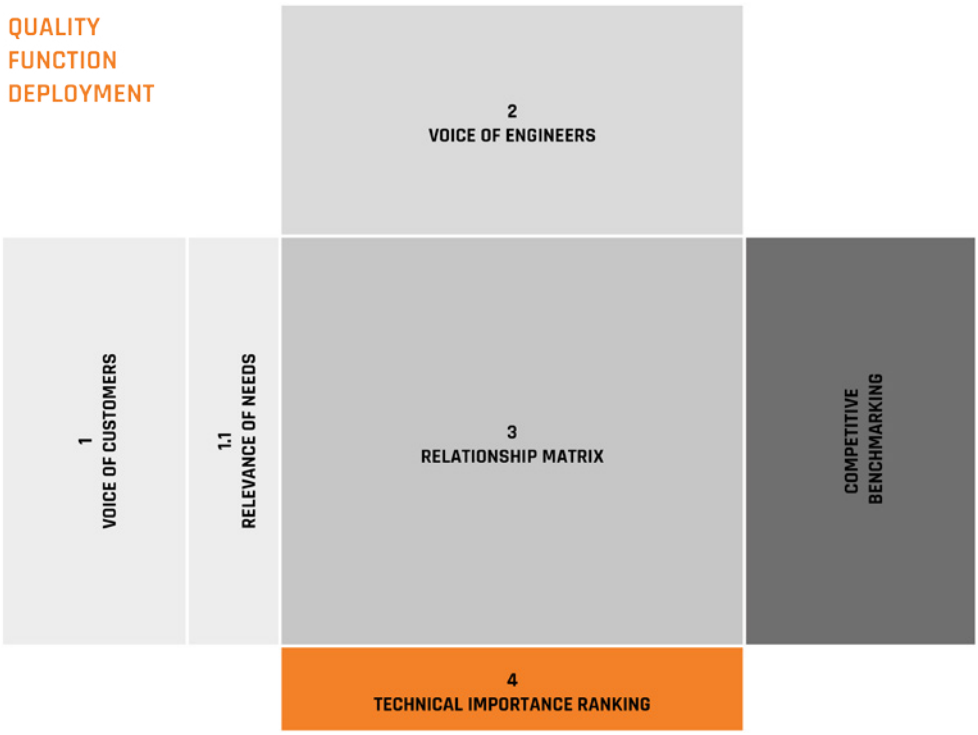

Fig. 1 Representation of the House of Quality, the main tool of Quality Function Deployment. In the first area there is the voice of costumers, in the second area the technical requirement of the expected product, in the third area the correlation matrix and in last and fourth area the technical importance ranking. Credits: Authors.

This chapter describes the human-centered design process that was conducted by Quality Function Deployment. In order to facilitate the conceptual design process, the KTM X-Bow[1] was used as primary case studies on which the research designed the final concept vehicle.

A preliminary activity regarded the analysis of end-users during their interactions with the KTM's vehicle in its specific context of use. In fact, the analysis has been carried out at a specific race event held at the Misano World Circuit Marco Simoncelli in Rimini, Italy. It was sponsored by KTM and completely dedicated to the X-Bow model (Giacobone & Mincolelli, 2020). From that particular activity, about 200 needs have been gathered and successively cataloged in four main typologies of user: drivers; technicians; operators; decision makers. Successively, those expectations were processed utilizing QFD approach.

Given the complexity of an automobile, the design management chose to carry out the entire development process through four main QFD matrices, which correspond to four specific areas of the car that more affect the final result of the concept vehicle. Reducing the quantity of the elements presented in the relationship matrix allowed to produce both better management of the QFD process and better quality of the expected results. QFD process produced and exanimated four main areas of the vehicle. The areas are: (a) vehicle dynamics;

1 Since 2008, X-BOW is KTM's first lightweight sport vehicle. X-Bow is a two-seat roadster car, without any door or hardtop, delivering at the same time an unique driving experience. It is designed for urban roads, track-day or race purposes. There are three model versions: Rookie, GT (with windshield) and GT4 (only for race).

(b) powertrain system; (c) passenger package; (d) vehicle interface. User needs were divided and distributed in four groups, one for each selected area of the vehicle. The process selected for each group only the most important needs. Subsequently, QFD identified the technical requirements of each matrix in base of the selected needs that are related to a particular area of the car. This because the four systems are the principal elements that people use to create a relationship with a vehicle, but also because they are the four areas in which the interactions between a car and a user occur more often. Moreover, those vehicle systems are also able to find the main technical characteristics that both determine the final properties of the concept vehicle and define the high level of quality desired by end-users (in terms of sustainability, safety, performance, comfort and usability).

About 20-24 needs for each area has been selected and processed within its specific QFD matrix. Every want has received a value in numbers that corresponds to its level of importance. The values were: 5 = indispensable; 4 = very important; 3 = important; 2 = preferable; 1 = negligible. Next, about 20-28 technical requirements for each QFD matrix have been chosen in order to find the most important product specifications that can be considered useful for satisfying users' expectations. The ranges of both elements (needs and product specifications) have been limited into account to better manage the complexity of the four QFD matrices. The relevance of the product parameters has been valuated through a specific rating scale, which correspond to the level of relationship with each expressed need. The values were: 9 = strong relation; 3 = medium relation; 1 = weak relation; 0 = no relation. Data of each QFD matrix have been correlated together revealing the most important product specifications that should be included into designing process to develop the concept vehicle.

5.1 QFD process

At the end of QFD process, the four matrices provided qualitative and quantitative assessment of the most important product specifications that are necessary to satisfy customer demands. The outcomes were analyzed and interpreted in order to come up with a technical framework that can be utilized to develop each system of the car. Considering this, hereinafter there are short considerations about the outputs of each QFD matrix:

- About powertrain, the wants of end-users indicate to provide the vehicle with a good acceleration and different engine mappings in order to have different driving performances in base of the context of use or a specific purpose (for example urban or racing modality). They also prefer to hear the sound of engine, which clearly suggest the research to maintain the traditional experience provided by combustion engine. The same experience is maintained by the manual gearbox.
- Regarding vehicle dynamics, the concept has to be rigid, permeable and provide adequate downforce in order to guarantee high stability and performance. It is significant also to decrease both the vehicle height and its center of mass because the two elements are able to increase handling.

Fig. 2 Images about the user analysis conducted during the KMT event held at the Misano World Circuit Marco Simoncelli in Rimini, Italy. Credits: Authors.

- About the interior package, the vehicle has to guarantee safety at the belt and head heights in such a way that airflow does not stress the driver or negatively affect his/her driving performance. The car has to provide also a not-intrusive steering wheel hub, in order to provide comfortable ingress/egress to the driver with different capabilities.
- Concerning the driving interface, the vehicle must provide a usable configuration of its driving controls. The interface has to be also clear and understandable in showing information. The controls themselves needs to be immediately touch-recognizable and rapidly reachable by hand.

6. Results and discussion

The activities of QFD provided a qualitative but also measurable assessment about the needs of people, which usually report subjective points of view. Each matrix offered a representative and synoptic view of the most important product characteristics that were necessary to take into account for developing the expected and final vehicle. Considering this, the final assessments became a strategic tool to define concretely the technical properties of concept vehicle – which were consider significant to satisfy customer demand – directly affecting the decision-making process of the conceptual design phase. The outcomes were used as guideline to make the vehicle more feasible and more related to users' desires.

The outputs of QFD indeed defined the first abstract concept of the final vehicle. According to user needs, QFD allowed the frontal-section area of the vehicle to be more permeable, in order to increase downforce and at the same time decrease aerodynamic drag. Again, QFD data permitted to equip the powertrain with the parallel hybrid layout2, accomplishing at the same time the task of the project. This particular configuration permitted to empower the car with an electric power source maintaining the traditional Internal Combustion Engine (ICE) and the mechanical gearbox. Parallel hybrid system ensured also more efficiency to the powertrain because it was able to downsized the engine and support it to manage and improve both fuel consumption and carbon emission (Jain & Kumar, 2018). About the interior package, QFD served to raise the height of the lateral sides of the car, in order to less expose drivers to the force of wind but also to better protect it from lateral collisions. In the end, in order to push driving experience to be more racing-oriented., QFD suggested to equip the vehicle with an active driving seat, which slid from the traditional lateral position to a central and individual position. This dynamic configuration guarantees much more involvement in driving and permits the seat to float outside the car, in order to facilitate the ingress/egress and so extend its experience to users with different abilities. QFD outcomes were used also to locate driving controls on the steering wheel in order to maintain a more active driving experience.

In conclusion, all the considerations elaborated by QFD helped the concept vehicle to achieve the main goals of the entire multidisciplinary project. The research provided a car model that satisfies the desires of people but also it perfectly coincides with the strategy of the entire project, providing, at the same time, a technical framework for future engineering activities to the other partners of the project.

2. Parallel hybrid system is a configuration made up by a combustion engine and an electric motor, which together can propel the vehicle. Engine is dominant and in some circumstances it engages the electric motor to receive additional motive power. If they are joined at an axis (in parallel), the speeds at this axis must be identical and the supplied torques add together. Parallel hybrids rely more on regenerative braking (like KERS - Kinetic Energy Recovery System) and the engine can also act as a generator for supplemental recharging. The advantage is that the conventional drivetrain can be maintained (Denton, 2016).

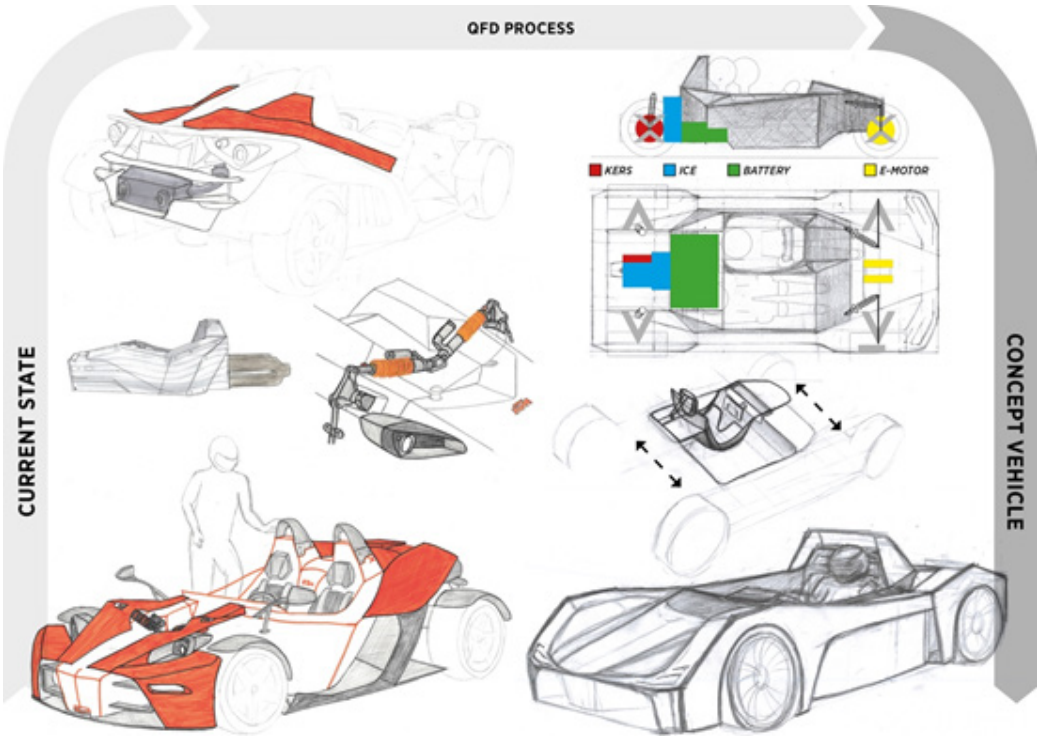

Fig. 3 Representation of X-Bow, the vehicle of KTM, and its conceptual evolution based on the outcomes derived from QFD. This approach helped the research to transform the needs of people into technical specification, which in turn were elaborated to develop the concept car. Credits: Authors

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[HTH:I/05]

Memory as a designing and compositional instrument in architecture

Ermal Hoxha[1], **Llazar Kumaraku**[2]
1. Scientific Research Centre, Polis University, Tirana, Albania
2. Head of Scientific Research Department, Polis University, Tirana, Albania

This paper is part of the research on architecture and its instruments of urban design. Part of this research is to understand the methodology of how architects design space using memory as the main instrument of designing.
The paper's objective is to explore an existing relation between the memory of places and projects that are built or implemented in that site/area.
The starting hypothesis is that through the use of memory as a designing instrument, we are able to carry in the project the traces of the past and to design or create spaces with a stronger connection to the anthropological sense of place.
The methodology that will be followed to verify this hypothesis will be based on the analysis of some projects and works that we consider as the main instrument of memory in those sites where they are built. We are going to analyse three projects, in order to explore the relationship between memory of places and the projects themselves. All three projects are from Peter Eisenman, one of the most important exponents of this approach in architecture.
The importance of this paper consists in searching for theoretical and practical instruments that are able to improve designing and compositional practices that aim to improve the identity of a place or a settlement.

keywords: Memory, Places, Architecture, Designing and Compositional Instruments.

1. Introduction

In the history of architecture, if we can mention an historical period that has been against the memory of places, then we can say with great certainty that that period is represented by the Modern Movement of the first half of the 20th century. If we consider the tragic fate of modernity, claimed by many architects, then we can say that the greatest "sin" of modernism lies precisely in its attempt to eliminate the memory of places, so they could anyway be atopic.
To read the footprints of a memory that may affect a project, according to Spirito, we need to investigate the relationship that the designing process should have with the site. Spirito claims that:

> *«This relationship is possible if the designing process takes as its first action the reading, the observation, the selection of data, traces and figures that are present in that place and in the memory of the architect, in his ability to reinterpret them, referring to other real places and also imaginary ones».* (Spirito, 2012)

Spirito emphasizes the importance of the intellectual formation of the architect and his professional ability to read, investigate and to select the data from the place where the project will be designed, but also from the "memory" of the architect who is designing it. At this stage of the study, it is more interesting for us to read and interpret the data that comes from the place than the data that comes from the architect's memory. But still, the ability of the architect to interpret these data remains of great importance to the quality of the project. For certain, we can say that even if important traces are found in a particular context, the centre of the designing success is exactly the ability to read them and, through the use of memory, to interpret them into a designing tool.
So, in order to use memory as a designing tool, it is important first of all to increase one's ability to read the information presented by the site, and this is achieved through prior knowledge of the different forms of memory that

a site carries. In the following section we will seek to list the methods of how architect Peter Eisenman manages to use memory as a designing tool.
These are some of the most representative cases / projects where Eisenman uses exactly these reading and designing methods.

2. The project for Cannareggio, Venice (1978)

In 1978 Venice holds an international competition for the project of the area called Cannaregio. The competition was won by the proposal of an American architect, Peter Eisenman, who considered a series of traces included in the area.
To build the concept of his project the American author relies on the work of Gian Battista Piranesi, Campo Marzio (Fig.1), designed by the Italian architect in year 1762. Campo Marzio is actually not a real project that seeks to be realized (there is also a similarity here with Eisenman's project, because even the project for Cannaregio is unrealizable), but expresses the fruit of Piranesi's imagination that incorporates real traces of old Rome with imaginary constructions derived from his imagination. There we can find a combination of real facts intertwined with author's imagination. Both of these projects are theoretical projects that question the conceptual continuity

Fig. 1 Gian Battista Piranesi, Campo Marzio conceptual drawing

As for *Campo Marzio*[1], for which Tafuri states that: *«At Iconographia Campo Martii we assist in an epic representation of the battle waged by architecture against itself (...) history is here called an inherent "value", but Piranesi's paradoxical refusal to historical and archaeological reality renders civic potential highly questionable; the formal invention seems to assert its primacy, but the rigorous repetition of the invention reduces the whole organism to a kind of giant "useless" machine.»* (Tafuri, 1976, pg. 18), so as in the Eisenman project, we are faced with a paradoxical approach and also with a "giant useless machine". On the one hand, Eisenman seeks to transcend an architectural expression, such as the modernism, through the use of memory as a designing tool, and on the other hand, the formal square-based grid still emerges as a generator of form. In the project for Cannareggio, the opposition to modernism at the metaphorical level, while the continuity appears at the process level of form generation.
In the 1978 *Cannaregio*[2] project, Peter Eisenman draws from the city of Venice a series of metaphors, including what he calls "*layers of scarcity*[3]" and which he overlaps to shape the project Fig. 2). The first layer is the missing one, or the emptiness of the future. Eisenman traces the project of the unrealized Hospital, of Le Corbusier, that was planned to be built in the western area of the Cannaregio Canal (Fig. 3) and forms an imaginary mesh, which extends to the other eastern area where he was intervening with his project. The network that Eisenman builds relies on the pedestrian circulation system of the patients, at the third level of Le Corbusier's project, on which

1. Da Vicenza uno sguardo alla Roma antica con illustrazioni di Piranesi e scenografie di Pasolini, [online] available at: https://www.stilearte.it/da-vicenza-uno-sguardo-della-roma-antica-con-illustrazioni-di-piranesi-e-scenografie-di-pasolini/; [accessed: August 2019]
2. Cannaregio Town Square, Eisenman Architects; [online] available at: https://eisenmanarchitects.com/Cannaregio-Town-Square-1978 [accessed: Mars 2019]
3. Eisenman, P. (1978) My work as it relates to social guilt, [online] available at: https://www.youtube.com/watch?time_continue=3201&v=MK5s3Xq31wk [accessed: Mars 2019]

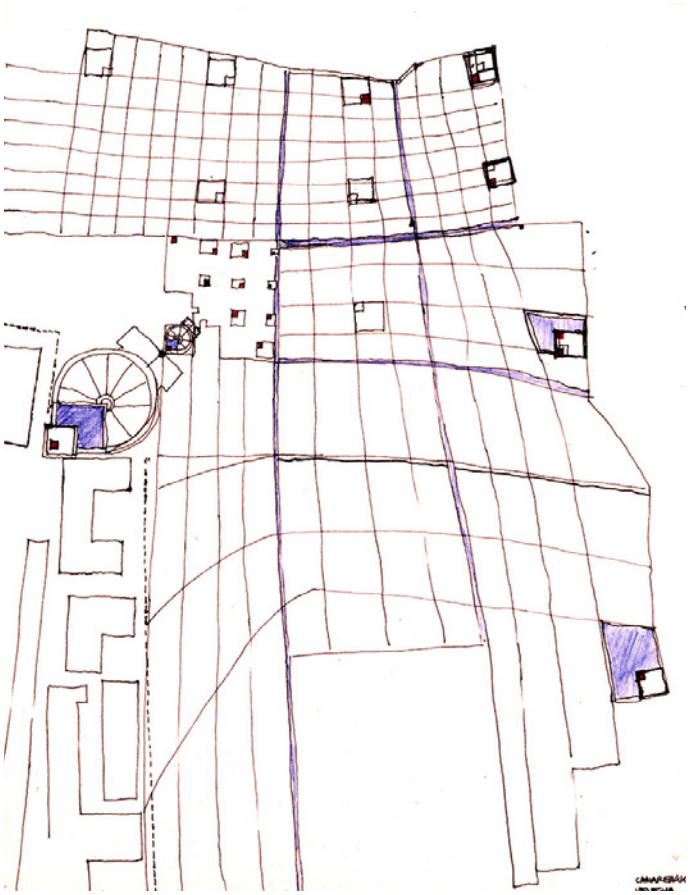


Fig. 2 Cannaregio concept diagram

Figure 3. Cannaregio Canal and the project of the Hospital of Le Corbusier

intersections are formed square spirals, according to which the patient rooms were grouped. The extension of Le Corbusier's network from the western part, where the hospital project was envisaged, to the east part of the canal, proves precisely the missing part and the traces that the project leaves in Eisenman's intervention. From that extension of the net to the rest of the area, Eisenman draws a layer that shapes his project. In fact, at the nodes of the extended grid, Eisenman places on the ground level a system of square voids, which have the same dimensions as the square spirals that organize the shape of the patient cells and places different three-dimensional objects inside or near them.
The second layer is formed by these objects which represent the absence and the *emptiness of the present*. Eisen-

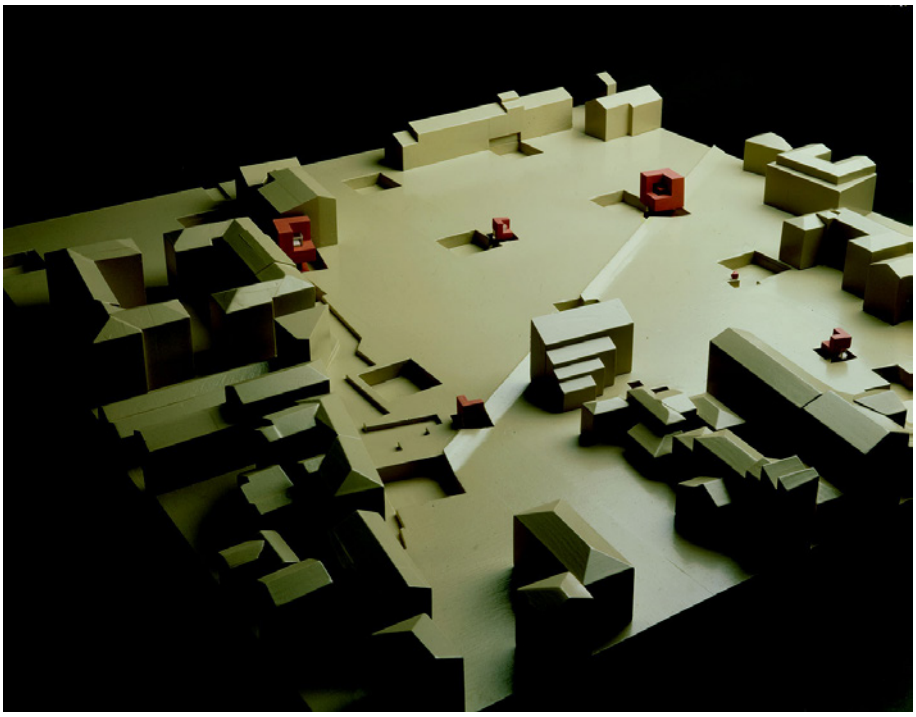


Figure 4. Model of the emptiness of the present and the different objects inside the voids

man's second absence is related more to the lack of relation between *function* and *form*. These objects, which are raised on the "House XI" model, as we have previously stated, are created out of three different dimensions. The smaller objects are so small that they cannot be used for living. Those with intermediate dimensions appear as houses, but they also have other "houses" inside them and those with larger dimensions can include any function within them. There is clearly stated the controversy over the modernist slogan that *Form follows Function* (Fig. 4).

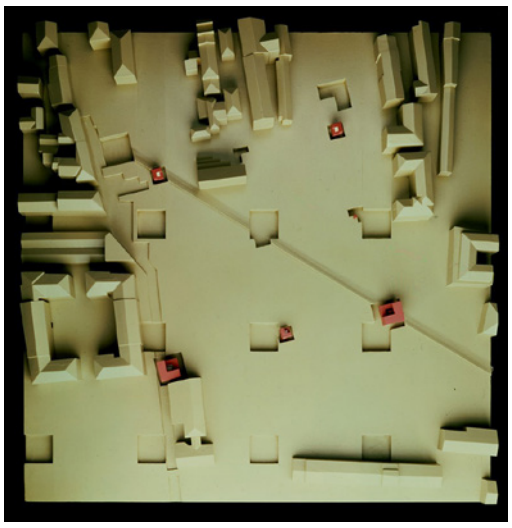
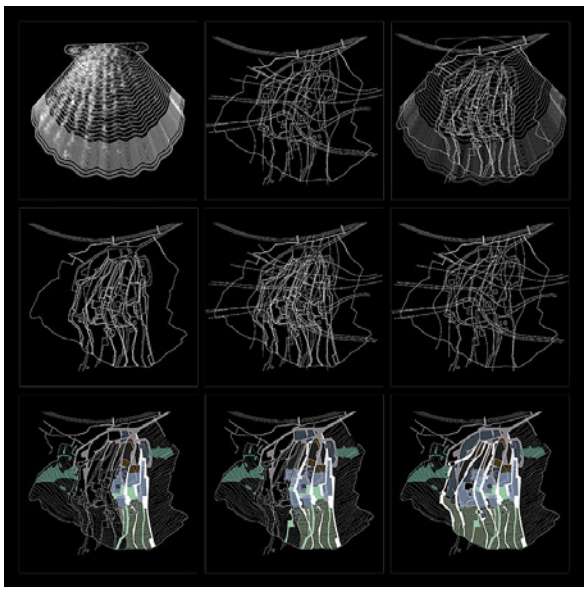


Figure 5. The diagonal topological axis that represents the emptiness of the past

The third absence is that of the *emptiness of the past* that the American architect states is represented by the topological axis that diagonally crosses the Eisenman project (Fig. 5). This axis, called topological by the author, seems to require a relationship with the topology where the project is knitted, but appears unclear how this element affects the formal aspects of the project. The axis, painted in red, looks more like a formal diagonal fracture that contradicts the geometric strictness of the square grid and the whiteness or the anonymity of Modernism.

3. City of Culture of Galicia, Santiago (1999 – current)

The project for City of Culture of Galicia, announced in '99 by the region of Galicia, is won by Eisenman's studio, which projects six volumes in total, conceived according to three main blocks: The Museum of Galicia and an International Art Center, The Galician Library and the Periodicals Archive, the Music Theater and the Center for Cultural Innovation. Currently, the cultural complex remains only partially implemented.
In this project the generating concept starts from three layers of historical memory of the city of Santiago, which overlap and influence each other, thus creating a series of mutual transformations / deformations of the overall scheme of the project. These interactions between layers (information inputs of the memory of the place) serve to Eisenman as an *internal genetic program*, and these layers are nothing but *encoding devices*, disconnected from their first formal meaning and, in this case, as codes of interpretation.



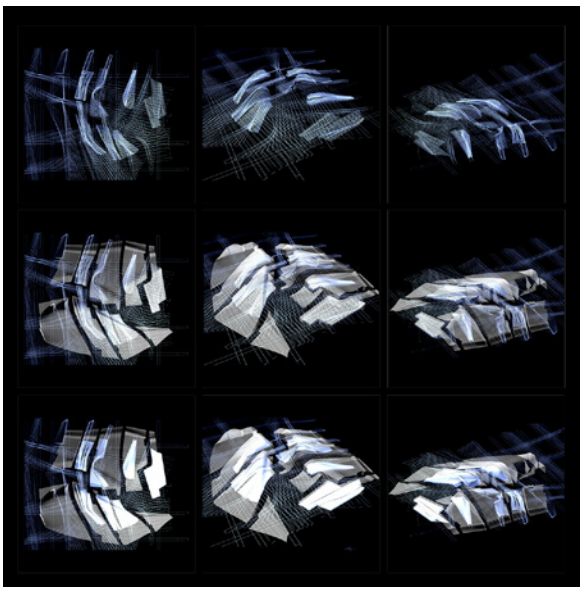


Figure 6. Diagrams of local / historic layers and the process of form generating
Figure 7. Diagrams of the process of form generating

The first information he reads from the context of Santiago, which he later uses as a transformation factor / a designing instrument, is the *conquille*, the first symbol that historically identifies the territory of Galicia and specifically the city of Santiago de Compostela. Known as the ultimate destination of Camino de Santiago spiritual pilgrimage and the place where St. James is thought was buried, she bears the conquille emblem on her emblem. Exactly this conquille symbol is used by Eisenman as a first diagram-structure, over which the other layers of information overlap (Fig. 6-7). The conquille, in this case, does not merely serve as a formal figure, where the structural elements converge to a point, but also as a source of information, where its character, both smooth and striated, reveals how these elements follow each other in a wavy sequence.
Eisenman interprets this information in design. The second layer, the medieval plan of the historic city of Santiago, is taken and overlaps with the topography of the hill where the project is being developed. This plan, though medieval, is nevertheless considered based on a Cartesian logic/pattern, figure-ground, where buildings are figures and roads are simply the remainder (the emptiness). However, this urban scheme is overrun and the tracing of historical roads is interpreted as an incision into the field, thus creating a different relationship with the built volumes, a figure-figure urbanism, where architecture and topography merge together (Fig. 8). The third information/ layer, which is generated by the pilgrimage route, is also the third transformation factor.
Overlapping with the first two layers, the pilgrimage flows merge with them and serve as fluid deforming force vectors, which operate both in plan and volume (influenced by the character of the shell/conquille). The required formal result aims to directly "touch" each visitor, offering him different experiences at the same time. For example, he is not only visiting the Museum of Galician Culture, but is also touring the medieval city and a pilgrimage route/itinerary.
The covers of the volume are lowered and raised, allowing the visitor a complex exploration, accompanied by the rhythms of the other volume (Fig. 9-10), or by different elements of the surrounding landscape contention.

Figure 8. Model of the buildings - architecture and topography merge together

Another reference of the "missing memory" is the construction of two iconic towers at the edge of the complex, a reinterpretation of John Hejduk's botanical towers (in the park of Belvís, Santiago de Compostela, never realized) and an homage of Eisenman to his former colleague of New York Five.

Figure 9-10. Interaction of architecture – ground design – landscape

4. Berlin Memorial to the Murdered Jews of Europe, Berlin (1998-2005)

The monument to the Holocaust in Berlin is required by the German Parliament, to materialize in the center of the city the memory of all the lives lost during this dark period of German history. To this monument is dedicated about 10 acres (approximately 40,000 m2), an area near the Brandenburg Gate. The project was commissioned to Eisenman's studio for the realization, which initially refuses: *«When I first saw this project, was something that I didn't want to do. You can't represent the horror and the enormity of what happened in Germany...it's impossible!»*[4]
The challenge, however, is accepted. The concept, which generates the project, relates closely to what Eisenman thinks should be a memorial monument and what memory represents nowadays. According to him, it is impossible for a traditional monument, which formally remembers a certain image of an historical context/moment, to symbolize the horrors of the Holocaust.

4. Michael Blackwood Productions (2016). Peter Eisenman: Building Germany's Holocaust Memorial. [online] Available at: (https://vimeo.com/ondemand/eisenmanmemorial) [Accessed: August 2019]

> *«In a prescient moment in "In Search of Lost Time", Marcel Proust identifies two different kinds of memory: a nostalgia located in the past, touched with a sentimentality that remembers things not as they were but as we want to remember them, and a living memory, which is active in the present and devoid of nostalgia for a remembered past»*. (Eisenman, 2006, pg. 152)

Eisenman chooses the second path to represent through a monument the pain for those human losses. For him, the memory of the Holocaust should be a «iving condition in which the past remains active in the present»[5]. The monument, although in its entirety is a formally very rigid structure (Fig. 11), begins to be perceived and explored by the visitor initially as an innocent game. You can sit on top of a stilae and use it as a place to relax, or hype over it and jump from one stilae to another, easily crossing the spaces in between (Fig. 12). After some leaps and bounds, you may suddenly find yourself in a situation you cannot manage, perhaps over a very high stilae. Or, if you want to start exploring the monument by simply walking, after a few seconds you would also find yourself in the middle of a "maze", where the *stilae* volumes would be so high that you could not see the exit and at the same time you'll feel suppressed by the weight of the stilae massive volumes. In a way, this is the feeling that the monument seeks to cause to the visitor, of being lost and oppressed, within a system that at first seemed so rational, so simple, so orderly.

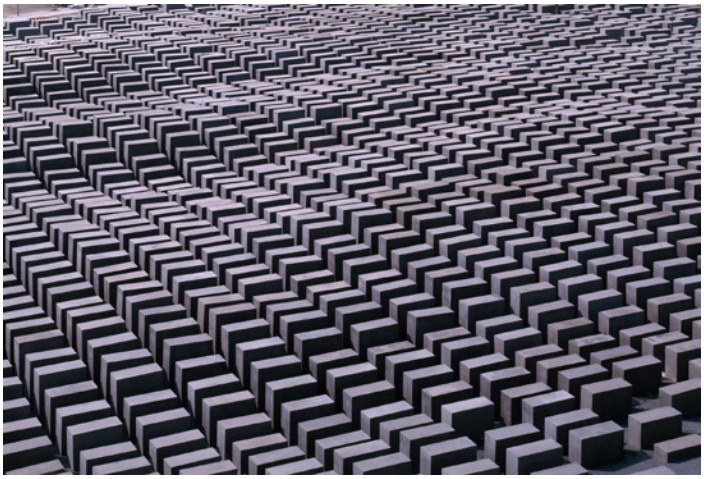


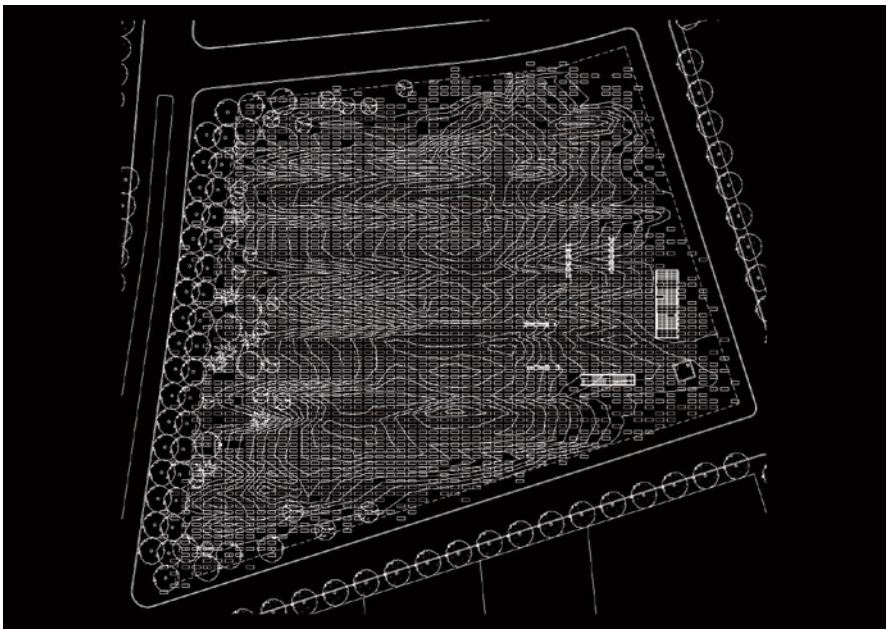
Figure 11. The monument and its formal structure

Figure 12. Exploring the monument in different ways

> *«This project manifests the instability inherent in what seems to be a system, here a rational grid, and its potential for dissolution in time. It suggests that when a supposedly rational and ordered system grows too large and out of proportion to its intended purpose, it loses touch with human reason. It then begins to reveal the innate disturbances and potential for chaos in all systems of apparent order»*. (Eisenman, 2006, pg. 152)

The formal structure of the monument is, apparently, quite simple. It is created by the overlap of two nets, that of columns/*stelae* and the spaces between them, and that of a somewhat larger Berlin context. The first net, the most rigid one, consists of 2711 concrete pillars, or stelae, with dimensions of 95 cm x 237 cm and height ranging from 0 to 4 meters. They are each 95 cm apart so that only one person can pass through that space. So, the experience of each visitor will be individual (Fig. 13).
In fact, the columns give the idea of a structure/system, which stands between the two waving planes of elevation (Fig. 14), that of the terrain topography (below) and that created by the sum of the top plans of the columns (above). This creates an intermediate, irregular, volatile space that traps the visitor so that after losing the sense of time and orientation, there is nothing left but to contemplate the unique experience (Fig. 15). As Eisenman writes, in conclusion: *«In this context, there is no nostalgia, no memory of the past, only living memory of the individual experience»* (Eisenman, 2006, pg. 155).

5. Humanity in action; A Self-Serving Admission of Guilt: An Examination of the Intentions and Effects of Germany's Memorial to the Murdered Jews of Europe, [online] available at: https://www.humanityinaction.org/knowledge_detail/a-self-serving-admission-of-guilt-an-examination-of-the-intentions-and-effects-of-germanys-memorial-to-the-murdered-jews-of-europe/ [Accessed: August 2019]



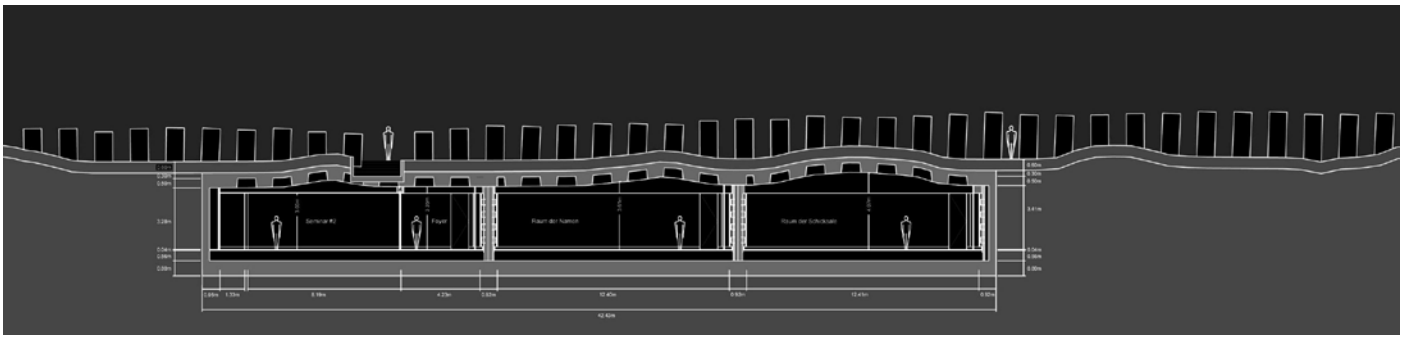


Figure 13. The rigid orthogonal grid of the stelae and the "isoipsis" of the ground level
Figure 14. Section of the two levels – the monument above and the museum below – and the in between spaces
Figure 15. A visitor in between the stelaes

5. Conclusions

At the end of this research we can state that some very important instruments, to generate projects with a strong memory reference, from a formal point of view, are: 1) the *extension of real networks*, built on the extension of existing networks, or imaginary networks as in the case of the extension of Le Corbusier's Hospital project network, to generate the shape of Eisenman project; 2) *placement of imaginary* connecting axes or extension of existing axes; 3) *rotation* is another instrument, not only for simulating a temporal stratification, as Purini would argue (Purini, 2000), but also for the continuity of memory encountered with a strong contextual trace; 4) *folding and transfer of information*, coming from the terrain layer, towards the height and volume; 5) *overlapping and grafting,* understood as a process where two or more layers overlap creating opportunities for each to take/use or leave pieces from the other layer; 6) the *use of external acting vectors* (*encoding devices*), which transform (according to a new logic) the existing information, but without losing the initial character.
It is important to note that these instruments always start from the reading of the contexts and then, from translating this existing information into form and volume - always emphasizing practical form-generating instruments.
These strategies, listed above, do not claim to be exhaustive and absolute. To these, may be added others that have the same, or more value in conserving or generating a memory that may not have previously existed in some form.

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History and Theory: Places

[HTH:P/01]

Tirana: The City Through the False Myth of the Ottoman Foundation and the Desired Scenography of Armando Brasini, the Consequences on the Current City

Krenar Gjokeja[1]
1. Sapienza University of Rome, Italy

"The past is neither a friend nor an enemy: it is the condition of the new, the ground on which its need is built. For those preparing for the project, the sheet is never white, but always crowded, and the new project must take place 1"

This brief communication on the city of Tirana sets as an objective first of all to clarify some issues, by the question of the foundation of Tirana as a town and the etymology of its name; Italian architecture in Albania, in particular the involvement of the figure of Armando Brasini; the state of total abandonment of institutions both locally and nationally without regards to safeguarding and strengthening the architectural-urban heritage of Tirana.

There are a number of legends regarding the foundation of Tirana as a city2 and above all linked to the etymology of its name. The fact that there is still a certain tendency and will, so to speak, a little nationalist3 to approach or even annihilate one's identity as a nation and what is even more serious as a people is surprising. There is a kind of real renunciation of local identity and knowledge of places, I would say tendentious in favor of a certain orientalism4.

The series of attempts and stories, which concern the etymology and the origin of the name of "TIRANA", speaks volumes: we try to place them more and more at facts, places or stories that are extremely distant and distant even for culture and tradition, in short it is sought to obtain at all costs. Obviously all these considerations are of a certain poetic and allegorical interest, but are not reflected in the historical documentation. For the most part these theses have been rejected by historiography5, given that the name Tirana can be found at least two and a half centuries before the foundation of Tirana as an inhabited center. Undoubtedly, certain information regarding the name Tirana can be found in the Albanian humanist Marin Barletti6, according to him Tirana is located on a beautiful plain between Kruja and Preza. If you draw two circles with radius Rome - Tirana, one with the center in Rome and the other in Istanbul we will see that they meet in the borders of Eastern Albania, a strange coincidence, this is to say that the development follows the routes of the Roman legions: via Appia and via Egnatia7

Introduction

During the long period of Ottoman rule in Albania that began in the 14th century, in Tirana an important crossroads was found between the main transport routes from East to West[7] . Several religious buildings were built as part of the desire to convert the population from Christianity to Islam. Certainly in most cases it was not a conversion for reasons of religious conscience but when it was not for physical violence it was for economic "violence".
With Tirana we find ourselves in front of a particular case, although not a place of commercial character and not even a particularly historical place, it was almost entirely developed for the commercial needs that in the nineteenth century will become political needs. It is difficult and tendentious to talk about Tirana as a city of new foundation whether abaut the constructions of the different "nuclei" of the Ottoman period from the 14th to the

1/V. GREGOTTI ., Necessità del passato, in B. PEDRETTI., (a cura di), Il Progetto del passato: Memoria, conservazione, restauro, architettura, Milano: Mondadori, 1997

2/B. ALIAJ, K. LULO, G. MYFTIU, TIRANA the Challenge of Urban Development, Cetis, Tiranë, 2003

3/In questo caso non si intende di escludere gli altri, ma bensì essere consapevoli e coerenti che la topografia e le denominazioni dei luoghi esistevano anche prima dell'invasione ottomana.

4/Bisogna affermare con chiarezza, che l'Albania è stata invasa dal Impero ottomano e dominata per quasi cinque secoli, e che l'Islam è stato imposto con violenza agli albanesi.

4/Shaking and seismic frequency activity.

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

19th century, or the architectural and urban planning projects developed by Italian architects in the 19th century. As we well known the newly founded cities were erected in areas without buildings and far from the inhabited area and this is not the case in our city, Tirana I dare say has developed over the centuries with ups and downs, but without being able to establish a point breaking with local tradition.
Its geographical position has determined the birth of what is now the city of Tirana, I can say that in this case it is an invented city, in this regard I like to remember the theoretical notion of Aristotle set out in a famous passage:

> *«If all the associations tend to do some good, they must strive for what is sovereign among all, and includes all the others: this is what is called the city and political association [...]. First of all it is necessary to associate the beings that are made to live together, that is the man and the woman to ensure descent, and the master and servant for material labors. The family is born of this association for the basic needs of life. The association of several families to reach a wider and more complex utility is the village. The association of several villages is the city, which is sufficient in itself, forming for the purpose of existence, and having achieved it to achieve its perfection. The city exists by nature, if they are by nature the simplest associations, because the city is the final aspiration to which all the others tend. In fact, let's call <<nature>> its condition at the last stage of its development.*
> *The city is therefore a natural fact, and man is by nature a political animal. But man is a political animal for different and stronger reasons than bees or any animal that lives in a flock. Only the man among the animals has the word; the voice can express pain or pleasure, and this is also possessed by other animals; but the word serves to manifest what is useful and harmful, just or unjust. This is indeed the character of man: having the notions of good and evil, of reason and wrong, and of other moral distinctions. The association of beings provided with these notions creates the family and the city. The city then is the condition of the family and of the single man. If in fact everyone is not enough to himself, he will be compared to the city in the same condition as the part with the whole. Whoever is not fit to participate in city life, or does not need it, cannot even properly call himself a man, but rather a beast or a god»*.

It can be affirmed with full awareness, that in this historical phase Tirana develops as a town with a strong Islamic character[8] because as a first thing a mosque is erected which acts as the fulcrum for the inhabited island that surrounds it, after all it could only be so.
The construction of the mosques took place between the 16th and 18th centuries in the most populous parts of the city, near the markets and public places; they played a central role in urban development, determining the creation of some urban "nuclei" [9] around them, which, merging with the local tradition, gave rise to a new urban scenography, for the city of Tirana.
The construction of the mosque of Sulejman Pasha (1614), the baths, the inn and the oven, symbolize historically and architecturally the birth of the city[10] of Tirana, this does not mean the foundation of Tirana. All these buildings have been destroyed over the time.

We do not talk at length on the description of the structure and composition of the other nuclei since it is not indispensable for the purposes of this communication but we concentrate directly on the fourth.
The fourth nucleus dates back to the foundation of the Haxhi Ethem mosque, about 200 meters west of the old mosque. And it is this mosque that thanks to the architectural fantasies of Armando Brasini and the realization of Florestano Di Fausto, will be part of that nucleo[11] of buildings that surround the most important square in Albania, called Skanderbeg square in the actual city of Tirana.
On November 28, 1912, meeting in Vlora under the leadership of Ismail Qemali, the council of Albanian patriots proclaimed the national independence, the council also established that Ismail Qemali himself will lead the first Albanian government.
The political situation in which Albania found itself remained however stressed and compromised, since the only desire and the sole will of the Albanian people of independence was not sufficient.

This decision required the approval of the International area, approval that arrived in 1913 from the Conference of Ambassadors in London.
The fact is that for the Albanians on November 28, 1912, it means independence from the long and bloody Ottoman occupation that lasted five interminable centuries, now the Albanians had their independent state. This

5/K. FRASHERI; Historia e tiranes, vol. 1, Botimet Toena, Tirane 2004
6/ in "Historia De vita et gestis Scanderbegi Epirotarum Principis", pubblicato a Roma 1508-1510
7/ "Mentre in Occidente L'umanesimo, il Rinascimento, la scoperta dell'America e l'invenzione della stampa aprivano nuove ere di civiltà e di progresso, l'impero ottomano, rimasto immobile nell'economia e nell'organizzazione dell'esercito, risentì molto dello spostamento del traffico commerciale dal Mediterraneo agli oceani Atlantico e Pacifico. Anche l'Albania, separata dalla famiglia dei popoli europei e caduta nell'oscurità, venne intristendosi nel lungo letargo del dominio turco", in C. OMICCIOLI, Storia e identità del popolo Albanese, Itaca, Ravenna 2012.

will be the most important event in the history of Albania after that of Scanderbeg happened in Kruja.
In this transitory phase took place the first attempts to renounce to the oriental political models in favor of the western ones, this renunciations going to be applied also to the urban structure of the cities with oriental characters.On January 20, 1920, at the Congress of Lushnja, Tirana was proclaimed the capital of Albania, hence the need to modernize and in some way westernize the image of the current city with oriental characters. Unlike the other historical Albanian cities, Tirana is the least known and the least likely to become capital. The choice falls on Tirana for purely geographical reasons, given that it was located at the center of the borders of the Albanian state, recognized in 1913 by the Conference of Ambassadors in London.
The Italian architecture in Albania has lived a parallel story to the national one, in some ways perhaps it was a very Roman story "Quinta Roma"[12] , obviously this statement by Marco Stigliano[13] is confirmed in Giorgio Ciucci .[14]
In the second phase the potential emerges, but also the fragility of this research, the export of Italian architecture from 1923 to 1943, the parallelism with the Roman architectural culture and the export of its "modus operandi".
Here the intent is not only to deal with the architectural - urbanistic events of Tirana, but also we will try to bring out the figure of the main advocate - creator of the project plan for Tirana, one of the bulky and most prominent exponents even in the Roman architectural culture of moment, the architect Armando Brasini. Obviously the later phases of the other Italian architects, such as Florestano Di Fausto and Gherardo Bosio, are dealt with in a marginal way because of their precious contribution and the almost definitive imprint on the city of Tirana.
During the period of the communist dictatorship 1944-1990, there were a series of events and interventions along the Monumental axis that slightly changed the status and layout of the architectural complex of Piazza Skanderbeg. The demolition of the former Town Hall in 1981, perhaps introduced a new way of acting that up to that moment since it was not usual to see "The demolition pick." In fact, the Monumental structure of the North-South structuring Axis is always maintained.

8/"La citta islamica. Uno degli aspetti caratterizzanti di questa nuova realtà è costituito dalla presenza del luogo di culto, che entra definitivamente nella città. [...] La moschea come edificio religioso sorse probabilmente in epoca relativamente tarda, volendo raffigurare l'abitazione del profeta a Medina, dove egli soleva predicare ai fedeli la nuova religione degli Arabi: è comunque verosimile che essa sorgesse a imitazione dei luoghi di culto cristiani ed ebrei dapprima nelle stesse chiese cristiane, che venivano requisite e divise a metà, adibite ai due distinti gruppi di fedeli. [...] L'ingresso della moschea Grande o Moschea del Venerdì nella città non fù un fatto casuale o soltanto di imitazione culturale, e neppure un evento simbolico di natura etico – religiosa. Essa ha infatti una sua precisa collocazione: viene costruita e ricostruita sul posto devo generalmente sorgevano precedenti luoghi di culto, nel centro della città, accanto al palazzo – castello del signore, e non distante dal suq, il mercato, il cuore pulsante della vita economica della città. Intorno a questo gruppo di edifici pubblici – la Moschea del Venerdì, il palazzo – castello del signore, il suq che indubbiamente rappresentano in termini topografici e architettonici l'importanza della nuova realtà istituzionale cittadina islamica nel quadro della collettività urbana – si estendono i quartieri, quelli residenziali delle famiglie gentilizie e quelli più popolari; alla periferia sorgono generalmente i quartieri mercantili con i caravanserragli, i pozzi e le cisterne per l'approvvigionamento dell'acqua per le carovane e i quartieri artigianali". V. F. Piacentini, La citta islamica, in Pietro Rossi, Modelli di citta. Strutture e funzioni politiche, Torino, 1987. 9/ B. ALIAJ, K. LULO, G. MYFTIU, TIRANA the Challenge of Urban Development, Cetis, Tiranë, 2003 10/Ivi, 11/ "Il primo nucleo urbano di Tirana crebbe insieme alla vecchia moschea di Sulejman Pasha, al centro dell'attuale struttura della città, all'incrocio delle principali arterie di transito interregionale. Insieme alla moschea furono eretti altri edifici, compresi quelli dei signori feudali e dei loro parenti, sulla riva destra del fiume Lana. Il secondo nucleo "isola" fu creato all'inizio del XVIII secolo attorno alla Moschea de Fuoco a circa 600 metri a nord-ovest del primo nucleo, dove oggi Rruga Barrikadave intersecca Rruga Fortuzi. La moschea venne chiamata "moschea di Beshiri" dal nome del suo costruttore. Il terzo nucleo "isola" fu costruito a nord – est del primo e vi fu eretta la moschea di Zajmi, all'intersezione di Rruga Dibres e Rruga Thanas Ziko. Il quarto nucleo risale all'epoca della fondazione della moschea di Haxhi Ethem, a circa 200 metri ad ovest della vecchia moschea. In altre zone limitrofe, intorno al primo nucleo, nacquero altri agglomerati, sempre con una moschea come fulcro (Stèrmas 1840; Kokonosi e Bèrxolli nel XIX secolo; Karapici 1858; ecc.). Ognuno di questi nuclei era nato indipendentemente dagli altri, fino a quando, crescendo, si fusero formando un disegno urbano irregolare. A questo si aggiunse la frammentazione feudale della terra e l'assenza di un'amministrazione centrale. [...] Le attuali preesistenze più storicizzate del periodo ottomano, la moschea di Ethem Beu e la Torre dell'Orologio, furono costruite tra il 1794 e il 1822. La città in questo periodo era riconoscibile in due aree ben distinte: una residenziale, con case base in mattoni, molto estesa senza apparenti limiti; l'altra più densa rappresentata dal bazar, vero centro commerciale, più volte distrutto e ricostruito. Fino al primo quarto del XIX sec. la città si estese attorno al nucleo dove si trovavano il bazar e le due moschee più antiche. Le strade principali collegavano il centro con i dintorni estesi della zona residenziale. A differenza di altre città albanesi, che hanno una struttura morfologica compatta, la città di Tirana appariva irregolare, estesa e frammentata a causa del retaggio feudale e dell'arretratezza economica e culturale", in M. STIGLIANO, Modernità d'esportazione. Florestano Di Fausto e lo stile del costruire nei territori italiani d'oltremare. Poliba Press - Arti Grafiche Favia, Bari 2009.

After the fall of the communist regime in Albania the phenomenon of mass migration to the big cities will take place which will determine, for better or for worse, the fate of the cities, including Tirana. Following a decade of degradation and total abandonment, and an uncontrolled and unsustainable development, it will be the turn of the left-wing junta, which with a series of operations and magisterial interventions I dare say, has tried to give a new face to the city. Certainly these operations will not solve the problems of Tirana, but in large part the result will be admirable. First of all the "reclamation" and the elimination of the slums that occupied the city in almost all the areas. The intent to revitalize and give hope to the city with the one and only facade operation, that is the painting of the facades in all the buildings of Tirana, will also be a wonderful strategy. From 2003 to the present, there will be a series of competitions that I believe will forever change the face and prospects of safeguarding and developing the city, which are not always acceptable.
Almost in all cases these international competitions will be disastrous and harmful to the city. I believe, in fact, that from my point of view, rather than reinforcing and emphasizing the value of the architectural complex of the North-South Monumental Axis, they will go to disfigure it or even destroy it. See the case of Piazza Scanderbeg and the demolition of the Gherardo Bosio Stadium previously declared Monument, to then build a new one on the same place, etc.

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Taking a cue from what has been said, the situation in Tirana, with the exception of some very rare cases, is dramatic as regards the safeguarding and strengthening of the monuments.
It is essential to understand that this is not just Albanian architectural and urban heritage, but I would say global. The North-South Monumental axis, a veritable structuring card of many cities, is one of the very rare cases at international level. For this reason, it deserves more attention from the "experts". A real misfortune for the architectural monuments[15] found in Tirana. If we take Gregotti's [16] statement at the opening, then I can say with full certainty and awareness that the current past in Tirana is considered as an enemy, therefore it must be eliminated, even eradicated. The new projects try to make room for themselves by erasing the existing to succeed. In my opinion, the value and quality of the various projects presented in the various international competitions on the structure and the monumental layout of the city have not even touched on the quality of the projects of the period 1923 - 1943. A rare and valid interpretation and dialogue is represented by the recent restoration and expansion project of the Central Bank of Albania.

At this point, however, only one consideration remains: if it is true that the architectural and urban value, when it exists, is universally recognized as valid, it can only be protected and administrations must do everything possible to facilitate any operation that does not alter the historical legacy. Protection that at the moment to the Urban Structure of the city of Tirana and in particular to its Monumental North-South structuring Axis is lacking. Perhaps there remains only one and last attempt at protection, so that it is not too late and that this structure is completely extinguished, that of writing this Axis as a UNESCO Heritage.

12/ Stigliano M., Modernità d'esportazione. Florestano Di Fausto e lo stile del costruire nei territori italiani d'oltremare. Poliba Press - Arti Grafiche Favia, Bari, 2009

13/ibidem

14/ "...dopo la Roma delle Origini, quella dell'Impero e quella della Chiesa, è l'ora della Roma Mussolini. L'E42 diviene la sintesi e il simbolo di questa quarta Roma." in Ciucci G., Gli Architetti e il Fascismo. Architettura e città 1922-1944, Einaudi, Torino, 1989.

15/Piazza Skanderbeg, Piramida, ex Stadio Qemal Stafa, L'asse Monumentale Nord – Sud.

16/"Il passato non è né amico né nemico: è la condizione del nuovo, il terreno su cui si costruisce la sua necessità. Per chi si accinge al progetto, il foglio non è mai bianco, ma sempre affollato e il nuovo progetto deve farsi posto". V. GREGOTTI, Necessità del passato, in B. PEDRETTI (a cura di), Il Progetto del passato: Memoria, conservazione, restauro, architettura, Mondadori, Milano 1997

[HTH:P/02]

Contrast Between Energy Efficiency Policy and Renovation Interventions in Existing School Buildings in Albania. Difficulties of Turning School Buildings into nZEB

Saimir Shtylla[1]
1. Polis University, Albania

Albania aims to be a member of the European Union in a near future, which implies significant efforts to adopt EU legislation. Energy Efficiency is undoubtedly a top priority in the EU and in order to be in the same path with the EU states, the Albanian government has transposed two main laws in this perspective the EPBD 2010 and the EED 2016 into their respective laws. The promotion of nZEB buildings, known for their low consume of energy that is close to zero is mandatory in EU and each country has to specify its own national parameters but in Albania, this aspect is still to be determined. Despite that, there are still many undefined aspects in the renovation intervention and the metrics that measure energy efficiency and determine the acquisition of the nZEB label too, that are not clear and approached differently in various interventions made in particular in existing school buildings.
There is a conflict in terms of the technological materials used to tackle heat loses and use of nonrenewable resources for heating. There are registered thermal improvements but there are no attention and improvement in the indoor comfort during the activities within the school classes etc. Therefore, there is an evident conflict between legal targets and non-normative interventions that expect important and undefined energy efficiency goals, that are signal that maybe there is an uncertainty between the will and the strategy to have nZEB school buildings in the future.

keywords: nZEB-nearly zero-energy building, School Building, Refurbishment, Sustainability, Energy Efficiency

1. Introduction

Buildings should produce energy and not only limit the consume. In Albania, energy efficiency is in the first steps and the path towards the configuration of a national program is still long and uncertain, despite having transposed to key directives of the EU energy efficiency policy by the government. The focus of the paper is the refurbishment policy in the national school building stock in relation to the national legislation, in particular with the nZEB goal, included in our law but yet with no definition and relative set of actions leading to this label. The EU context (legislation, best practices and case studies) with be closely analyzed in order to comprehend the actions that led toward the refurbishment of existing school building in nearly Zero school buildings. Furthermore, there will be given some recommendations in order to approach the future refurbishment of school buildings in the country in a nZEB perspective by also listing the potentials that can ease much more this approach.

2. EU experience. Refurbished nZEB school buildings

Since 2002, with the approval of the Energy Performance of Buildings Directive (2002/91/EC) in the European Union, the EU energy efficiency policy become more inclusive by putting on focus also on the refurbishment of existing buildings. In order to cover all the possible scenarios the directive defined two approaches for refurbishment interventions: (i) the limited and (ii) the major one. For limited interventions, by means cost-effective, reference made for those parts of the existing building highly relevant for the energy performance. The major intervention, implying intervention cost exceeding 25 % the value of the building (excluding the value of the land) and concerned with more than 25 % of the building's envelope. The EPBD recast of 2010 brought the energetic goals for building into another level by requiring them to produce most of their own energy demand in order to rely less possible from the grid, as long as transmitting energy generated from non-renewable sources and directly responsible to

the emission of carbon dioxide CO_2 and greenhouse gases GHG emissions in the atmosphere.
For this purpose there was introduced the nearly Zero Energy Building (nZEB), well-known for requiring a low amount of energy and generated from renewable sources, including energy from renewable sources produced on-site or nearby (EPBD, 2010). By starting: from 31/12/ 2020, all new buildings must be nZEB and after 31/12/2018, all new buildings occupied and owned by public authorities have to be nZEB according to directive. EU member states have elaborated and approved their on national plans for the requirements that nZEB buildings should have in their countries by making a distinction between new/existing and residential/nonresidential buildings. The minimum values in terms of primary energy use or carbon emissions approved to measure the achievement of the nZEB label in refurbishment interventions for non-residential buildings is not as strict as for the new constructions. In some defined by the indicator of primary energy use in kWh/m2 per year (Austria, Bulgaria, Denmark, Latvia, Romania); reduction in percentage of primary energy (Czech Republic, France) and by meeting the highest label of energy efficiency in the national level (Italy, Lithuania) (D'Agostino, et al., 2016). Despite promoting measures for deep and nZEB renovation, most EU Member States have not describe in a detailed way policies and measures that would lead to the NZEB level in refurbishments, through legislative and normative measures explicitly refer to a clear definition of an NZEB renovation. The energy refurbishment of existing school building by transforming them into nZEB is registering a growing attention, thanks to the many programs financed by the EU to encourage their refurbishment to nZEB. Fortunately, programs financed by the EU (ZeMeds and Renew school) and the federal program in Germany represent a good sign.

The Zero Energy Mediterranean schools, known as ZEMeds. (2013 -2016) co-funded by the European Union under the Intelligent Energy Europe (IEE) Program (call CIP-IEE-2012), aimed to enforce even more the EU energy efficiency policy. By elaborating concrete energy, refurbishment proposals for existing school buildings, they wanted to simultenaously stimulate EU member states to undertake concrete steps toward the refurbishment of their building stock into nZEB, as affirmed in the EU energy policy. Through the elaboration of 10 proposal for the refurbishment of existing school building located in Spain(3), Italy(3), France (2) and Greece(2); they want to make clear to stakeholders the benefits deriving from. The interesting considerations emerged from this proposals are related to the final energy consume per year and the payback period are very interesting and promising, too. A typical Mediterranean school built in the period 60s□80s may achieve a final consume of 110 kWh/m^2/y (final energy) once refurbished to nZEB, very important when compared to minimum values for existing building in EU member states nZEB plans. The second consideration, related to the payback period gave two possible scenarios in relation to the chronology of the set of interventions to refurbish a school building: (i) not less than 20 years for deep renovation works carried out in a unique stage; and (ii) more than 50 years when work plan is performed in different stages (EURECAT & NKUA, 2016).

The second important project registered for school buildings in the EU, is in the Renew School (2014-17), that supported and promoted, and initiated high-energy performance and highly replicable school building renovations (Knotzer, et al., 2018). Contrary to ZEMeds, it did not limit in the elaboration of the refurbishment proposals for school buildings by transforming them to nZEB but they found possibilities to implement their proposals in concrete refurbishment interventions. In total there were elaborated 20 proposals for renovations leading to nZEB standard of school buildings located in 9 countries (Italy, Slovenia, Austria, Germany, Belgium, Denmark, Poland, Norway and Sweden) but only 2 schools underwent to this kind of intervention until 2017 (Knotzer, et al., 2018). One of the best examples is the secondary school "Alessandro Volta" in Italy, also beneficiating funds from the national program "Scuola buona, scuola sicura". Even though, build in the 1977 just by implementing the innovative building system made of prefabricated wood panels, the heating demand (about 45 kWh/m^2/y), impact on the environment, and improve indoor air quality (Knotzer, et al., 2018, p. 29).

The Eneffschule project, a federal project promoted by the Federal Ministry for Economic Affairs and Energy in Germany, within the framework of the "Energy Optimized Buildings (EnOB) project aimed to lower the energy consume of the existing school buildings in the country. This project carried in two phases (2007-2011 and 2012-2017) aimed to increase the attention toward the energy efficiency of German schools by stimulating their refurbishment through innovative solutions to reduce primary energy requirements for heating, domestic hot water heating, ventilation, cooling and lighting. Three main levels of energy efficiency were obtained: (i) the Plus energy school; (ii) the 3-liter home school- very low and (iii) the Best practice. All these interventions did not just accomplish the energy efficiency goals by reducing the energy consumption and improvement of the indoor comfort within the schools' classrooms but they revealed to be a synergic cooperation model of Public Private Partnership between the public sector, science and business. The achievement of nZEB label in the refurbishment interventions of the school existing building in the ZEMed and the Eneffschule projects was strongly supported by the EU policy but above the national ambition to improve

[1]*For further information http://www.zemeds.eu/*

Fig. 1 Map soucers –Albanian Watershed Assessment Project.

Fig. 2 Territorial distribution of refurbished schools in Germany in 2017:Plus Energy (red); 3-Liter house standard (orange); Best-practice (blue)- Source: https://www.eneff-schule.de

the quality of these buildings. When performing a refurbishment intervention towards, in all these countries minimum standards for the achieving the nZEB goal and in particular the technical aspects in terms of U-value that building elements should fulfil have been set to help designers in their choices. But this practice was not implemented for the first time with the nZEB plans and with the EPBD recast of 2010, but with the requirements of the SAVE directive (93/76/EEC) and the first version of the EPBD 2002 (2002/91/EC). The importance of the elaboration of the building codes, where the U-values of the building envelope, heating/cooling plants conditions or even the exploit of renewable energy are clearly defined, permits the proper continuity of the refurbishment of school buildings and not to unpredictable situations. If not, this may lead to an incorrect interpretation or even misinterpretation of the nZEB goal by compromising the expected outcomes.

Energy efficiency in Albania and Refurbishment in school buildings

[2] *For further information http://www.renew-school.eu/*

[3] *[GER] Abbreviation for Energieeffiziente Schule – Energy efficient schools*

[4] *[GER.] Abbreviation for Energieoptimiertes Bauen – Energy efficient buildings*

Albania has proved the will to adopt EU energy efficiency policy, as long as the country aims to join the EU in a near future. The transposition of the Energy Efficiency directive EED 2012 (2012/27/EU) in the respective Law Nr. 124/2015 and of the EPBD recast (2010/31/EU) in the Law Nr. 116/2016 are a clear signal. Although representing two important steps towards the increase of energy-efficient buildings in the country there are necessary further steps to make these laws operative, in particular for the refurbishment of the existing buildings. In this perspective, the EED 2012 set important requirements for the member to renovate 3% of the total floor area of heated and/or cooled buildings owned and occupied by its central government each year to meet at least the minimum energy performance, starting from 01/01/2014. In this percentage, there were initially included those buildings whose total useful floor area exceeded 500 m^2 and starting from 09/07/2015 it was lowered to 250 m^2. Unlike most of the other articles and points of this directive, this point has not been transposed. Because of not being a EU member this mandatory "task", may not be restrictive but it does not imply the absence of lower annual percentage renovation rate suitable for the country's condition. As mentioned above the EPBD recast 2010 (2010/31/EU) introduced the nZEB goal and the obligation for member states to elaborate their respective plan to promote their diffusion for the new buildings (public and private) and the refurbishment of the existing ones. Even here, there is still missing a national plan in the country and maybe the reason may be same as mentioned above: not being an EU member.

In light of this unusual situation with a transposition of EU directives and absence the necessary articles, the government is free to undertake intervention to an lower than the established on of 3 % threshold values, but it can also not perform any refurbishment over the year. As common for nZEB policies in EU, there should have been elaborated a national plan where are specified the main criteria for defining this goal. Maybe in terms of: (i) primary energy use in kWh/m^2 per year; (ii) reduction in percentage of primary energy PE; or (iii) by meeting the highest label of energy efficiency in the national level for new/existing buildings. Postponing these key points in the respective directives, may threaten their implementation and when in case Albania joins the EU sooner, the government may be in very difficult situation, if future directives will be even more restrictive.

Unfortunately, these missing points do not represent the only problems in the Albanian energy-efficiency policy, because there are still missing the minimum energy consume levels regulated by law (known also as energy classes) and the minimum U-values for the buildings' envelope components in relation to the climatic context. Approaching refurbishment interventions in this undefined energy-efficiency framework may lead to many contradictory situation, especially in the refurbishment of school buildings in the national territory. First, the missing of the minimum energy consume levels (energy classes) leads to many (subjective) interventions to the building envelope and the heating plants. Second, the missing of a building code specifying minimum U-values of building envelope components makes impossible to determine if the insulation of the building envelope and replacement of the old windows and external doors of school building, probably to lower energy consumption, without specifying if this final outcome is a C, B or even A energy class. Approaching the insulation of the school building envelope as a matter of thickness and not constraint to a minimum U-Value, besides being a non-normative intervention it may reveal inappropriate in a near future when legally determined minimum energy consumption values. Indeed, in case of future low energy consumes levels, there might emerge an ineffectiveness of the performed

Fig. 3 Refurbished 9-year cycle school "Nënë Tereza" in Laknas, Kamza municipality. Source: the author

Fig. 4 New double-glazing windows and new radiator. Source: the author

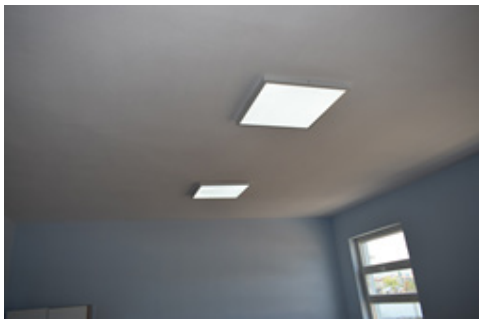

Fig. 5 Interior of the classroom with new lighting fixtures. Source: the author

interventions and the necessity to perform another (and expensive) one reach the levels approved by law.
An important recent example of energy refurbishment represented by the 9-year cycle "Nënë Tereza" school in the Kamza municipality. Undoubtedly, the refurbishment intervention resulted with a substantial improvement of the school conditions and during winter days, the indoor comfort has been improved due to the presence of radiators run by pellet-supplied heating plant. The intervention made on the building envelope by adding 5 cm of thermal insulation is not that enough to affirm the achievement of good level of energy efficiency. The attention toward sustainability shown in this intervention in the absence of metering system to quantify the energy saving.

3. nZEB schools: a possible and advantageous goal

From the state-of-arts of the Albanian energy-efficiency framework emerges a will to introduce efficient EU directives and a current undefined national one. Speaking about a legislation that promotes the construction and refurbishment interventions in a nZEB point of view may reveal premature and dangerous, too. Some considerations about the implementation of nZEBs in Albania based on a comparison of the EU situation and the Albanian are necessary to comprehend the approach to adopt.
Aware that buildings have to reduce energy consumption in both contexts, there should be made an initial consideration on the energy supply. In EU, the promotion of the nZEBs has not initiated because of making buildings more efficient as long as they are the other hand buildings account approximately about 40% of final energy consumption (Pérez-Lombard, et al., 2008). Production of energy demand from renewable sources, a key feature for a nZEB, permits the progressive abandon the grid that transmits energy from non-renewable sources that according to (Eurostat, 2019) amount nuclear energy (27, 8 %), solid fossil fuels (19%) compared to the renewable sources(29,9 %), which means that a nZEB is necessary to reduce CO_2 and GHG emissions. On the other hand in Albania most of energy supply is covered by crude oil (53,3%) and renewables (47,7%) whereas the production of electricity derives for more than 90% from hydropower (Eurostat, 2018). Furthermore, being a Mediterranean country is very advantageous because of large potentials of sun energy and especially geothermal energy to be exploited (AEA, 2012). From these considerations, emerge that the nZEB goal is not impossible to reach in a renewable resources point of view and considering the favorable climate when refurbishing the building envelope, the U-values should not be as lower as in the Norther EU countries (Germany, Denmark ecc.)
Refurbishing our school buildings towards nZEB can be very advantageous considering our climate and grid system. In our case when the national grid electricity is generated by 90 % from hydropower energy, a nZEB refurbished intervention on our school buildings will lower emissions to zero. Not being an EU member should not serve as excuse delaying the elaboration of the national nZEB plan or at least a national plan to refurbish our school building to nZEB. By doing so, there will be anticipated the amount of work that need to be done when the elaboration of a national plan for nZEB will be mandatory and non-normative interventions will not be allowed anymore.

4. Conclusions

The national energy-efficiency policy in Albania should change and pose clear targets and guidelines to the interventions made in the existing school buildings in order to achieve tangible results. Providing clear energy consumption classes and by specifying minimum U-values will make investments in our school buildings stock less risky and provide a secure path toward energy-efficiency. The refurbishment of existing school building towards nZEB is not an impossible goal if the Albanian government will approach it sooner. Considering the enormous renewable resource and the production of primary energy and electricity, nZEB-refurbished school will help to lower CO_2 and GHG emissions further. To refurbish or school buildings in a nZEB perspective, there should be financed similar programs like ZEMeds and Renew school and learn from the approach adopted by federal program in Germany, Eneffschule that stimulated various levels of energy refurbishment of school buildings in the country.

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Innovative Processes: Computation

[IP:C/01]

3D Printed Stereotomy: a tribute to Erwin Hauer

Giuseppe Fallacara, Giuseppe Scaltrito
Polytechnic of Bari, Italy

The contribution proposes a reflection on Modular Constructivism and consequent considerations on the relationship between Stereotomy and Stereolithography. Modular Constructivism is a style of sculpture that emerged in the 1950s and 1960s and was associated in particular with Erwin Hauer. It is based on modules that allow complex and in some cases infinite repetition patterns, sometimes used to create unlimited, fundamentally planar, screen-like formations, and sometimes used to create multidimensional interlaced structures. These latest designs have proved to be useful and attractive for use in architectural walls and screens that capture attention, often with complex patterns of wavy tape, similar to fabric, with openings that transmit and filter light, generating delicate shading patterns.
These complex structural geometries of the walls and three-dimensional screens of the Austrian sculptor Erwin Hauer, would be mostly impossible to mold with the classic stereotomic techniques, but Stereolithography could be complementary and integrative. The traditional design of these structures involves an in-depth study of the silicone molds used to make interlaced patterns. In contrast, Stereolithography is able to create such architectural screens by superimposing layer-on-layer material seamlessly. The case study is a proposal for an ideal cenotaph for Erwin Hauer. His studies and models have changed the way we think about how light enters a space and the blurring of the line between what is considered solid and empty. As opposed to Newton's cenotaph with small openings allowing light permeation through while also enclosing space, Hauer's cenotaph would include a structure that applies one of its models to a concrete dome. Shell construction is described as one of the possible design reflections that use stereotomic and stereolithographic techniques to generate complex spatial configurations and, above all, as one of the solutions that update the ancient stereotomic discipline.

keywords: Stereotomy, Stereolithography, Modular Constructivism

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1. Introduction

This article investigates a possibility of application of geopolymers as structural material. It takes inspiration from the Erwin Hauer's 'Continua' series, and proposes how it could be developed with the contemporary digital tools and through 3D printing. The objective is to develop a new system that minimises wastage and that facilitates the production of architectural elements. The study was inspired by a research initiated during the teaching period of Prof. Fallacara at the New York Institute of Technology in particular while holding the course "Building construction 2". The reported study includes the following phases:

A. Collection of data about the history of Erwin Hauer
B. Specific study design: geometric analysis and identification of generative processes
C. Production

The first phase concerns the study of the talented personality of Erwin Hauer. In particular, we can distinguish different phases from the set of formative experiences that contributed to the construction of his works. The second stage concerns the design of the dome. The study selection starts with the analysis, through the collection of data and information from the basic module of Hauer's Design1. Include the revision of the concepts of geometry and geometric entities and the recognition of the processes used for modeling the objects of study. The third step is the study of a possible study production on digital technologies. In this way, the modeling hypotheses elaborated in the analysis phase are tested. This point also includes reflections on the use of waste materials and the use of 3D printing for production. Once the three operational phases are completed, the steps are analyzed with respect to the theme of innovative processes for production.

2. Erwin Hauer's influences and formative years

Born on January 18, 1926 in Vienna, Erwin Hauer found his passion for art after serving mandatory military service in the Second World War after suffering a leg injury and partial deafness, he applied to Vienna's Academy of Applied Art and the Academia di Belle Arti di Brera in Milan. After finding his true talent of sculpting, he began to explore modular sculptures featuring infinite continuous surfaces in 1950. His concrete structures involved an intricate pattern of geodesic forms. Continuity and potential infinity have been at the very center of his sculpture from early on. He derived the notion of a continuous surface primarily from studies of biomorphic form. This was greatly reinforced by first encounter with the works of Henry Moore, who combined the dominant continuity of surface with an unprecedent cultivation of interior spaces within his sculpture. The combination of these two factors inevitably led to the emerging of saddle surfaces, so named because they resemble a horse saddle, fusing convex and concave curvature. This kind of surface, while present in organic nature and in sculpture derived from it, has never received much attention in art, except at beginning in the nineteen-forties, in the works of Moore, Naum Gabo and Antoine Persner. In architecture, saddle type roofs also emerged. They were pioneered by Felix Candela's thin-shell concrete structures and Frei Otto's hi-tech tent structures. In 1950 the saddle surface of Henry Moore influenced sculpture Design1. Thus was born the Modular Constructivism, a style of sculpture associated especially with him and Norman Carlberg. It is based on carefully structured modules wich allow for intricate and in some cases infinite patterns of repetition, sometimes used to create limitless, basically planar, screen-like formations, and sometimes employed to make more multidimensional structures. Designing these structures quite curvilinear and fluidly shapes modules, creating a seamless, quasi-organic unity that can be either rounded and self-closed, or open and potentially infinite. The designs have proved useful and attractive for use in eye-catching architectural walls and screens, often featuring complex patterns of undulating, tissue-like webbing, with apertures wich transmit and filter light, while generating delicate patterns of shadows. These patterns held voids which strategically let in light through. Many of his structures became useful to architects, a tasteful and beautiful way of dividing rooms without interrupting light. A few churches in Vienna were especially keen on his designs and used his modern use of technology to divide their spaces. It was seen as a more modern and in fashion way of diffusing light rather the stained glass windows which has been seen for centuries. By 1954 several of the design had been published in Domus and were chosen to be included in the book Solar Control and Shading Devices. This recognition became the basis for a 1955 Fullbright Grant, which brought him to the United States. Within first year (coinciding with the design for US Embassy in India by Edward Durell Stone), oublication of his screen walls in Interiors magazine contributed to the creation of a widespread demand by architects and interior designers for perforated, light- diffusign walls and room-dividing screens. Soon he was sent by Arthur Drexler and Edgar Kaufmann Jr of the Museum of Modern Art to several noted architects (including Philip Johnson, Florence Knoll, Welton Beckett, Max Abramovitz and Marcel Breuer). While he had produced and constructed most of the installations in Austria by himself, He licensed production and marketing in the USA and worldwide to Art for Architecture, a division of Murals Inc. of New York, thought he continued to develop the molds needed for the manufacturing. During second year in the United States, 1956, Josef Albers of Yale University took him on for a year of postgraduate studies and subsequently invited him to join the faculty of the Department of Design, as the Yale University School of Art was then called. During the ensuing four years at Yale, while exploring new topics in continuity [1]. Hauer joined the Yale Faculty in 1957 and taught there until 1990. His designs really marked the end of the World Wars and gave a gleamof hope for people around the world. Hauer was successful in selling his works for about twelve years, but due to changing economic situations his dividers were not produced anymore. However, his passion for design did not stop, he continues to work as independent sculptor, and also as designer in partnership with Enrique Rosado, in Bethany, Connecticut. In 2004, as Princeton Architectural Press published Erwin Hauer: Continua architectural walls and screens, Hauer teamed up with Rosado to adapt his Continua for production by digital means.

3. Design1

Design1 (Fig.1) was the first of the Continua series, conceived in 1950 by the sculptor, while he was still a student in Vienna. This panel was created when the sculptor developed studies on continuous surfaces based on modular structures and biometric shapes. These are saddle-shaped surfaces, inspired by Henry Moore's sculptures. The information on the design allowed the transposition to the design and production of panels through CAD / CAM technologies, demonstrating its potential as a suitable object for the recognition and application of modeling techniques. In the present section, there is the intention to understand the Hauer's discourse in which explains his own logic and, from it, perform the experiments of representation. In this phase, the minimum and conceptual parameters of the panel have been identified [2]. The minimum module, defined as the minimum fraction on which the symmetry principles are applied, has been identified by tracing the meshes on the panel image. The conceptual framework recognized at this early stage was also identified as a compositional element that generates the panel (Fig.2). The organic form, the symmetry principles of the panel and, of course, the recognition of the potential of parametrization techniques, have promoted the study of development hypotheses through use of modeling programs like Rhinoceros and Grasshopper.

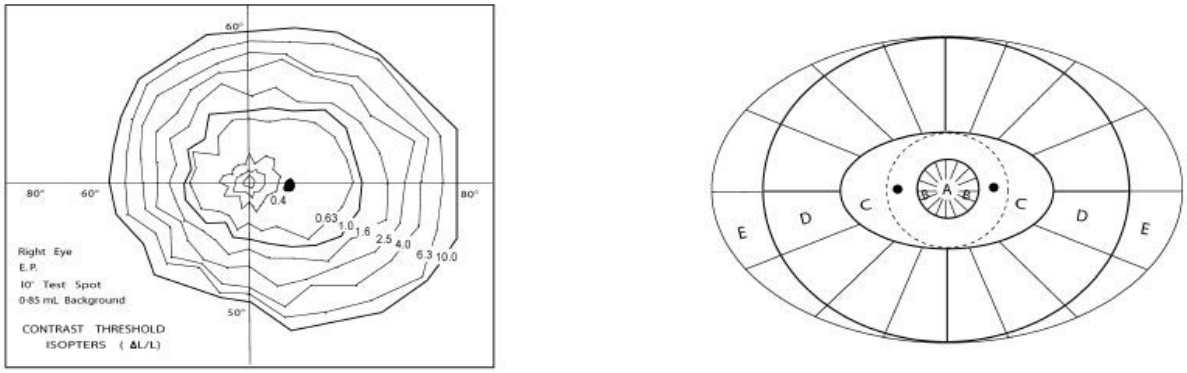

Fig.1 Design 1 - Installation in showroom of Knoll Internacional de México City, 1950. Source: E. Erwin Hauer: continua architectural screens and walls. 1st edn. Princeton Architectural Press, New York (2004

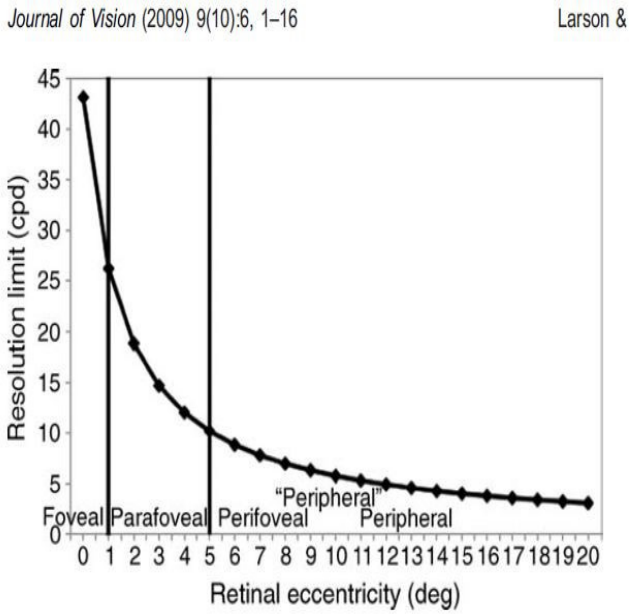

Fig.2 Preliminary identification of modules: 1. minimum module; 2. bridge; 3. Enneper surface; 4. constructional module. Source: Authors.

4. Geometrical Analysis

The use of saddle-shaped surfaces and the use of the suture curve described by Hauer [1] provided the classification analysis of the geometric entities. The saddle was identified as a portion of an hyperbolic paraboloid of double curvature, and recognized as a square of the non-elongated straight type, according to the Rodrigues classification [3]. The suture curve, according to Hauer [1], corresponds to the limit of the surface used in the manufacture of tennis balls and baseballs. This surface corresponds to the division of a sphere into two identical parts. The structure of the suture curve was analyzed by Hauer in different points of view (Fig 3). The suture curve corresponds to the limits of the surface identified in the conceptual exercise of the panel, and classified as the Enneper surface, one of the classic minimum surfaces, according to Weber [4], of the differential geometry. This surface can be defined, according to Karcher and Polthier [5], by the following concepts:
A. in relation to its area, whose surface corresponds to the minimum area for a certain perimeter; to be considered complete, the Enneper surface must have two lines perpendicular to each other in the horizontal plane;
B. in relation to its average curvatures, and its two curvatures must be of the same magnitude and have opposite signs, as well as a saddle, in this case the hyperbolic paraboloid.
original creative process with artisanal techniques with the process developed through CAD / CAM technologies. The discourse on the original conception, recorded by the author, was interpreted from the following graphic elements: two opposing bridges (1), containing an interior space, inserted diagonally into a square; such bridges represent the original building block (2). The minimum module (3), which represents a quarter of the bridge, is shown on the side. Geometries are identified and represented in the diagram wherein the surfaces (4) are inserted in the center of the spacings (5) between the meshes 1 and 2 and the direction of maximum curvature is indicated by the arrow; paraboloids (6), whose central point is located in the center of the circles (7) of both meshes, have their maximum curvatures positioned in the indicated direction and correspond to the surfaces which conforms to the maximum and minimum curvatures of the Enneper surface (8). The interpretation of the rationalization of the design and production process proposed for the Design1 panel was carried out by reading the schemes published in Hauer [1]: the formation of two meshes (mesh 1 and mesh 2) from the circle element (7), with identical spacing between them. On the one hand, this overlap delimits tangent squares to the circles of the two meshes (5). The direction of the arrows in the diagonal of the scheme differentiates the reading of the constructive modules (2), the upward arrow (high) corresponds to the direction of the maximum curvatures of the Enneper surfaces and the downward arrow (direction) of the curvatures maximal paraboloids; in the voids (9) are inserted connectors (10). These connectors, according to the author, create a neutral plane between the ups and downs, such connectors were interpreted as parts of the Enneper surfaces located in the plane of their mean curvature whose value, in this case is zero, therefore described as neutral. At the end of the analysis phase, research into the recognition of Design1 modeling processes with Rhinoceros started.

Fig.3 The Suture Curve. Drawings of the suture curve boundaries from different points of view. Source: E. Erwin Hauer: continua architectural screens and walls. 1st edn. Princeton Architectural Press, New York (2004).

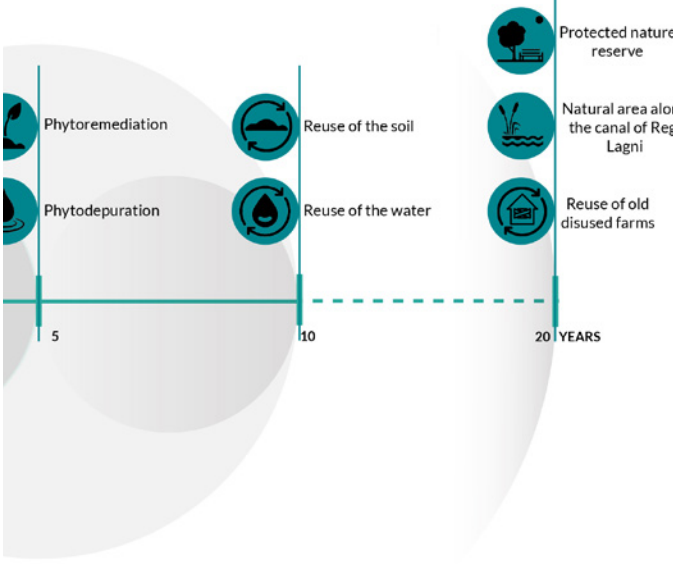

Fig.4 Interpretative analysis of the Hauer's discourse on the origin of the Design1 pattern. Source: Authors

5. NURBS and Parametric modeling

The modeling process is based on the interpretative scheme of Hauer's logic (Fig. 5). Using the direct modeling techniques, the following steps have been developed through the NURBS Rhinoceros modeling program [6]:

A. the first control line: arch curve connects the diagonal points of tile square;
B. the second control line: boundary of tile square;
C. the third control line: the boundary of hole;
D. restriction of control lines:

- 1st line: three horizontal tangent control points in YZ plane;
- 2nd line: square;
- 3rd line: three horizontal tangent control points in different planes, but symmetrical.

With these three control curves: arc-curve, square boundary, hole boundary, we can generate the surfaces between these control curves and make a solid tile. The next steps include assigning the thickness to the form for realization by 3D printing techniques of the panel. At this point a global topological transformation is applied (Fig. 6). By global topological transformation we mean that deformation which corresponds to a starting system a duly deformed arrival system [7]. In order to be operated it is essential that the starting system is inscribed, possibly in a regular manner, in a basic parallelepiped (bounding box). The more the basic system adheres to the bounding box, the more effective the deformation will be with respect to the arrival system. This modeling method is very efficient when the starting system is made up of very complex elements, while the arrival system has a very simple form. The workflow [Fig. 7] for generating a global topological transformation, obtained using parametric modeling techniques, through the Grasshopper program associated with Rhinoceros, is the following:

A. the base system is modeled in all its parts and enclosed in a bounding box;
B. the base surface of the arrival system is modeled. This surface must be topologically equivalent to the overall geometry of the base system;
C. a thickness is assigned to the surface of the arrival system. This thickness can be more or less equal to the thickness of the starting system, and represents the domain within which the deformation will be performed;
D. the deformation algorithm starts;

The geometry of the arrival system is exported.

Fig.5 Rhinoceros modeling process of Design1. Source: Park, D., Jiang, G., Perezamado, V., Tew, WB., 2010, Primitive Family 07_ Walls&Screens. [CONTINUA], 2010.

Fig.6 Global topological transformation: A. Base system; B. Base surface; C. Arrival System. Source: Authors.

Fig.7 Grasshopper code by Maurizio Barberio for the global topological transformation. Source: Authors.

6. Designs to Architecture

Design1 is part of a proposal for a cenotaph for Erwin Hauer [Fig. 8]. This proposal could be referenced to Newton's cenotaph and how they chose to construct it. As opposed to Newton's cenotaph with small openings allowing light permeation through while also enclosing space, Hauer's cenotaph would include a structure that applies one of his patterns to a concrete dome. Our model portrays a dome and a basement level to support and connect the dome to pathways of circulation. As we were inspired by Hauer's work our project also yields a geodesic pattern much like the theory of Hauer's walls and sculptures. The linking of the single pattern creates a grid lock which is permeable with light and air. The materials he used mostly are concrete, gypsum, and acrylic resin using knowledge he acquired in Vienna. Some of his walls were weather resilient, composed of cement and crushed marble. The construction of the shell would not use a conventional strategy that would fabricate the dome in a lab and ship it to the site, it would use new conventional methods of 3D concrete printing on-site. This cenotaph would become a landmark in achieving a step forward to the future where, hopefully, concrete would be fully automatic and complex.

Fig.8 Erwin Hauer Memorial @NYIT Campus Long Island NY; Proposal for a cenotaph for Erwin Hauer. Source: Authors.

7. Production

7.1 3D Printing in PLA

The first 3D printing attempts were made at the NYT with a Makerbot 3D printer and PLA filament. As we went through the process of 3D printing our dome model we faced a few hardships. Most mishaps were solved with mending the prints original Rhinoceros 3D program model. The 3D computer models need to be closed and manifold. We printed a model a large scale (18 inches in diameter). The Makerbot 3D printing machines took a 1.75 mm PLA filament (Fig.9, left). We were able to print without any extra supports underneath the dome as it printed layer by layer. Fig. 9, in the centre, shows our dome after the completion of our print. The exterior of the dome was unharmed with a few pieces of filament melted in small strings between the voids. These strings were easily cut off and sanded down. The interior of the dome however had large strings of filament hanging down from the top, due to the absence of a base support to print on (Fig. 9, right). Subsequently large format prints were made at Lab Stereotomy 2.0 - Polytechnic of Bari through DeltaWasp 3MT Printer funded by Fondazione Puglia. The DeltaWasp 3MT has a 3mm diameter nozzle and it was interesting to see the different behavior of the PLA in relation to the size of the extruder. This prototyping phase involved the creation of the Design1 pattern for a total size of 0,52m (Fig. 10).

Fig.9 Prototype printed in the fablab NYIT SoAeD, 2018, design by. G. FallacaraSource: Authors..

Fig.10 Large PLA 3D print of Design1 panel. Source: Authors.

7.2 3D Printing for Construction

The only existing 3D printers used for construction purposes operate in a rectangular coordinate system. At the same time, there is also a height restriction on these 3D printers as they are only capable to print within their frame. These printers are known as portal printers (Fig.11). Portal printers require each form to be manufactured in a factory, once all the forms are completed, they then must be shipped to the site where they are then put together. This requires additional labor before the building is even started. The prefabricated pieces construct the frame in which the object restrictions are created. This frame allows the 3D printers to move along its rails only if it is on a level plane. This begins to make limitations for not only the concrete, but the design. One must take the grid of the printer into consideration before they even design the project. The printer adds in an extra factor that has to be taken into consideration and checked constantly before construction because one change in level can wreck the whole project. Similar to the smaller printers we use for other purposes, the machine will not think it is making a mistake and will continue to print. Which is why the printer calls for constant monitoring in order to make sure the process runs smoothly and everything remains level. Unlike the portal printers, the Apis Cor 3D printer is 4.5 meters long by 1.5 meters in height and width weighing only 2 tons (Fig. 12). The printer does not require prefabricated pieces in order to print on bigger jobs. The size and parameters remain consistent throughout all jobs so the printer itself could be mass produced. The printer itself can be installed on a construction site via cranes so installation is relatively easy compared to those of the portal printers. Compared to the regular construction site, the Apis core printer saves weeks of time and money as it takes 2-3 days to construct the walls of a house compared to workers that would take 1.5 months. Once this process is finished the printer can be removed and the site is ready for finishing work as there is no waste cleanup as the printer works with an absence of waste. Not only will the 3D printer speed up the construction of a building, it will lower costs of building. Once a project is designed on the computer and it is successfully printed, it can be reprinted over again.

Fig.11 Dutch-based company ROHACO portal 3D printer. Source: Koslow, T. 2015, viewed July 2019

7.3 Geopolymers

Geopolymers are new materials for fire and heat resistant coatings and adhesives, medicinal applications, high-temperature ceramics and new cements for concrete. The use of alkali materials to form a cement which is referred to as " Geopolymer" which was created by Davidovits, but it's also known as alkali-activated cement and inorganic polymer concrete in various parts of the world. Geopolymer technology provides comparable performance to traditional cementitious binders, but with the added advantage of significantly reduced Greenhouse emissions. The properties and uses of geopolymers are being explored in many scientific and industrial fields like chemistry and in other types of engineering process technologies. Geopolymers are part of polymers science, chemistry and technology that forms one of the major areas of materials science. A Geopolymer is a mineral chemical compound or mixture of compounds consisting of repeating units, for example silico-oxide, silico-aluminate etc. created

through a process of geopolymerization. This mineral synthesis was first presented at an IUPAC symposium I 1976 (Fig.12). The microstructure of geopolymers is temperature dependent, its x-ray becomes formless at room temperature, but evolves into a crystalline matrix at temperatures about 500 Celsius. It can be distinguished between two synthesis routes like an alkaline medium and acidic medium with phosphoric acid from plant extracts. The alkaline route is very important in terms of research, development and commercial applications. In the 1950s, Viktor Glukhovsky, USSR, developed concrete materials originally known under the names “soil concretes” and “soil cements.” Numerous structures have been constructed in the intervening years through no commercial entities have carried this through to industrial scale. Since the introduction of the geopolymer concept by Joseph Davidovits, the definition of geopolymer has become more diverse and often conflicting. Concrete is one of the most common building materials used in the construction of buildings, bridges and infrastructure across the world. Even though concrete is an excellent material, it releases a large amount of carbon dioxide. OPC relies on a high-energy manufacturing process that imparts high potential energy to the material via calcination. This means the activated material will react readily with a low energy material such as water. The major constituents of concrete are coarse and fine aggregates, typically natural quarried stone or sand. Production of geopolymer cement requires a precursor material such as metakaolin or fly ash. Room temperature hardening is achieved with the addition of a source of calcium cations. The different types of geopolymer are slag-based geopolymer, rock based geopolymer, fly ash-based geopolymer cement etc. Fly ash is the fine solid particulate residue driven out of the boiler with the gases in coal-fired power plants. Now it can be used for making geopolymer which acts as a cement-like product. The geopolymer technology provides an alternative good solution to the fly ash with little negative impact on environment. The production of fly ash-based geopolymer is mainly based on alkali activated geopolymerization which can occur under mild conditions and is considered a cleaner process due to lower CO2 emission. The mechanical performances of the fly ash-based geopolymer, including compressive strength, tensile strength and durability such as the resistance to sulfate, acid and thermal are the primary concerns. Geopolymer concrete offers a number of benefits over conventional OPC concrete. It significantly lowers CO2 emissions, it can better thermal insulation properties, it has a higher temperature and it’s fire resistant.

Fig.12 Apis Cor 3D Printer. Source: Jamie, D. 2018, viewed July 20192015, viewed July 2019

8. Overcoming issues

Technical solutions for the problems associated with Concrete 3D printing all stem from the nuances of the long-established traditional concrete construction methods. This new technology can allow architects to make buildings in almost any shape imaginable. Contractors are interested because it could allow them to build structures without external forms; what that means is that they can work from the inside to build up structure like the concrete 3D printers mentioned prior in this article. Civil engineers are also intrigued because this technology may allow them to replace current cement-based mixtures with new materials that make the construction process faster, cheaper and more flexible. This collaboration is bringing the team together during the building process. Types of problems examined include rebar design, detailing and placement; congested rebar; rebar stacking; rebar conflicts with embedded items; coordination of overall project management practices. Basic improvements

in communication and coordination have the potential to reduce both premature deterioration and structural failures in concrete construction, and can enhance the quality and reliability of concrete construction in the future. As concrete technology advances and concrete performance reaches new and higher levels, its important to reintroduce perfection in coordination and communication within the design & construction team. Cement mixtures have been around since the dawn of the Roman Empire, but we have never advanced our mixtures today enough to last as long or serve as a more stable structure as the ancient Romans did. Hope is that the hype around 3D-printed concrete would encourage proper experimentation and spur a series of new and advanced mixtures more reliable than the current Portland cement standard. The complex makeup of cement-based materials make them difficult to adapt to 3D printing. That was shown by a project in 2008 at Oak Ridge National Laboratory, designed to demonstrate that 3D printing can be used to construct low-rise residential and commercial buildings for half the cost of conventional methods. It took a team of scientists and engineers two years of experimentation to come up the right combination of hardware and cement-based material to finally get the 3D printing process to work. The Lab's Catherine Mattus says that the mixing process of concrete is familiar, but the combination of materials is another story. Chemically, it can make sense, but in practice, it must be very precise in order to serve as structure. Recent research into 3D concrete printing proves that proper material development is one of the biggest challenges that need to be tackled for successful printing of the concrete structures. Concrete printing method has a limitation of not being able to fabricate significantly overhanging parts since this would need support material for stability in the design. This would restrict the building of complex freeform structures. Voids and hollow designs also may not be achieved with this limitation, unless a sacrificial support system is used. An alternative approach that would permit more complex designs to be fabricated would be for these structures to be built in multiple sections and later assembled to build the complete structure. The poor surface finish has also been seen as a limitation in concrete printing. Improper control and excess deposition of material also cause poor surface quality in the part, which is not desired at all.

9. Conclusions

Additive production can be applied in this specific case essentially in two ways: to "print" the entire dome or to produce smaller components to be assembled and connected to create larger structures (the same approach as the stereotomic discipline). Stereotomy and stereolithography are two processes apparently at odds, but united by the same aim: the realization of three-dimensional solids to assemble. Stereotomy is the discipline of building in cut stone, the technique (or rather the art) of removing material, in order to create stone blocks, geometrically refined, that allow the construction of elements and architectural systems of triple value: aesthetic, static and functional. Stereolithography is the technique that makes possible to create objects by adding material by overlapping layers. The term Stereo, in common between the two techniques, indicates the purpose of the technique or the creation of solid-volumetric objects created mutually: by removal of matter or by addition of matter. The two techniques, in the sense of exploitation of the raw material, could be complementary and integrative. Specifically, if, by Stereolithography, we mean additive manufacturing or 3D printing through the stratification and solidification of semi-fluid material composed of specific mortar, it is useful to reason on the reuse of stone processing waste for the inert part of the mortar. 3D geopolymer printing results in a low cost and high speed construction method, which allows for a greater freedom in both architectural and structural design. The development trajectories include the research on innovative and environmentally friendly materials and on waste treatment. The aim, as already underlined, is to manufacture and build on a large scale using additive manufacturing methods and using powders and waste deriving from the stone working process as a printing material. This application would, therefore, result in a transformation of waste from a cost element to an economic resource, from unusable processing by-products to raw materials for environmentally friendly services and products, in a cyclic process of environmental and economic regeneration. The 3D Printer, is not just a technology, but a paradigm shift for design. It will change the way architects think and design as they evolve with the technology. The exponential technological growth has been observed in information systems and material sciences and robotics. However, the major part of the construction system of today is still based on the traditional manufacturing technologies and implementation methods. The system is outdated as there are many alternatives that can contribute to a new and more effective way of creating architecture. Rethinking of the strategical approach of building architecture is of a primary importance in our times as new needs require new strategies. On the other hand the increased power of computing devices has allowed a digital fabrication approach of whose potential has surpassed our possibility of physical fabrication. The recent development in manufacturing technology based on synchronozation between the computer and the machine has created new opportunities to transmigrate the digital fabrication power to physical implementation of digital designs. 3D printing technology is one of these developments and it holds us a big promise in terms of customized complex geometries and automation process within a large spectrum of applications. Complexity is no longer a constraint on architecture and design, but an opportunity. [8].

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[IP:C/02]

Using cognition for improving visual thinking process in CAD systems (Visual recognition role in future of Computer Aid Design)

Afshin Nazarieh[1]
1. Sapienza University of Rome, Italy

In next 20 years more will change around the way we do our work than its happened over the last two thousand, in fact we are in the beginning of a new age in human history. There have been four major historical eras defined by the way we work, think and design. Together age lasted several million years, then the agricultural age lasted several thousand years, the industrial age lasted a couple of centuries and the information age has lasted just a few decades, and today we are on the cusp of the next great era as species, Augmented age, the effective use of information technology in augmenting human intelligence. The growing impact of digital design technologies on design and production has resulted in the need for re-examining current procedures to guide future developments. Dynamo, Grasshopper and Sverchok and many other computational design platforms, either cognitively augmented or not are all passive; they need to be told what to do.
In product design Efficient communication between designer and modeling software improves the effectiveness of design process, but still, to have an active communication; visual recognition is the missing boundary. The importance of re-cognitive lopes still needs to be investigated more, to achieve an effective level of human computer interaction in design emergent field. In this research cognitive augmentation is used to improve a perceptual thinking model from existing passive to an active cyclic process that mediates between design intentions and represented designed solutions. The presented research tries to define a new perceptual map based on a direct analogy between the work-flow of Autodesk Dream catcher and the cognitive model of visual thinking in studies of Rivka Oxman in design emergent. The final revised model is intended to improve visual recognition of the CAD system, regarding improvement of designer computer interaction.

keywords: Computational Design, Cognitive Augmentation, Design Emergent, Generative CAD Systems, Cognitive Augmentation

1. Background and contexts

The field of human augmentation is deeply rooted in the history of human evolution during decades and centuries. All developed products and services during human history are assigned to boost anthropoids' physical or mental capabilities. Of the first ideas of a body with mechanical enhancement appeared in Leonardo da Vinci's flying machine notion which is Perhaps the inspiration of the bat shines through the most, as the two wings of the device feature pointed ends commonly associated with the winged creature (InventHelp, 2008). The impute of human enhancement gradually stretched in time to meet second world war when A large number of psychologists were conscripted to devise better and faster methods to train the large numbers of soldiers and pilots needed to fight the War. What began largely as an educational endeavor changed emphasis as these researchers realized that their training could only be made as effective as the machines their pupils were trained to use. (Boring, 2002) These studies gradually formed a boundary of knowledge, named human factors which According to the Human Factors and Ergonomics Society (HFES), is (HFES, 1989 Amended 2005):
. . . The Human Factors and Ergonomics Society is dedicated to the betterment of humankind through the scientific inquiry into and application of those principles that relate to the interface of humans with their natural, residential, recreational, and vocational environments and the procedures, practices, and design considerations that increase a human's performance and safety at those interfaces...
After second world war growth of technologies and especially advent of personal computers, interaction between human kind and computer systems gradually affected and changed the way we organize our information and work. This gradual change after advent of new machines and human factors (HFES, 1989 Amended 2005) now and by meeting computer technologies causes some new issues in the field of human computer interaction(HCI). These new issues are explored from variety of viewpoints. Psychology, philosophy, cognitive science and so on

which among them cognitive augmentation in visual emergence process is where this paper is aimed to apply its effect on.

2. Cognitive Science

Ask any group of cognitive scientists to define cognitive science, and there will be a multitude of answers. Some will say that cognitive science is the science of the mind; others will say it is the science of humans as information processors; others will say it is a behavioral science; still others will say it is nothing more than cognitive psychology. Given the fact that cognitive science has many definitions regarding to different domains of knowledge we try to choose the best definition as an "interdisciplinary study of mind and nature of intelligence. Scholars can come from a wide range of backgrounds, including psychology, computer science, philosophy, mathematics, neuroscience, and others but share the common goals of better understanding the mind". (Indiana University, 2015) This definition clears the stetament of cognitive science as a tool of better understanding the mind. Feature that when it comes along human augmentation makes it much deeper, more sustainable and more efficient especially in the field interacting with computer systems.

3. Cognitive Augmentation

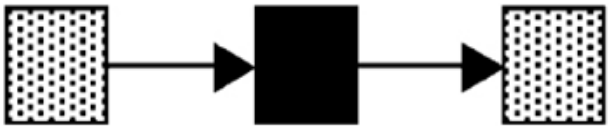
Cognitive enhancement may be defined as the amplification or extension of core capacities of the mind through improvement or augmentation of internal or external information processing systems. As cognitive neuroscience has advanced, the list of prospective internal, biological enhancements has steadily expanded (Farah, 2004). External hardware and software supports now routinely give human beings effective cognitive abilities that in many respects far outstrip those of biological brains. Cognition can be defined as the processes an organism uses to organize information. This includes acquiring information (perception), selecting (attention), representing (understanding) and retaining (memory) information, and using it to guide behavior (reasoning and coordination of motor outputs). Interventions to improve cognitive function may be directed at any one of these core faculties. An intervention that is aimed at correcting a specific pathology or defect of a cognitive subsystem may be characterized as therapeutic. An enhancement is an intervention that improves a subsystem in some way other than repairing something that is broken or remedying a specific dysfunction. (Nick Bostrom, 2009). Among presented subsystems by Nick Bostrom, external software support though computer services and software are rising dramatically and exceeding the speed of human adaptation. Artificial intelligence and computers calculation speed are gradually taking the initiative of human kind and the role of human as center of decision making. Here is where lack of a cognitive augmented methodology feels, a well enhanced process that brings back the role of human kind in stage of decision making regarding HCI.

4. Cognition Role in Visual Design Process

Emergence has been widely recognized as a central phenomenon of visual reasoning in design and as one of the bases of creativity. In recent years the study of emergence has become a major focus of design research. The phenomenon is so seminal to our understanding of design that it has stimulated a broad body of research and diverse research directions. In the attempt to understand and explain the cognitive richness of emergence, current research has exploited a wide range of diverse methods from protocol analysis to computational modeling. It is the knowledge and understanding of visual cognition that underlies any comprehensive explanation of emergence. Among various research directions, shape emergence has come to constitute one of the important research tendencies in emergence studies. Much of the current work has been centered on the perceptual act of shape emergence. However, the perceptual phenomenon of shape emergence has been insufficient to explain the richness of the cognitive content of visual emergence (Oxman, 2002). Present research has been researching the cognitive view of shape emergence in computer aid design(CAD) that might complement others researches by providing the explanation for the contribution of visual cognition to emergence in a more intelligent way that boosts designers shape creation ability.

5. Basic Visual Shape Emergence

Research over past years has arrived at a set of basic and semi-developed concepts for the exploration and modeling of design emergence. Rudimentary to design reasoning in emergence is the formulation of its sequential and cyclical processes. (Steadman, 1972), (Akin, 1990), (Lawson, 1990). Complementary research has demonstrated how design thinking operates through externalized representations in visual reasoning. In one well-known rendition of this relationship, according to Schon (Schon, 1983), designing proceeds in a sequence of 'seeing–moving–seeing cycles'. The 'seeing–moving–seeing' model has been widely accepted and has been supported by extensive studies of the externalization of design thinking in drawing and sketching. Schon's interpretation of the design process as the designer having a 'reflective conversation with his or her ideas' as embedded in design drawings and the 'back-talk' of information provided in the process have become key terminology which



seeing A *moving* *seeing B*

Figure 1 Schon's basic model of 'seeing moving seeing. (Schon, 1983)

has fostered much research in design thinking. This basic model depicts the designer visually interacting with symbolic representations of the materials of the problem.

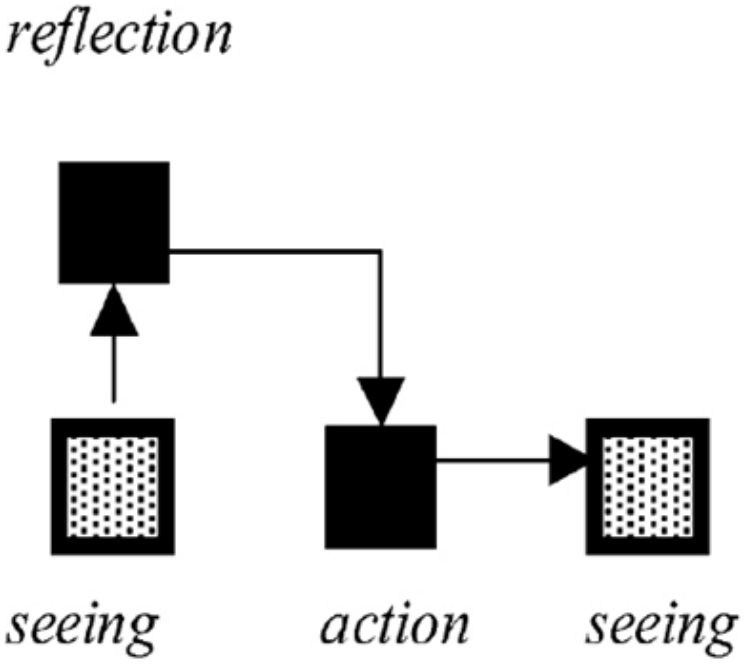


Figure 2 The expanded model including reflection in action (Oxman, 2002)

Reflection in action' is an interpretation of this model initiated by reflection and feedback from the external representations, which initiate an action (Figure 2).

In thinking eyes (Oxman, 2002) after explaining shape emergence and shape ambiguity it explains basic perceptual model of emergence as below; where picture after seeing act, first perceives then saves in visual memory and for the last step before representation(drawing) perceives again and represents(drawing).

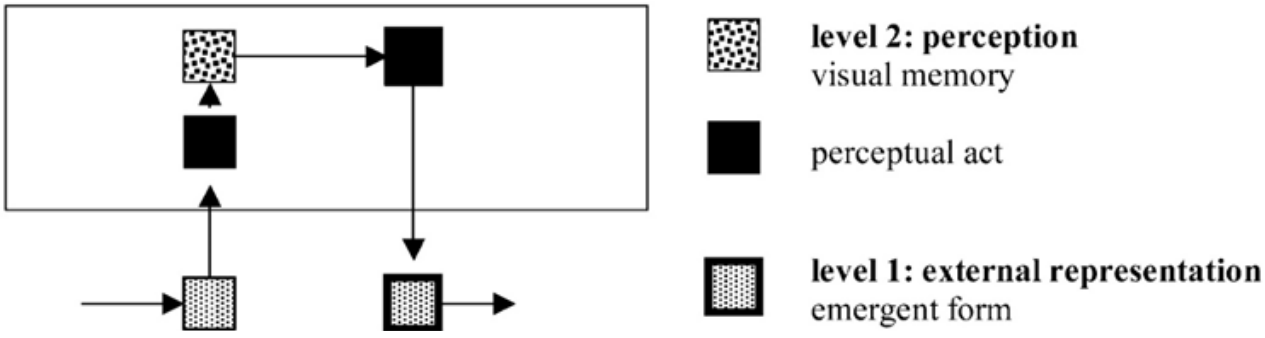


Figure 3 Perceptual shape emergence (Oxman, 2002)

As an underlying sequential model it may explain emergence through visual acts that initiate modifications of the visual representations of the design object (Figure 1).

6. **Cognitive visual design process**

Image schemas are the context of emerging perceptual-cognitive categories of image processing in mind (Figure 4). They are formed by and directly structure our experience with the world. (Johnson, 1987).The container image schema, for example, forms the basis of our visual daily experiences with houses, rooms, boxes, teapots, cups, cars, and so on (Hurtienne, 2009). Design schemas are examples of such a knowledge structure in product, material fashion and especially architecture design in which the schema as a pattern, or configuration, of shapes constitutes an important class of domain knowledge. Considering image schemas as an integrated cognitive understanding we can approach our perceptual model to a cognitive process based on semantic shape emergence.

Another relevant case study is “dreamcatcher”, done in Autodesk Design and Computational Science Research.

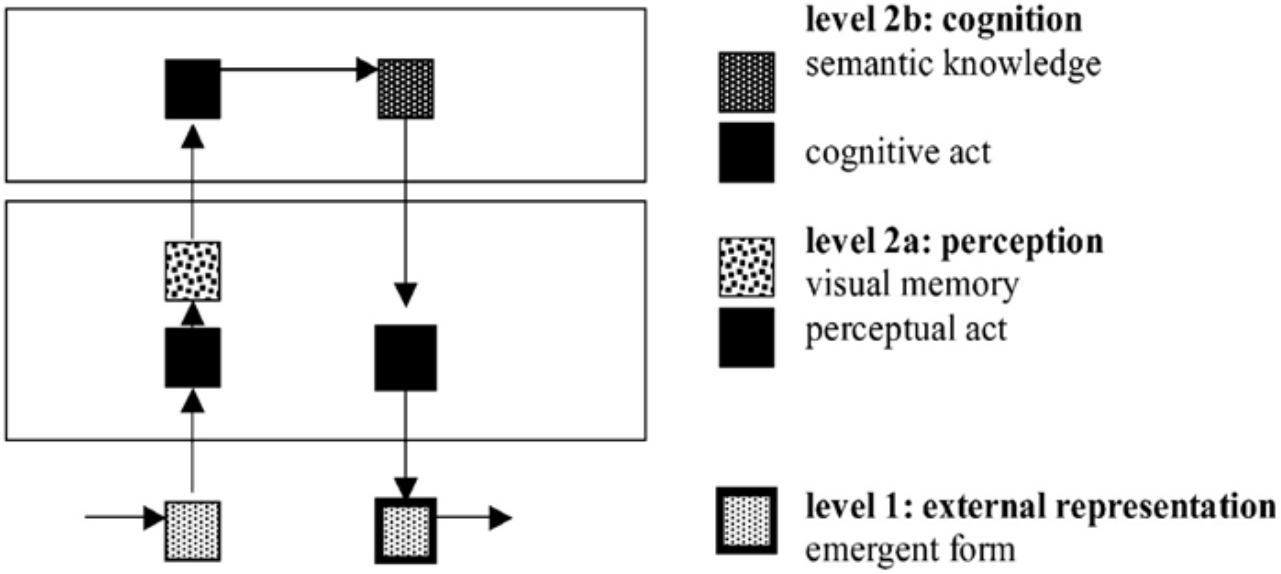


Figure 4 cognitive emergence (Oxman, 2002)

7. Literature Review

In Oxman model of recognition in visual emergence it allocates visual cognition in the highest level of cognition in visual emergence (Figure 5). As she defines her final statement “It distinguishes perceptual events from mental imagery and high-level cognitive processes. It became clear from the case studies that such distinctions are justified by their ability to support a rich cognitive model of emergence. In fact, in the complex configurative world of architecture from which we have drawn the case studies, it does not appear possible for emergence to occur without distinguishing such perceptual-cognitive mechanisms. It therefore appears that these conceptual distinctions regarding visual reasoning in emergence may have some general relevance for visual reasoning. Grammars have enabled us to symbolize and to clarify these important distinctions as classes of transformation. As such, they have proved to be a unique research tool in modeling visual reasoning.” (Oxman, 2002). This hierarchy of cognition and recognition in visual design process evidently requires more accurate definition in visual cognition part. The highest visual cognitive level happens via computer processing, where she states thinking through images. In explained architecture instances, the Oxman model is practical for simple shape emergent based on specific semantics, but The reciprocating direction of this process, outputs random shape results (in re-cognitive part of process) that a high percentage of final outputs are not so relevant to designer aims in complex sculpture compilations, where by the shape has complex syntax.

1/An image schema is a recurring dynamic pattern of our perceptual interactions and motor programs that gives coherence and structure to our experience….Experience is to be understood in a very rich, broad sense as including basic perceptual, motor-program, emotional, historical, social and linguistic dimensions. (Johnson M. , 1987)
2/Mental imagery (varieties of which are sometimes colloquially refered to as “visualizing,” “seeing in the mind’s eye,” “hearing in the head,” “imagining the feel of,” etc.) is quasi-perceptual experience; it resembles perceptual experience, but occurs in the absence of the appropriate external stimuli. (Thomas, 2014)

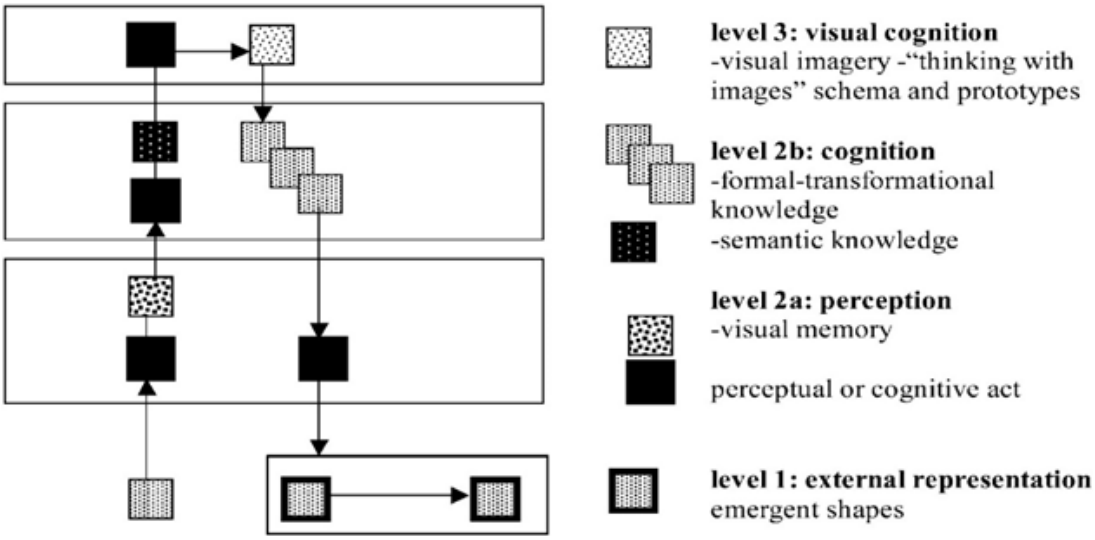


Figure 5 Re-cognition in visual emergence (Oxman, 2002)

Dreamcatcher is a generative design system that enables designers to craft a definition of their design problem through goals and constraints. This information is used to synthesize alternative design solutions that meet the objectives. Designers are able to explore trade-offs between many alternative approaches and select design solutions for manufacture. Recent advancements in artificial intelligence and the simulation of complex phenomena have enabled software to play an active, participatory role in the invention of form. Project Dreamcatcher is an experimental design platform with focused research probes into generative design systems (Autodesk, 2017).
Explore: After a number of solutions have been computationally generated from a problem definition, the Dreamcatcher design explorer presents to the user a set of possible solutions and their associated solution

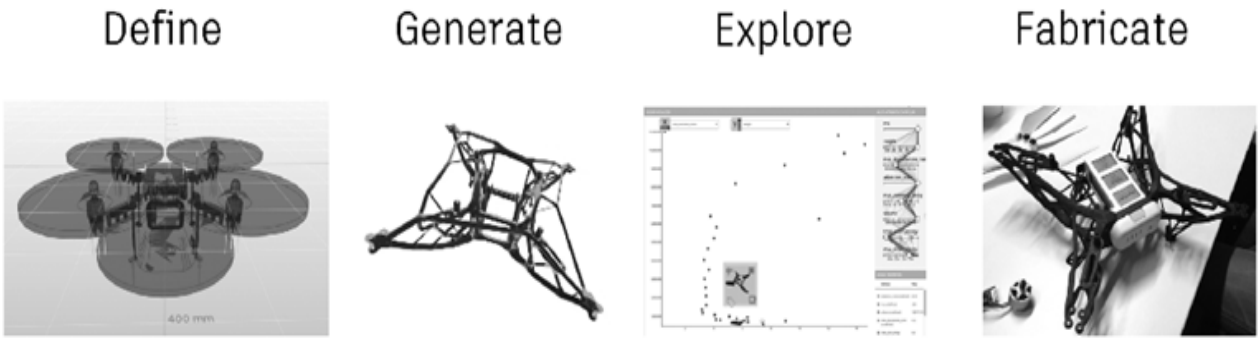


Figure 6 The workflow of dreamcatcher explained in Autodesk (Autodesk, 2017)

Dreamcatcher workflow approves the role of cognition in cyclical process in generation part and after while exploration. W
Generate: The Dreamcatcher team is developing several, purpose-built design synthesis methods that algorithmically generate designs of different types from a broad set of input criteria. Synthesis objectives include structural, thermal and fluid physical requirements. Dreamcatcher's design synthesis methods compete against each-other to solve problems most effectively through Dreamcatcher's high-performance computing servers. A focused research effort into incorporating manufacturing constraints for various methods of fabrication are incorporated into the design synthesis process itself, so that only manufacturable designs are returned to the design team. The Dreamcatcher system enables designers to truly leverage an emerging class of manufacturing tools that release designers from hundreds of years of predicating design decisions on tool based constraints (Autodesk, 2017). So it is explained in Autodesk dreamcatcher is mostly approached to meat manufacturing goals. Design computational goals that are mostly based on visual constraints seems to be left on the back of engineering generation.

strategies. This user interface provides a sense of the shape of the valid design space and variable interactions. It also assists users in building a mental model of which alternatives are high performing relative to all others in the set. Once the solution has been adequately explored, the designer can modify the problem definition to iteratively generate more relevant solutions. (Autodesk, 2017). This is the most admirable part of dreamcatcher where using machine learning technologies system uses designer's cognitive elaboration to regenerate new solution.

8. Discussion

Comparing Oxman re-cognitive model and Autodesk dreamcatcher project gives a bright statement of cognitive CAD system. In an analogy of Oxman recognition model and Autodesk dreamcatcher and based on Nick Bostrom (Nick Bostrom, 2009) definition of cognition we can see how dreamcatcher comes in the middle and boost designer's problem solving potency of mechanical production and fabrication (Figure 7).

Recognition or using mental imagery, thinking with images and in prototypes for generating series of shapes which is being used in variety of software assistants such as Rhino Grasshopper, Revit Dynamo and in an upper level Dreamcatcher, however it is a great cognitive approach toward future in human computer interaction in shape emergence but still lacks in covering complex more art relevant shape emergence fields. Shape emergence in art related fields needs applying more visual constraints in re-cognition part. What if a designer wants to create product shape which is more Italian style like and less German or less American or either to be more classic or modern in any defined context? What if an artist aims to create a form or shape which is something between human and beetle style?

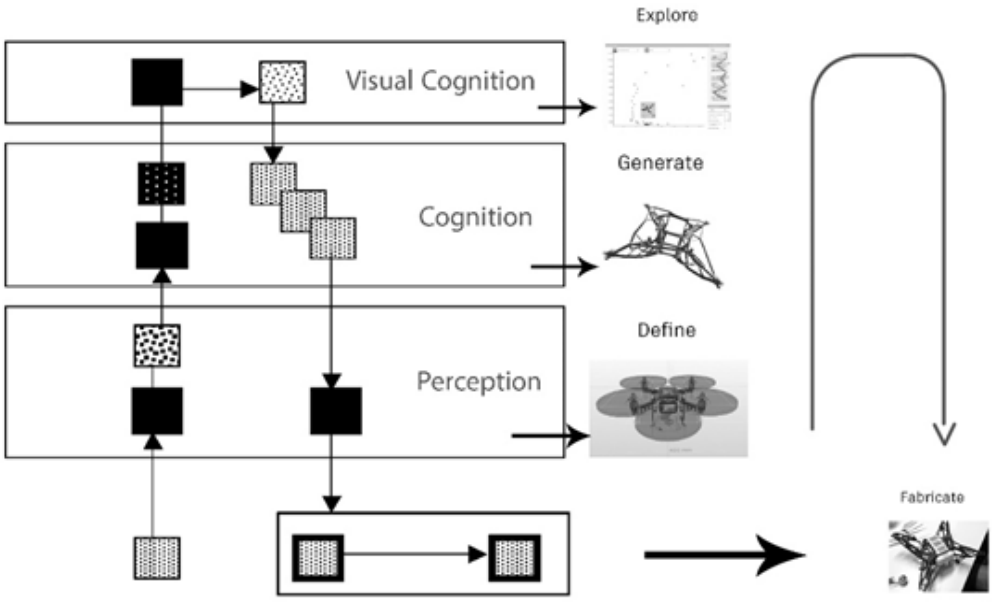


Figure 7 Analogy of Oxman theory and dreamcatcher project

Therefor considering Oxman and Dreamcatcher, following model of cognitive shape emergence based on applying image morphology[3] on combination of two 3D base patterns is suggested. In the presented model aim is to give 3D researcher (can be an architect product designer or any other shape design relevant field or even a computational artist) potential to design series of desired shapes based on morphing two categories of targeted shapes (Figure 8).

In the middle column of figure 8, morphologic compilation defines new compiled visual perception based on the designer's semantics of the desired shape and the visual imagery resulted from each of two categories in visual cognition level. Then the morphologic formal transformational knowledge defines the geometry of targeted shapes. In the last step before generating the final representation, the perceptual and semantic acts sift the most compatible shape for emergent.

3/ Morphology is a broad set of image processing operations that process images based on shapes.

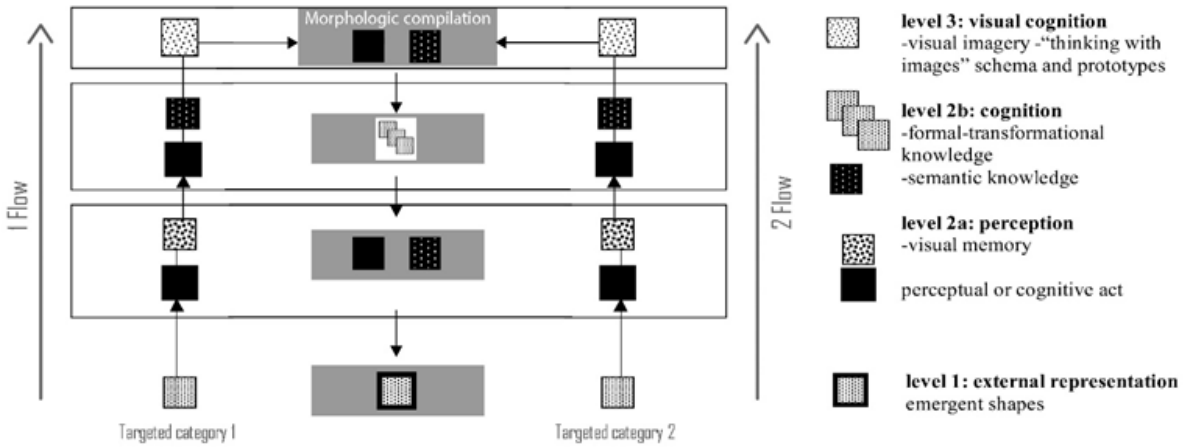


Figure 8 Cognitive re-generation based on morphologic transformation

9. Conclusion

The presented technologies and platforms in cognitive design emergence are still in progress to understand human situation and communicate in the most efficient way. There is still more and more cognitive process demanded to make a responsive design emergence computational platform which responds effectively to the needs and visual questions of the designer or artist. The platform has to be able to think and suggest in primary levels instead of the designer and the designer should be involved only on taking the fundamental decisions in the visual part of design process. The presented research suggests image(shape) morphologic compilation as solution for presented design issue in HCI. Of course the geometric potential of each category(fugure8) has to be investigated to translate in to a parametric base, regarding more effective morphologic compilation.

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3D printed joints and PVC pipes for a diagrid structure

Gerdi Papa [1]
1. Polis University, Albania

3D printing has been projected for long to disrupt the current practice of the industry. Yet, in the field of architectural design, its application has been mostly limited to a way of representing scale models. 3D printing has allowed normal users to design and build parts on their own, bypassing the traditional factory and creating a human friendly alternative to it for the traditional factory to spread out, the possibility of everyone using 3D printing for their own projects becomes even more interesting. In this way, designers take advantage of the potentials of an integrated digital chain, from complex geometry parametric modeling, to structural optimization and automated manufacturing. This paper presents results of an ongoing research on 3D printing application of joinery elements for a 1:1 prototype assembly. The structure of the prototype will represent a diagrid structure. Diagrids offer high performance due to their stability, high material-efficiency as well as structural complexity. As the joints would require to be unique, 3D printing offer a solution at a reasonable price. Our solution aims at improving flexibility in design, ease of assembly, and as aesthetic appearance. The research is based on 1 built full-scale project as well as 3 study models that followed the same methods but were limited to scaled study models. The paper discusses methodology, results and a discussion.

keywords: 3D printing, diagrid structure, PVC pipes, parametric design

1. Introduction

Current industry practices in manufacturing have seen a disruption with the emergence of 3D printers. Similar to how laser jet printers revolutionized the press, 3D printers are revolutionizing manufacturing. (Anderson, 2012) Yet, in the field of architectural design, its application has been mostly limited to a way of representing scale models (Raspall, Amtsberg, & Banon, 2018). As the 3D printing technologies have become increasingly faster, better, cheaper and more available, its applications have not yet been completely explored. 3D printing has allowed the casual users to design and build parts on their own, bypassing the traditional factory and creating a human friendly alternative to it. The traditional factory spreads out with the possibility of everyone using 3D printing for their own projects becoming even more real and interesting. The automotive and aerospace industries are increasingly driving the development of production-grade 3D-printing technologies to manufacture functional structural components for their own design. In this way, designers take advantage of the potentials of an integrated digital chain, from complex geometries and parametric modeling, to structural optimization and automated manufacturing. There is a lot of potential coming from the construction sector as well recent applications of similar technologies. Academic research has stressed before on the opportunities provided by 3D printing (Mueller, 2016). This paper presents results of an ongoing research on 3D printing application of joinery elements for a 1:1 prototype assembly. The structure of the prototype will represent a diagrid structure. Diagrids offer high performance due to their stability, high material-efficiency as well as structural complexity. As the joints would require to be unique, 3D printing offer a solution at a reasonable price. Our solution aims at improving flexibility in design, ease of assembly, and as aesthetic appearance. The research is based on 1 built full-scale project as well as 3 study models that followed the same methods but were limited to scaled study models. The paper discusses methodology, results and offers a discussion.

2. Methods

The research aims to cover the processes of designing and manufacturing a diagrid structure that uses 3D printed joints as connectors. Therefore the methodology will cover the following steps: (1) survey and development of digital design tools (2) selection and implementation of additive manufacturing methods as well as materials to be used and (3) development of assembly process. As the scaled models do not deal with 3D printing part, they serve as study models of the process itself. These steps conclude with a 1:1 proof of concept prototype.

3. Digital Tools

Diagrids are structural systems consisting of diamond shaped modules where lateral stiffness is more provided than in conventional structures. In recent years diagrids have grown in popularity due to the offered structural flexibility and elegance. The main distinguishing characteristics is that vertical columns at the periphery are eliminated in diagrid structures. Due to the triangulated configuration forming in the diagrid structural system as a result of the modules, loads such as gravity or lateral are carried and distributed in a uniform and regular pattern. In addition, by using diagonals, less amount of material is used. Also, due to the elimination of columns, much more space is available that allows for more flexibility in the structure (Khan & Shinde, 2015). Applications of diagrid structures in their most advanced forms would require anything but standard joints. As a response this research aims to improve the design flexibility, performance, aesthetic appearance as well as ease of assembly by using 3D printed joints. The design processes focuses on two main scales: the design of the diagrid structure and the design of the joints. The software selected for this task, like Rhinoceros 3D and Grasshopper (along with plugins) allow working on multiple scales on a single platform. Due to the fact that diagrid structures do not have to follow a strict pattern and size, software such as Rhinoceros allows for an ease of control of complex geometries, while Grasshopper allows for exploration and optimization.
As 3D printing removes the necessity of using standard parts, the economic benefit of repetitive patterns are reduced. Furthermore, as the resulting diagrid would be anything but standard, the joints themselves can become guides in the assembly process. The primary solution was to design a parametric model of the final prototype, one that can be easily edited in order to accommodate different constraints, such as material of the structure, size of printable objects etc. Having a well set up parametric model in grasshopper, allows for many different parts to be adaptable and interchangeable to factors such as design or materials to be used (and their parameters) (Figure 1).

Figure 1 Parametric models for the diagrid structure and the joint generation

At the joint level the research focused on automating the creation of the joints directly from the geometry of the parametric model and by using parametric modeling techniques. The intention was to create a joint design that facilitates ease of assembly as well as informs the assembly process. All joints need to be friction based as to allow for disassembly. Additionally the nodes are tagged as soon as they are printed in order to know their position in the overall structure and facilitate the final assembly process.

4. Selection of material to be used

Plastic constitutes of one of the most problematic threats to our environment. The production of a plastic bag, requires crude oil not only as the raw material but the same quantity of oil to produce the energy needed for the manufacture of the bag. It is estimated that one kilogram of CO2is emitted in the air for the production of just five average plastic bags. We could potentially save almost half of that amount if we were to start recycling waste instead burning it or locking it away (Hebbel, Winsleska, & Heisel, 2015). PVC tubes are a very common material used in constructions nowadays. They can range from different lengths, diameter and material thickness and the purpose of use can vary from simple electrical installations to large infrastructural projects. Their flexibility would allow for easy bending and shaping into a circular form. As a relatively cheap and easy to find, recyclable material, the choice fell on PVC pipes of a diameter of 44mm.

5. 3D Printing method selection

The premise of our research is that 3D printing technologies enable the manufacturing functional diagrid nodes. For this, a survey of the existing additive manufacturing processes (Yan & Gu, 1996), was conducted. A brief description of each method can be found below:

- SLS with PA nylon. This fabrication method has a very good resolution and maximum geometric freedom because of it being powder-base. The mechanical properties are adequate for the requirements of the projects where no live loads will be applied. The printing cost is comparatively low;
- Industrial grade FDM (Fused Filament Fabrication) with transparent ABS. The mechanical properties are very good and the resolution fair;
- Due to costs and availability, the use of entry level FDM machines such as Makerbot or the Lulzbot (Figure 2), were tested for functional architectural components in a project with a tight budget such as this one. The lower cost and availability encouraged its use. The creation of larger joints would then be a result of the machine capability to print larger objects. Printing speed in this case is quite slow.

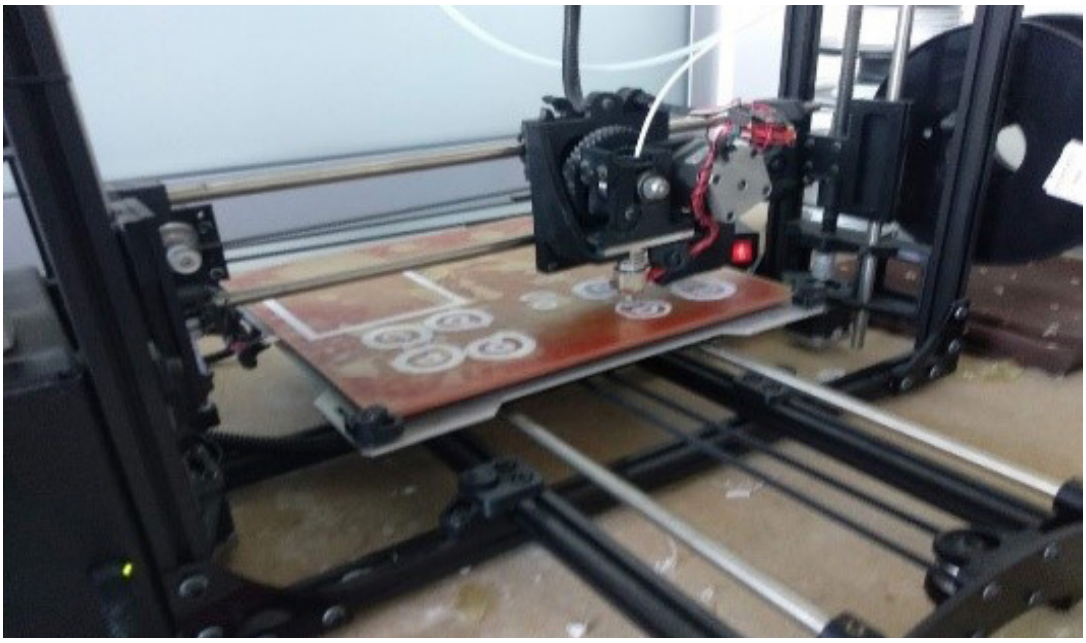

Figure 2 Lulzbot 3D printer, printing the first joints

6. Development of assembly process for complex space frame structures

The design generated by the parametric model in Rhinoceros and Grasshopper served as the input for the generation of the 3D-printable joints. The joints were generated based on the flattened drawing of the structure on the XY plane while always taking into account the bending and flexibility that the PVC pipes provided. The joints were tagged and each unique to the position. Either two pipes intersect, creating a double joint, or 3 pipes intersect in the cases where the joint also connect to the horizontal profiles (Figure 3). Some manual work was needed as the PVC pipes had to be tagged in order to understand their position. Each joint and PVC pipe had a unique tag in

order to always be recognizable in the structure itself. Furthermore no fasteners would be used throughout the assembly in order to allow for disassembly and re-use. The assembly processes needs to be friction based in order to allow the structure to be easily disassembled, without any of the PVC pipes or nodes damaged. The horizontal profiles in this case also play the role of primary guides. Although the diagrid structure does not follow a regular shape, the horizontal profiles are still circles, which were created through flexible PVC pipes. For this reason, the horizontal circles are marked with the position of each joint, and pre-assembled (Figure 4). The final structure is assembled by laying out the horizontal profiles first and following the numbered sequence of assembly of each PVC pipe. This allows for an informed assembly that guides the user to the finished product. No special tools are required during the assembly. Due to the scale and weight of the structure, the assembly can be easily done by 2-3 people. The lack of fixings allows adjustments to be made during the whole assembly process

Figure 3 Some of the types of joints 3D printed for the final prototype. All are friction based and are unique in terms of their position in space and connection angles. Photo: Sara Codarin | Pre prepared horizontal profiles with joints to ease assembly

7. Results

The ideas were tested during a weekend long workshop. During the workshop, participant groups, (3 groups of 4 people each) used the parametric models created in order to design and generate designs. The provided parametric model generated the joints based on those designs. These were proposed and developed in order to test the steps mentioned during the method in different scenarios and designs. Below the scaled models are briefly presented. The 1:1 prototype on the other hand is real focus of this part.

8. Scaled Models

Workshop participants produced their own designs based on the parametric model provided (and used for the 1:1 prototype). This allowed them to explore possible design solutions while constantly receiving feedback on general design, amount of joints as well as scale of proposals. In order to create a more tangible application of these scaled models, participants were asked to use the same PVC pipes in the design but to use an alternative for the scaled models. Wooden dowels were used for this purpose. The process involved the participants generating their designs through Rhinoceros and Grasshopper. The assembly process for the scaled models involved printing sheets of 2D images of their designs flattened (Figure 5). These would become guides during the assembly processes of the models. Worth noting that due to time and machine constrains, participants did not 3D print the joints but used small connectors and printed information to create the models. The scaled models allowed them to understand how the assembly processes would work on a full prototype.
Proposals ranged in function and purpose and were left free to be decided by the intention of the group. This meant that even though they would build only the scaled models, full prototyped designs could be built if needed by following the same process (of the full prototype). Groups proposed a PVC structure that would wrap around a well-known local and work as a kind of protection (Figure 7) or that can be easily built for suburban bus stations (Figure 8). Another one abandoned the typical diagrid structure for a more space frame like structure in favor of proposing a pavilion (Figure 9). As the designed followed the same parametric model, all generated 3D digital nodes that could be printed and then easily assembled.

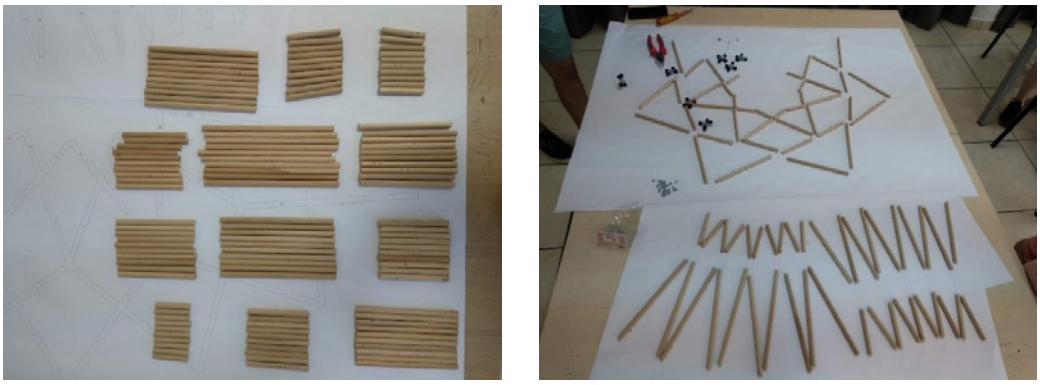

Figure 4 Scaled models being pre laid out before assembly

Figure 5 (a) Selvia area in Tirana with its iconic Cypress tree source: google maps (b) model built to be assembled around the tree, photo: author

Scaled models allowed for a test ride on the assembly processes while having the knowledge that the design could be easily prototyped at full scale using the same information from the same parametric model. While working with parametric models, the flexibility and feedback loop allows for more exploration during the design phase. Material of choice could be easily exchanged in the parametric model and the design would adapt to the new material. Joints are generated based on the design parameters so they would change in real time with the design.

Figure 6 The Cloud by Sou Fujimoto in front of the National Gallery of Tirana source: google maps (a) Model of the proposed Pavilion during the workshop (b) photo: author

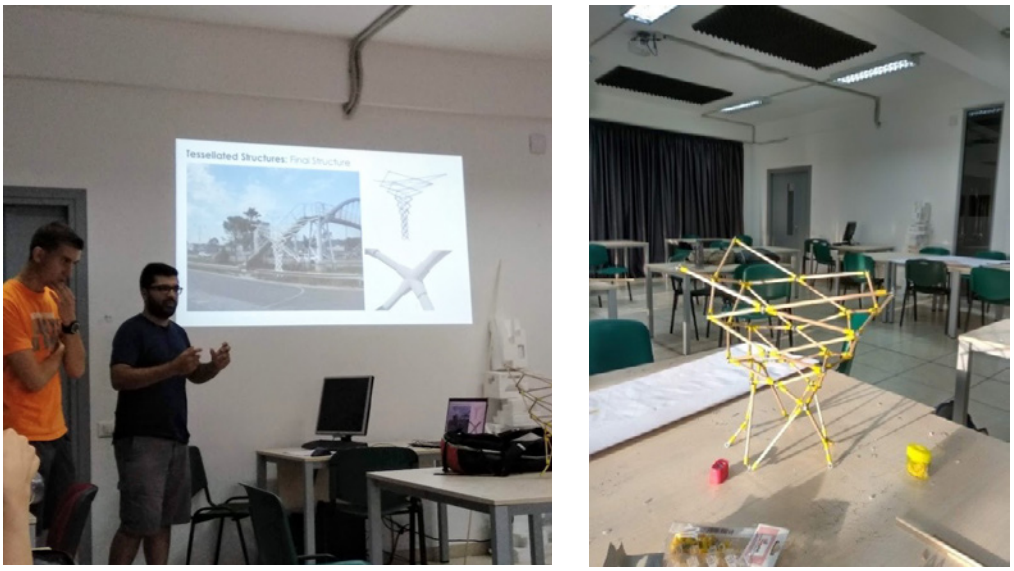

Figure 7 The bus station group during the final presentation of their proposal (a) Work in progress on their scaled model (b) photo: author

9. Prototype

The 1:1 scale prototype would act as a proof of concept. While the workshop participants worked on designing and building their models, part of the organizing team was working on tagging the elements by following the computer model and 3D printing the joints generated. Each joint generated through the parametric model was completely unique to its position. All joints where tagged and marked which in term also meant that all joints would be able to inform the assembly process. PVC pipes would be slid into the joints up until the marked position, alternating the direction of each PVC pipe during the assembly processes.
The process of assembly (Figure 9) starts with the first horizontal profile which was used as a guide and starting point. All joints connected to the base could be joined with the ends of the PVC pipes easily. The joints were precisely generated to fit the parameters of the PVC pipes. There is some difficulty due to very little tolerance from the joints themselves but the friction helps them not slide out of place after the assembly. All the assembly is done on site, without the use of any specialized tools. Due to the height of the structure (4.2m) a stair is needed in order to finish assembling the top part. The assembly process in itself proves to be low effort in terms of time (the structure is assembled in 2 hours), manual work and number of people working on the assembly (3 people at a time). After each joint and member is in position and the structure has been fully assembled, zip ties are used in order to fix the joints in place as they are fast, easy to use and easy to remove. In total the structure used 6 green PVC flexible pipes (2 for each horizontal profile) and 24 PVC pipes about 70m/l. In total 48 joints were 3D printed for this prototype. As the nodes of the structure are all friction based, disassembly becomes just a trivial process that takes 10 minutes. This process leaves the PVC pipes undamaged, which means they can either be re-used or recycled.

10. Observations

Generating designs that are highly customizable has already proved to be easier and faster with digital technologies. The ability to generate designs through a simple control of parameters can be a very effective way to offer non repeatable and unique solutions. Joining this ability with fast prototyping techniques such as 3D printing proves a very interesting possibility. As freeform digital models that can present complex forms are harder to manage in real life, parts or components of the digital transformed into physicals to inform the assembly and become connectors. Furthermore it is possible to replicate this process with different results as shown in the scaled models with its ability to be disassembled becoming a very interesting factor. In this case the diagram below show how different parts of the project are interconnected and all working on 3 different levels, that of the user, the material and the computation or digital design. As the parts are left undamaged, disassembly could potentially re-introduce all these materials to another similar process. PVC pipes could be re-used as members of another structure while the joints themselves, being in plastic, can be recycled and turned back into filament so they can be reprinted. The variety of presented projects demonstrate the how 3D-printing can improve their aesthetic expression and expand the design possibilities while informing the process itself. The used PVC standard pipes on the other hand also raise interesting questions. As recyclable and easily found, a collection of pipes could even include different shapes and sizes. Computation and the 3D printed joints in this case would become the link that can generate designs out of this new information. Especially dealing with non-standard recovered materials could become much easier with 3D printing.

Figure 8 Assembly process of the PVC pipe structure and details photos: author and Sara Codarin

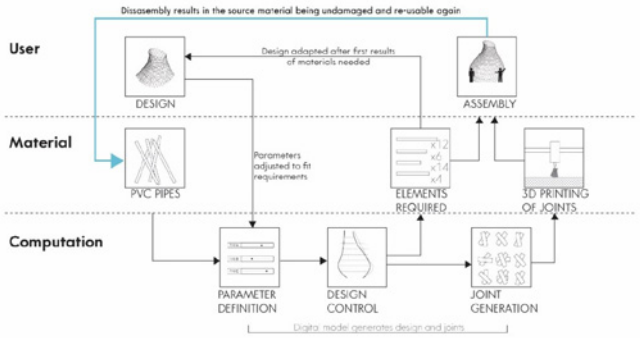

Figure 9 Diagram showing the design and manufacture workflow, source: author

11. Acknowledgments

I would like to thank Dr. James Stevens (LTU), Dr. Sara Codarin (Universita di Ferrara), Chris Westerlund (LTU) and Asdren Sela (Polis) for their collaboration and work during this workshop. Their insights in organization and work during the class and during the assembly process was invaluable. Gratitude also goes to students of Lawrance Tech (USA) and Polis University (AL) for their work during the workshop.

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Innovative Processes: Environment

[IP:C/01]

RISK ANALYSIS AND ALTERNATIVES OF PROTECTION FROM VJOSA RIVER FLOOD.

Prof.Dr. Sherif Lushaj[1], Dr. Artan Kacani[2]
Department of Environment, POLIS University, Tiranë, Albania

Vjosa is one of the country's major rivers, with a length of 272 km and with the surface of watershed 6700 km2 (of which 4365 km2 within the territory of the country) and an average altitude of 855 m (Albanian Encyclopaedia Dictionary, 1985). The two main branches of Vjosa are Shushica and Drino. Upstream from the state border to Dragot is characterized as a narrow erosive-tectonic valley. In the river middle of Dragot-Pocem stream, the valley extends to 1-2 km with erosive character going downstream Pocem-Rivermouth to the river flow.
In the last 30 km (Mifol-rivermouth) the Vjosa basine expands and turns into a completely plain river. Here it's possible to identify the major problems of land flooding, river erosion, damage to engineering structures and embankments, massive exploitation for over 30 years, and the intensification of coastal erosion which changed the river delta position - and as a result a disruption of ecological and morphological balances. Multi-years data showed that up to 22,000 ha of land has been inundated, with an average duration of 20 days and maximum floods of up to 5500 m3/sec.
The most critical flood points identified are: the Mifol-Novosele segment, Frakull, Cakran, Bishan, Poro, Akerni, Darezeze, the confluence point of the river with Shushica: Lakatund, Lubonja, Kota, while in Dropull: the Dropull plain, Gjirokastra, Dervican, Vrisera etc.
This article, features Vjosa River and major breach, dimensions, distribution, flood zones and flood points, water residence time, environmental and economic impacts of flooding, analysis of causes such as low-scale drainage network operation, damage to river protection structures such as embankments and panels, wrong investments, untimely exploitation of river gravel, consequences of coastal erosion and delta change as well as flood rehabilitation measures and flood protection.

keywords: river, floods, river protection, river morphology, river embankments, river row materials,

1. Watershed characteristics and features.

The Vjosa watershed included an area of economic, tourist and valuable natural resources, containing approximately 560 settlements as part of the Gjirokastra district and parts of Fier, Mallakastra, Vlora Municipality downstream of the river. Only upstream, where the district of Gjirokastra lies, with a population of about 61423 inhabitants (Instat, 2019) are included 7 municipalities (Gjirokastra, Libohova, Dropull, Tepelena, Përmet, Memaliaj, Kelcyra) with an area of 2280 km² with 45000 ha of agricultural land, 85000 ha of forest, 95000 ha of pasture.

The municipality of Selenica is in Vlora District, including the town of Selenica and the villages of the Vlora River, located linearly on both sides of the Shushica River (Vjosa breach), with a population around 18500 inhabitants with high economic potentialities on tourism, but still with poor infrastructure and high emigration. The main activities of the population in the watershed are agriculture, livestock farming, businesses, medicinal plants, services, family and mountain tourism, culinary and cultural. It is rich in natural and cultural heritage, thermal baths and food industry, about 25% of the villages declared in the 100 tourist villages of the country are in the territory of this watershed.

The Vjosa Valley is important part for development of agricultural potentialities, from the Permet valley with agricultural lands suitable for vineyard and pergola, fruit trees, vegetables and other agricultural crops. The Tepelena field of Memaliaj to the Qesarat, the hilly area of Mallakastra is cultivated with olives trees, vineyards and fruit trees, which continues in Cakran-Frakull-Levan-Bishan-Novolese administrative units, with

high potentialities on agricultural areas. The area of Dropull with about 5600 ha is one of the most important agricultural areas in the country and with high production capacity. Another field is created in the watershed Shushica River, from the village of Gjorm and expands into the potential agricultural field of Llakatund and the field area until the Shushica out flow into Vjosa. Vjosa is also known for its fish production and its branches.

In the Vjosa River, water reserves are provided 70% by surface water reserves and 30% by groundwater resources. The average minimum flows perennial vary to 190 m³ / sec and the extreme maximum flows to 5500 m3 / sec. The region where Vjosa crosses is geologically complex, as it passes through 7 tectonic structures of the Ionian zone, tectonic faults in the form of slides and overflows. Vjosa and its two main breach (Shushica and Drinos) pass through many formations of different periods as dominant lime stones, flysch, Shushica valley from siliceous carbonates, clay and sand deposits. The Drinos basin is formed by flysch and carbonate formations, alluvial deposits in the Dropull Plain

In the last river bottom flow of the Vjosa to the river mouth sandy and marine deposits are found. Sandy and marshy. On both sides of the delta parallel to the shore line are sand dunes at a height of 3-4 m and widths of up to 300 m with high values for protection of the coast from erosion. In areas where coastal erosion is intensified by sea waves and wind, or deforested segments of the coast, dunes have been damaged and coastline dynamics have changed. Vjosa valley, based on geomorphologic characteristics, is divided into three parts:

(i) Upper stream: start from the entrance to the State border - Kelcyra-Dragot, characterized as eroded area, with steep slopes, with streams transporting to the shores of Vjosa and have formed, erosive-accumulative terraces rivers.

(ii) Middle stream: Dragot-Pocem, where the Vjosa valley has erosive and partially erosive-tectonic character,

(iii) Downstream from Pocem to the river mouth, characterized by extension across the riverbed, numerous meanders are created that condition the concentration of inertia and the intensity of floods higher than the upper and middle stream.

The **Shushica branch** emanation fromo the Kuc village of Vlora, passing through the Shushica valley about 82 km long, the watershed elevation 540 m above sea level, and the area watershed 715 km². In the watershed, the composition of the formations is dominated by carbonate rocks. Shushica has high inflows during winter and very low water reserves during summer. The riverbed consists of carbonate rock. ***The Drino River*** is the second main river branch, originating from Greece; with a basin area of 1324 km² collects the waters of the short rivers and mountain streams of Suha and Kardhiqi (basin area of 445 km²). Drinos passes through the Drinos valley 60 km long and extends the Dropull Plain. Formations are formed from carbonate material. From the Drinos basin, the waters pass through the limestone massiv of Greater Mountain (Mali Gjere) to the Blue Eye source, in Bistrica, and to the formation of other sources outside the basin.

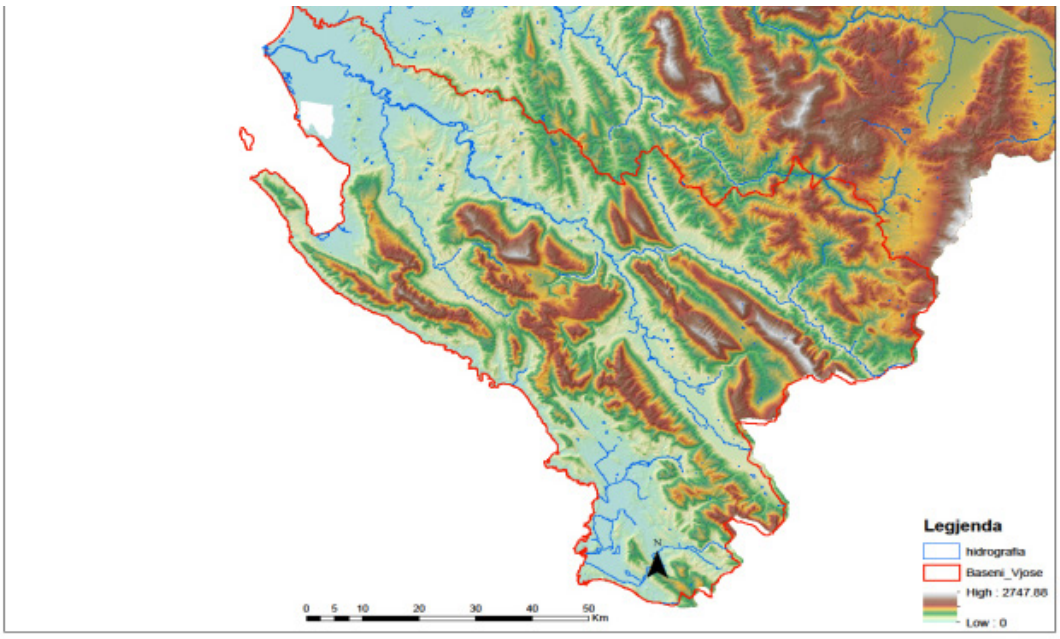

Fig. 1 Vjosa watershed River relief and Shushica, Drinos breachs

2. Methodology

The data were obtained from previous studies conducted by the author 2000-2005, study and field surveys for flooding from 2012, 2017 onwards, as well as historical flood data caused by the Vjosa River at all lengths, but especially in the downstream to the river mouth, where the river turns completely flat and high sand content and highly prone to erosion. For this purpose, the research points the critical flood levels, the status of the protective structures, the intensity of river gravel exploitation, the erosion action of the riverbanks, the impacts of delta and coastline changes, the study of soil characteristics and types, through analysis of soil and river water samples. Also in the segment from Mifol bridge to the river mouth, besides identified problems, the plan of protection of the river was also drafted, to reduce the degradation phenomena (construction and repair of damaged river panel, reforestation of bare river banks, rehabilitation of the river embankments, forestation of sediment deposition sites to reduce erosion and flooding.

3. Results Of The Study

3.1 Problem Identification.

The flooding is one of the problems that caused many times by the Vjosa River with varying intensity by years and extreme events in particular years, depending on the amount of rainfall, water flows from the river water supply systems, the manner and intensity of exploitation of river gravel, state of river protection structures, forest cover of the banks and level of watershed management. During high floods, the Vjosa River comes out of bed and floods the lands, mainly in the municipalities of Fier, Vlora, Selenice, Dropull. The floods with Vjosa coming out of bed belong to the years 1937, 1956, 1962-1963, 1968, 1970-1971, 1980-1981, 1983, 1996, 1998, 2005, 2010, 2015, 2017 and March 2018. To be distinguished as the largest floods in the last 60 years, which have affected the entire territory of the country and the Vjosa River, have caused severe damage to agricultural production and protective infrastructure, loss of life and livestock are marked in the period: November 16, 1962 and January 13, 1963, from December 31, 1970 - January 1, 1971, from September 24-29, 2002, December 2010 - January 2011, January 31-February 5, 2015.

3.2 Last Studies

Flooding is a global phenomenon. Ut to 5 million people in the UK is at risk from river and coastal fludings. Significant river floods in the UK over the years have encouraged a substantial programme of building flood defenses (Fleming G, 2002)

The 1962-1963 flood (November 16, 1962 and January 13, 1963) affected the entire territory of the country and the Vjosa watershed, with a high rainfall of 92 mm (November 15-18) which was classified as devastating and the highest level of Vjosa level was 85 cm above the designated level.

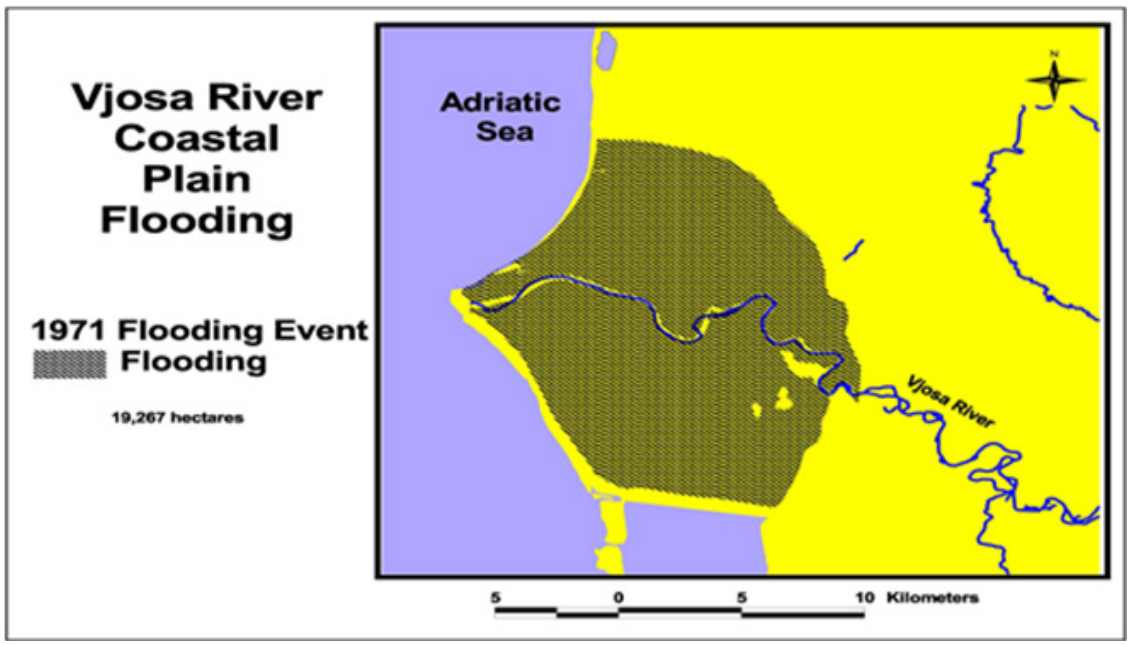

Fig. 2 Vjosa, Flood, 1971

Only from the Vjosa 22,000 hectares of agricultural land were flooded, with an average time of 20 days and with an extreme maximum flow of 5500 m³ / secont of the river in the plain. All the embankments of the river protection in the plain were damaged.

The highest floods were recorded between December 31, 1970 - January 1, 1971, the Vjosa River level reached 1.2 m above the critical level of water coming out of the bed, a situation repeated every 50 years. From 31.12,1970 to 1.01.1971 in the Vjosa Watershed included (Gjirokastra, Permeti, Tepelena) the amount of rainfall was respectively 405 mm, 244 mm and 221 mm. The Vjosa flooded only in Vlora district around 21000 ha of agricultural land.Also in Gjirokaster, Tepelene and Fier Vjosa flooded (the whole valley of Vjosa, Levan-Hoxhare area), Vlora (Novosele, Selenica and Lakatundi plain) Dropull field and water stand for 10-30 days. In this flood, damaged embankments, bridges, pumping stations, protection structure and agricultural products, with thousands of drowned livestock and some drowned people. Damages were the same on 9000 ha of agricultural land in Fieri. The level of the Vjosa in the Mifoli bridge reached 0.94 m above the critical flood point. In the Martin (Fier) irrigation canal, supplied by the Vjosa-Levan-Fier canal (which also performs the embankment function), 2000 hectares were flooded, of which 700 hectares in the Hambar-Kafaraj area (Mecaj N, 2003).

After 1990, as a result of the intensive exploitation and without criteria of gravel river, according to monitoring in Vjosa River 2003-2004, there has been the collapse of riverbanks, damaging the embankments in 35 % of total, the hydro-technical regime of river water flow has been destroyed, ruining the functioning of the190 transverse panels out from 300 built in the riverbed and destroyed 5000 ml longitudinal panels on the river bed. The exploitation of gravelriver in the depths of the riverbed has also destroyed the irrigation and drainage works such as water pumps in Rrogozhine, bridges, creating pits at the bottom of the river, and sediments replenish the holes without being transported to the rivermouth (Sh. Lushaj, P.Laze, V. Kovaci ect, 2003- 2004). Also flood points have been added.

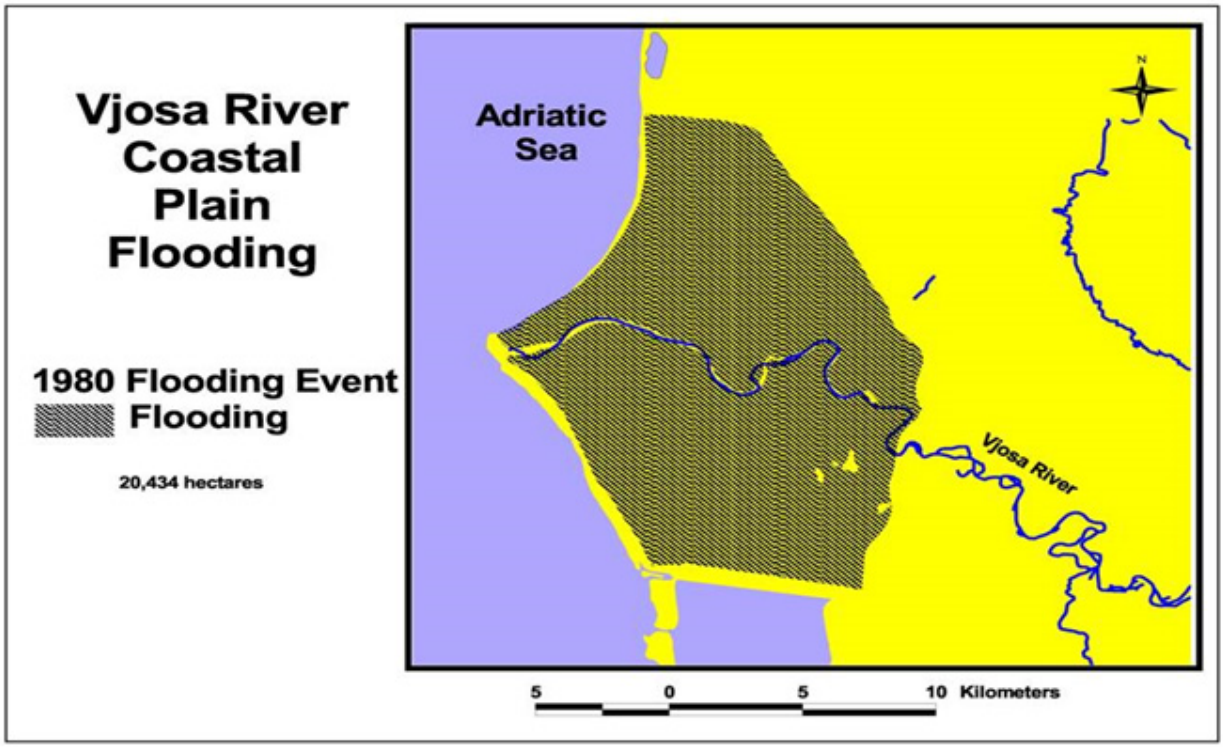

Fig. 3 Vjosa flood, 1980

The flood December 2010 - January 2011 affected Novosela, flooding the field lands, livestock, destroyed houses, planted lands, embankments, and protection panels.

In 2015 (January 31-February 5) there were record water levels in the river, because of heavy rains, the Vjosa caused massive flooding in the Novosela (Vlora) area in the Fier Municipality from river mouth to Povelce (especially in Darezesa). The Vjosa level on February 1, 2015 reached the highest level 0.94 m above the critical level, that repeated once for every 75 years. In 2015 in Fier-Vlora were flooded about 10-12 thousand hectares of agricultural land and large urban and unproductive areas. The main flood points from Vjosa and the main breach (Shushica and Drinos) are: Mifol, Darezeza, Bishan, Poro, Fitore, Dellenje, Kamcisht, river mouth, Ferras, Martina, Bishani) from Vrisera to Jorgucat, Subashi bridge, Lazarat, Virua, Kardhiq at the point of Union of Shushica with Vjosa River,

Fig. 4 Flooding Vjosa, Mifol, 2015

Fig. 5 Flooding Vjosa in the rivermouth, 2015

in Lakatund, Lubonja etc. Damages by flooding: All agricultural production in the field, livestock death, flooding and damage to housing, embankment damage (Lushaj Sh, Muharremaj, Aliko N, 2015),.

During the Febrary-March **2017**, the flood was located in the Novosela-Levan-Cakran-Povelce area, Dropull, and Tepelena plain. From the study of the areas flooded by the Vjose River in 2015, (Lushaj, Sh, Muharremaj V, Aliko N 2017), (Lushaj Sh, Laze P, Kovaci V, 2003-2004), (Sh.Lushaj, Koloneci M, 2017) the main points of flooding recorded throughout the Vjosa and the main breach (Shushica and Drinos) are: a. In the river upstream there was limited surfaces flood. In the Drinos River floods are evidenced by Vrisera- in Jorgucat at gravel river points in Subashi Bridge, near the stream of Lazarati stream, Virua, Kardhiq, Vrisera Jorgucat. In the middle of the stream (Dragot-Pocem), the river banks are elevated and floods are restricted to the Tepelena plain. While down-stream (Pocem-rivermouth) is generally low in the plain area, floods are intense in high rainfall years. In this area, the critical points of flooding are: in the point of taking irrigation water in the Vjosa-Levan-Fier canal, Kamcisht and Mifol.

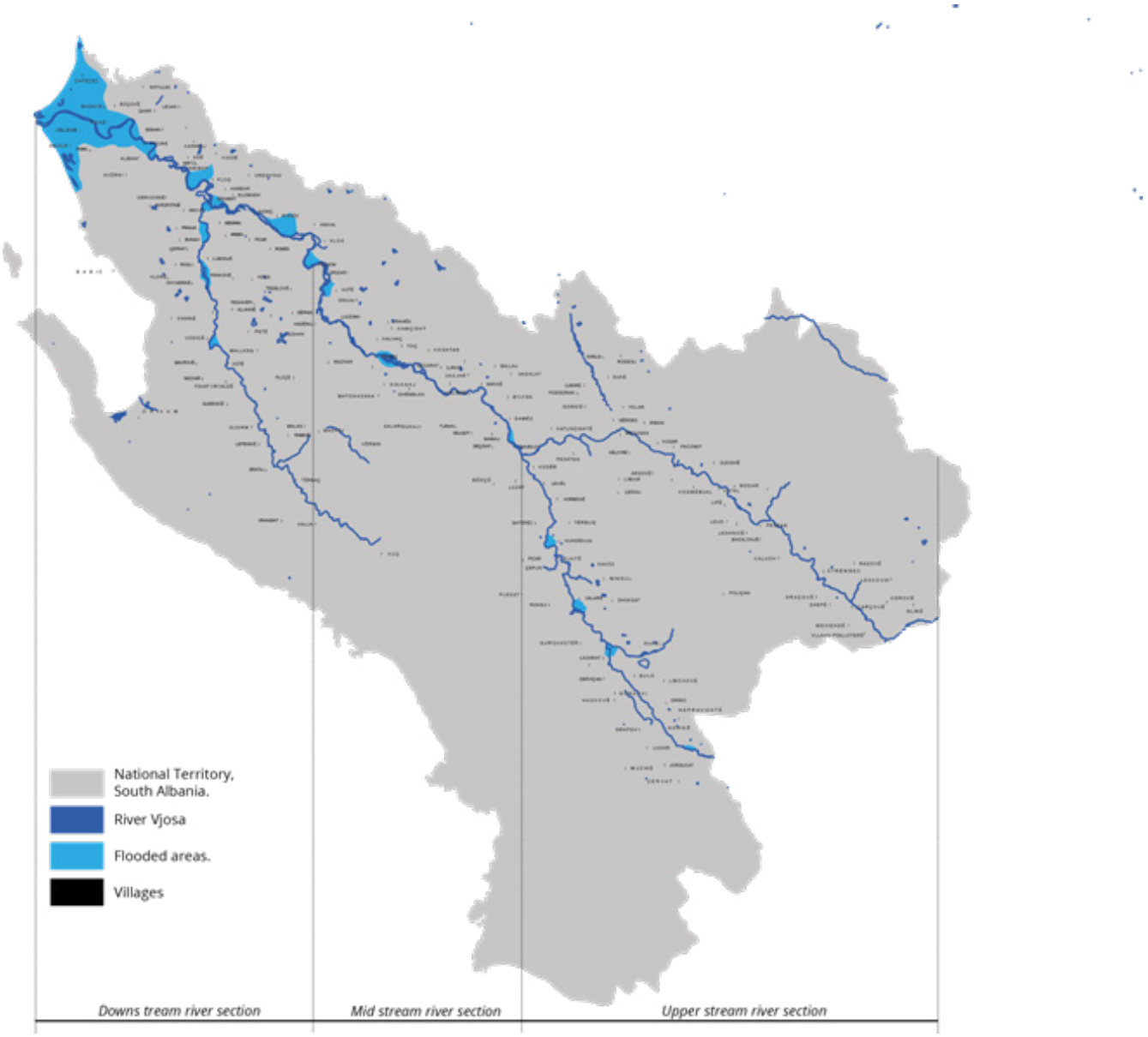

Fig. 6 Flooding maps in Vjosa, 2017

Intensive use of Gravel River: In the village of Mifol, damaged river banks have become flood plains. Starting from the Mifoli bridge to the rivermouth on both sides of the river, there are the villages of Vlora (Novosela, Bishan, Fitore, Dellenje, Poro, Akerni), and the Municipality of Fier (Ferras, Martina, Bishani, Darezeza, Povelce). Flood in

Fig. 7 Flooding maps in Vjosa, 2017

whenever the river gets out of bed (the Map Vjosa watershed flood, 2017)

While the Shushica breach, from the Peshkepi village (Vlora district), where the river is plain and low-lying, causes flooding at the point of Union of Shushica with the river Vjosa and in the plain of Lakatund and Lubonje.

4. Causes of floods

The floods from the Vjosa River caused as a result of geographical position, average altitude of 855 m, rainfall intensity of 1400-1500 mm per year (Pano N, 2008), at 80% of annual amount in November-March, damage to protective structures (longitudinal and transverse panels, embankments, land cover of the banks of the river 51 % (Lushaj Sh, Laze P, Kovaci V, etc. 2004), interventions and pressure on coastal area, through informal activities.

The coastal area is the most economically important and especially agricultural area, where lands with high production potentials are located in order to provide agricultural and livestock food products for the population, development of marine, cultural and natural tourism. The coastal Land there is at low levels, with considerable surface area below sea level. Such a situation dictates the need for the establishment of an infrastructure system to allow the flow and removal of river water flows as well as flood protection.

A rich surface and underground hydraulic system with high flows, where they lose the ability to carry water out of the bed causing flooding. In Vjosa the waters of two main breaches are discharged: Shushica and Drino. Vjosa collects the waters of the mountains streams and groundwater, Nemërcka, Lunxheri, Mali Gjere, Leskovik, Erseka, Dangëlli and Mallakastra. In the coastal plain area are collected the waters of Myzeqe of Vlora (Novosela area), Mallakastra (Hekal-Klos-Pocem) and Fier (Levan-Bishan-Frakull-Cakran), Selenica and Vlora administrive unit. From state border of vjosa entrance in Albania -to Dragot in Vjosa collect the water from the streams of Carshova, Langarica, Lemnica, Dishnica, as well as mountain streams of Gjere Mountain (mali Gjere) and other mountains.

From Dragoti, the riverbed widens, many narrow gorges are encountered, below the Pocem the Vjosa bed expands and the deposition of gravel and sandstones increases, but also dry streams, which during the winter cause floods such as the streams of Permet, Lazarat, Sotira, etc.

Lack of vegetation, acts directly on the areas of soil flooding and surface erosion. In high-density forest conditions, about 70-80% of rainfall is maintained by vegetation, limiting flooding and soil erosion. Studies carried out in our country (Kovaci V, Lushaj Sh, Dedaj K) show that soil loss from erosion in soils without vegetation is 4 times higher,

while in steep areas, soil loss from erosion is high. The deforested surface of the Vjosa River watershed ranges at 51%.

Exploitation without criteria and without study of gravel reserves in the riverbed, exploitation of identified floodplains zone, exploitation of gravel quantities higher than the volume of solid effluents, exploitation in areas prohibited. The manner of gravel river exploitation use in the Vjosa River in the last 30 years remains the main factor: (informal exploitation), use without complying with the terms of the permit (exploitation out zone), use of gravel river without conducting reserves studies (are exploited areas without potential reserves), exploitation outside technical conditions (excavation under water mirror as they are qualitative although excavation of river banks), exploitation near bridges and protective engineering structure (protective structures damaged by floods). The amount of inertia produced and transported to the rivermouth is less than the amount used material feeds.

Thus from the monitoring in Pocem (M. Cukalla and CO, 2003) and (C.A. Troendle, 2002) the solid bottom flow resulted in 476 thousand m3 / year, while the used materials 600 thousand m3 / year. The uncontrolled exploitation of river gravel has made the amount of gravel that going into the rivermouth unable to disperse inland. The shore remains under the tide of strong waves, water has no obstacles, the water level that erodes the shore increases The difference between the river gravel produced and transported in the Vjosa River occurs as the gravel fills the most typically used pits in the village of Mifol, where over 30 years numerous entities on both sides of the river (Mifol, Vlora) and Kamcisht (Fier), causing one massive erosion at a length of about 6 km on the riverbank. The uncontrolled exploitation of the inertia has caused the riverbanks to fall, hydrotechnical changes of the river, changes of the bed, changes of the rivermouth, changes of the coastline morphological, changes as well as the creation of flood points.One of the causes of flood is related to the bypass constructed in Levan (Levan-Gjirokastra highway) which impedes water circulation and diverts water movement inside agricultural lands as well as the urbanization level of agricultural lands and construction on drainage and irrigation system.

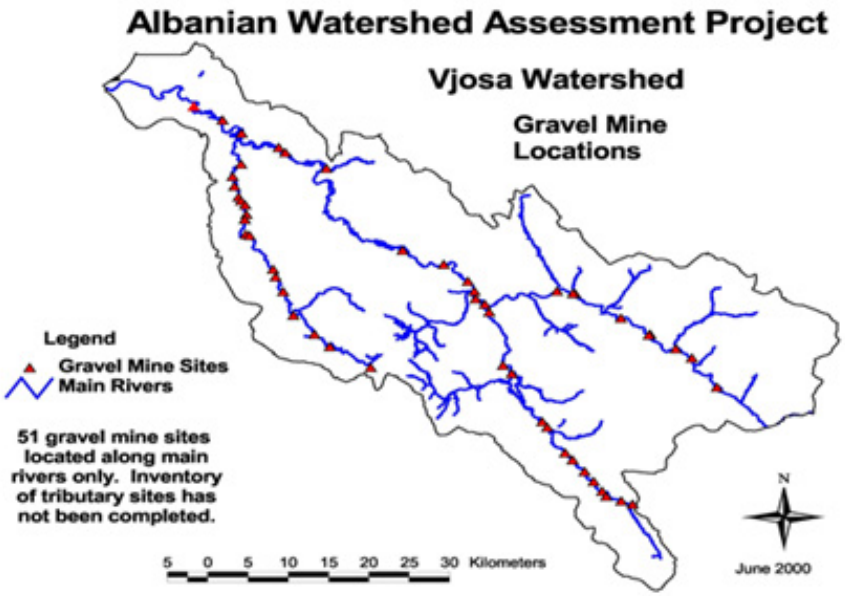

Fig. 8 Map soucers –Albanian Watershed Assessment Project

In 2006, the National Water Council issued a decree defining for each river the river segments allowed to be used for the period June 1-October 31, the rules of use and the restricted areas. The decision had positive impacts, but did not find proper implementation in some respects. The decision stipulates that the use of gravel materials is permitted only when specialized institutions (research and design) in the fields of hydraulics, hydrology, geology, soils, and environment have carried out studies. The decision generally had positive impacts. But in another decision of the National Water Council, no.2, dated 27.7.2012 - On an amendment to Decision no.1, dated 7.7.2011 "On the management of the use of gravel for road construction", in which it is decided that - for the purpose of building roads of national and regional importance, the use of river basins in any basin shall be permitted according to studies carried out by contracting firms and approved by the relevant catchment councils. This was a wrong decision that resulted in (i) the immediate and unauthorized use of millions of m3 river gravel environmental waste (ii) excluding the study from specialized Institutions under previous decisions; (iii) coordination between control institutions was excluded. This decision should be repealed.

5. Malfunction of drainage structures

The Vjosa rivermouth is often blocked by urban waste debris, soils, hay and has not transported sediments inland and dispersed for shore protection. This has caused the clogged gravel river to spill over into the riverbanks and to gravel beaches with clay. Beffore 1990 the river estuaries were continuously cleaned with drag, while after 1990 this process was interrupted. The drainage collector has not been cleaned at all for several years. The purpose of purification is to allow water flows to move freely and soils transported with water to penetrate deep into the water and disperse. Collectors, being untreated throughout the length and at the estuary, soils are blocked at the estuary and the waters flood the surrounding areas. The Novosola-Poro-Akroni-Aliban-Delisufaj area, reclaimed before and after 1970, has marshy origin and the soil has water-holding capabilities. Drainage of the Myzeqe Vlora massif to the left of the Vjosa River (Novosela and surrounding areas) of 5600 Ha is realized through two drainage schemes. The Akeria pumping station was built in the 1970s and drains an area of 4500 ha. Massive secondary channel system with a length of 120 km. The Selevec embankment, built in 1970-1973 with a length of 6.5 km and a height of 15 m, protects the land mass from the marshy waters of Narta. In general, the drainage system works partially due to the lack of drainage channels throughout the system.

Part of the drainage system functions is supplemented by the irrigation system. The source of irrigation water supply is the Vjosa River. The irrigation system of the Myzeqe Vlora massif provides an irrigation capability of 3500 ha from the Mifol pumping station, the 16 km long drainage channel. The Vjosa-Levan-Fier canal is used for irrigation of Fier lands. 80 km long canal system and third irrigation canal system. The main irrigation canal 16 km parallel to the Vjosa River also serves as embankment for flood protection. The second and third canals, after 1991, almost did not function for lack of pastrami. In this important agricultural area, a set of remedial measures should be implemented for drainage and irrigation such as: (i) rehabilitation of the second and third canals network (ii) rehabilitation of the artworks, (iii) cleaning of the Acrania collector.

5.1 Damage to river protection structures is another cause of flooding.

In 2003, from the monitoring of the protective structures of the river beds of the Vjosa Basin (Lushaj Sh, Laze P, Kovaci V, 2003-2004), it resulted that out of 300 panels, about 190 of them were out of function. From 180 km of embankments of the river, protecting agricultural lands and flood-prone areas, 75-80% of the length embankment crowns are lowered and cared for as a result of the uncritical use of inertia on the Vjosa river bed and its branches, which caused the fall of riverbanks all along the river, after 1990 river protection structure, irrigation pumping stations, embankments were damaged. The most severe damages were to embankments in Mifol, Drino-Odrie, Kuta, Hekal, Hambar, Kallm, Shushicë. Damage to embankments has caused not only flooding of agricultural land, but also of residential areas. One of the causes is related to the bypass constructed in Levan (Levan-Gjirokastra highway) which impedes water circulation and diverts water movement inside agricultural lands as well as the level of urbanization in the agricultural lands and constructions on drainage and irrigation system.

5.2 Insufficient investment in flood protection and solutions:

The floods from the Vjosa River are a recurring phenomenon. But the conceptual position of the institutional flood management of planners, environmentalists, and decision makers needs to change, as flooding continues to be treated as an emergency problem and solutions on long-term flood prevention should be addressed.

5.3 Change river mouth, coastal erosion and change coastline.

The coastal area along the Vjosa River till rivermouth has historically been relates with floods, coastal plain formation from deposited alluviums, erosion, environmental impacts, delta and coastline change, the relationships between erosion and accumulation . Within this dynamic there are causes, but also consequences, such are natural phenomena and human interference, mistake design and low investment. The Vjosa has changed the position of river mouth and coastal line some times. The position of the old Vjosa estuary in continuation of the existing bed in the village of Dellenja, has changed early along with the riverbed and has moved 4.7 km to north. In the old rivermouth, due to the lack of sediment and to the remains from the most eroded area, the sea has advanced towards the land. In 1986, the rivermouth of the river moved about 1.2 km to the south (Lushaj Sh, Alikaj N, 2000). In these conditions around the abandoned delta, in the absence of inert transport, coastal erosion phenomena intensified.

The coastline following the monitoring (Albanian Geological Service) in the period from 1986-2015 (monitoring 2015) the segment from the river mouth to the Water of sea port of Vlora of about 33.7 km results that: 11.7 km are affected by erosion phenomen and 22 km by accumulation . In this segment, the area around the river mouth (current river estuary) has intensive accumulation, around the old rivermouth of Vjosa-Kepi Dajlan there is intense erosion, because lack of gravel river on the coast). At Zverneci beach (in the developed part) some engineering measures need to be implemented. From the kampi pionereve to Uji Ftohte place, the accumulation phenomenon and surface area increase around 17.5 ha.

units of the Municipalities), the sewage is managed in septic tanks , but without standards, polluting the soil and endangering groundwater. Even in the rural area, mainly downstream of Vjosa, during floods, the sewage flows over the surface and circulates with water to the river and sea.

Sewage pollutes the water of the beaches of Vjosa river waters and marine waters. In all cases of flooding, sewage from the septic tanks circulates in surface waters, discharging heavy metals (toxic) into the environment, high concentrations of Coli, Salmonella, etc., very harmful to human health and aquatic life, epidemic and food safety risks from food products. (ii) Urban waste management in almost all of the Vjosa watershed is at a low level. In the towns of Gjirokastra, Dropull, Tepelena, Përmet, Memaliaj, Kelcyra and Libohova, administrative units are deposited about ¼ of the quantity urban waste. The waste is not separated at the source and at the disposal site almost all types are found (organic, inert, hospital, recyclable, plastic, glass, metal, wood, paper, cardboard, batteries, tires, electronics, etc.). Recyclable waste management almost does not work in any of the towns and villages of the Vjosa Basin. In the municipality of Selenica, in the town center (Selenica) the urban waste is not managed, while in the villages the waste is discharged into the Shushica River. Landfills are unstable, in inappropriate sites, where all the unbundled waste is dumped. In the town of Selenica, landfill from the residential center approximately 500 m and 900 m from the river risks environmental impacts. In Tepelena, Memaliaj, Përmet, Dropull, the dumpsites are without standards. One of the causes is related to the bypass constructed in Levan (Levan-Gjirokastra highway) which impedes water circulation and diverts water movement inside agricultural lands as well as the urbanization level of agricultural lands and construction on drainage and irrigation system.

5.4 Measures against the river flood

The Vjosa watershed is a wide territory, with the inhabited areas of Gjirokastra and partially of Fier, Vlora, Mallakaster and Selenica Municipality, important agricultural areas, livestock of different economic activities, other businesses, 25% of tourist villages, rich cultural heritage, diverse landscapes, medicinal plants, and high economic potentialities. Historically Vjosa River and the main tributaries (Shushica and Drinos) have caused extreme floods with environmental, social and economic consequences. Protective works have been carried out with the construction of panels, the improvement of the functioning of drainage systems, the improvement of the protective embankments. But in general, the work has been done treating the flood as an emergency, when the flood has occurred. Exactly Vjosest's defense models needs systematic work starting with (i) Identification of critical problems, survey of of the dykes, the riverbanks adnd riverbed, vegetation cover of banks, forest cover on the watershed, the structure protection, assessment of conditations and damages of river, erosion of river-bank, impacts of gravel mining activity, funcsioning of protection panels, condition of dykes, (ii) drafting the management plan (preparation of watershed management plan) (ii) priority of rehabiliatition practices and development of cost analysis for the proposed restoration activities, (iii) implemention of protection plan.

Measures: Forestation of riverbanks (creation of new forest for bank protection with forest and shrubs trees as poplar, willow, tamarixect), increase density of rare forest in the riverbanks, plant the areas created by sediment deposition (along the entire length of the river, especially close to the eroded sites are created aress due to sediment deposition, which cen be planned with shrubs, mainly tamarix. In terms of cultivation practices the first belt planned with tamarix, the second belt with willow and subsequently with popular, Construction of protecton fences(with wood materials is tu be able to prevent the sedimentation resulting from erosion to go to the river, as well as control the further erosion. Put trunk trees for protection (the large trunk or trees with branches put in the riverbank, help the reducte the stream flow velocity in the riverbanks, as well as collection sediments to raisev the bank level and the possibility of the forestation). Put stone belts, is anothes that can applicable measure, especially effective in the low gradient riverbanks and shallow riverbed to the banks, constriction and reparation of protection panels, constraction of panel with stones and gabion wire, protection and rehabilitation of dykes. All these measures should be included in the protection and rehabilitation maps and conseguetly implemented.

6. Conclusions

1.In the last 30 years the number of floods and the area involved in the downstream area of the Vjosa River has increased. Most notable are the repeated floods in the Nevosela-Bishan-Dernenas-Povelce-Estuary area. Flooding from the Vjosa River is a recurring phenomenon that has caused and continues to cause social, economic and environmental problems, changing delta and coastline.

2.In the segment from Mifol bridge to rivermouth, of the Vjosa watershed, ecological and morphological balances have been destroyed, caused from **exploitation without criteria of rivel gravel** from the riverbed, the lack of sediment transport for the protection of the coastal line from erosion. Annual perennial flows vary from190 m³/sec to the extreme maximum flows causing massive flooding, up to 5500 m3/sec.

3. In the Vjosa watershed and its breach, the highest floods belong to 1962-1963, 1970-1971, 1980, 2010-

2011, 2015 and the most flood-prone areas (Downstream) in the plain area Cakran-Mifol-Levan-Darezese-Povelce- rivermouth where the floods are intense in high rainfall years and throughout the area from the Mifoli bridge to the rivermouth on both sides of the river villages of Novoseles and Fier Municipality. Flooded area varies up to 22 thousand ha of agricultural land with a concentration of 10-30 days.

4. Floods from the Shushica breach, from where the river takes a field character in the Peshkepi, the plain of Lakatundi, Ljubonja and at the point of Shushica's confluence with the Vjosa River. The Drinos River floods the Dropull and Gjirokastra fields.

5 . Rivers and streams mountainous in watershed such as Carshova, Langarica, Lemnica, Dishnica, Lazarat, Virua, Kardhiqi, Sotiras, Suha that descend from the high altitudes during transport brings high flows that flood the Gjirokastra and Dropull Plain, and partly town, Kelcyre and Memaliaj residential centers

6. To protect the river from floods, protection should be conceived as a long-term planning rather than an emergency, on the basis of planning engineering works in each segment (construction stone panels, construction stone panels+gabion wire, potential gravel mining location, rehabilition od dyces, erecting embankments and constructing new embankments, repairing panels, cleaning the river mouth. River and discharge collectors, coating of river banks with vegetation.

7. For flood protection, a drainage system at Vjosa river-mouth is needed, to allow water and river gravel water to circulate inland. Apart from traditional and costly methods of building concrete panels, we should aim to implement economic and ecological measures on the shallow riverbanks for concrete replacement by put trunk trees for protection- large trees such as poplar (trunk, branches and leaves) where sediments and forms a belt that diverts the watercourse toward the center of the river channel..

8. Apply coreloxide as a long-term method, consisting of placing bands containing vegetable seeds in critical flood segments of the floodplain that, after germination, they cover the banks of the river with vegetation.

9. Downstream of the Vjosa, to protect the banks from landslides, the plants should be planted by create new forest belt, bank protection and vetiver that is a perennial plant, with a strong root system and as strong as 1/5 of the wire, which has a low cost and high degree of protection. .

10. For standing banks of the river the vegetation should be planted in three generations of plants: the first generation in sedimentary layers with tamarix reed planting, the second generation with willow and the third generation with poplar.

11. In the territory of Vjosa watershed, the Floods directly and indirectly affect the environmental impacts, both through the transport of pollutants into environments from sewage, urban waste and erosion that in 7 municipalities pour into the Vjosa River untreated. Alsou Urban waste management in the entire Vjosa watershed is at a low level.

7. Recommendations

1. We suggest that land planning; territory management and protection, urban waste and sewage management should be developed on a watershed basis, as an opportunity for territory control, planning and implementation of plan protection.
2. Complete rehabilitation of drainage system (collectors, first, second and third canals), especially in the downstream of the Vjosa rivers (from Frakula to Mifol-river mouth)
3. To protect the morphological balance of the rivers, try to substitute the river inert materials with the use of quarry inert materials. River material inert shall be exploited based on the study of reserves by topographic works as well as the preservation of the ratio between exploitation and the rhythms of the river inert materials rejuvenation at the river mouth.
4. To protect the river from floods, protection should be conceived as a long-term planning rather than an emergency, on the basis of planning engineering works in each segment (construction stone panels, construction stone panels+gabion wire, potential gravel mining location, rehabilition od dyces, erecting embankments and constructing new embankments, repairing panels, cleaning the river mouth. River and discharge collectors, coating of river banks with vegetation.

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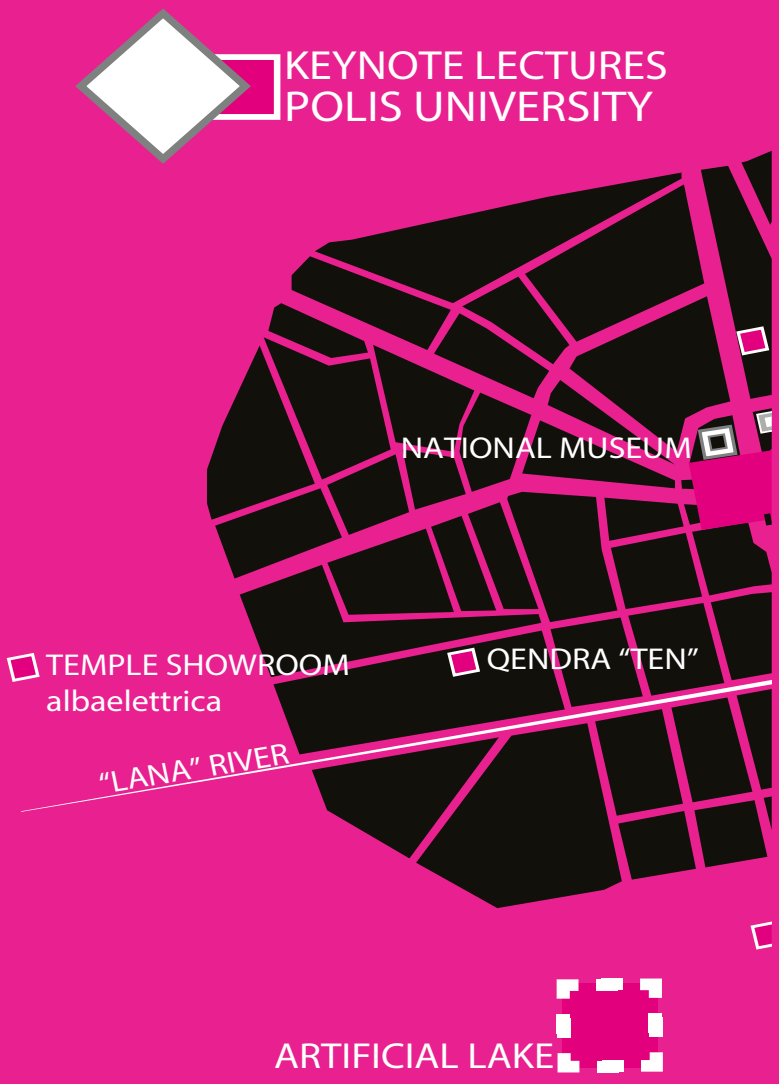

ARTIFICIAL LAKE OF TIRANA
ARTIFICIAL LAKE OF TIRANA

EVENTS
LOCATION AND ADDRESS

SKANDERBEG SQUARE OF TIRANA
SKANDERBEG SQUARE OF TIRANA

KEYNOTE LECTURES
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MAP

find your way

NATIONAL GALERY OF TIRANA
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NATIONAL MUSEUM OF HISTORY
NATIONAL MUSEUM OF HISTORY

TIRANA INTERNATIONAL HOTEL
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