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HCI International 2020 – Late Breaking Papers

Cognition, Learning and Games

22nd HCI International Conference, HCII 2020
Copenhagen, Denmark, July 19–24, 2020
Proceedings

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ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-60127-0 ISBN 978-3-030-60128-7 (eBook)
https://doi.org/10.1007/978-3-030-60128-7

LNCS Sublibrary: SL3 – Information Systems and Applications, incl. Internet/Web, and HCI

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Foreword

The 22nd International Conference on Human-Computer Interaction, HCI International 2020 (HCII 2020), was planned to be held at the AC Bella Sky Hotel and Bella Center, Copenhagen, Denmark, during July 19–24, 2020. Due to the COVID-19 pandemic and the resolution of the Danish government not to allow events larger than 500 people to be hosted until September 1, 2020, HCII 2020 had to be held virtually. It incorporated the 21 thematic areas and affiliated conferences listed on the following page.

A total of 6,326 individuals from academia, research institutes, industry, and governmental agencies from 97 countries submitted contributions, and 1,439 papers and 238 posters were included in the volumes of the proceedings published before the conference. Additionally, 333 papers and 144 posters are included in the volumes of the proceedings published after the conference, as "Late Breaking Work" (papers and posters). These contributions address the latest research and development efforts in the field and highlight the human aspects of design and use of computing systems.

The volumes comprising the full set of the HCII 2020 conference proceedings are listed in the following pages and together they broadly cover the entire field of human-computer interaction, addressing major advances in knowledge and effective use of computers in a variety of application areas.

I would like to thank the Program Board Chairs and the members of the Program Boards of all Thematic Areas and Affiliated Conferences for their valuable contributions towards the highest scientific quality and the overall success of the HCI International 2020 conference.

This conference would not have been possible without the continuous and unwavering support and advice of the founder, conference general chair emeritus and conference scientific advisor, Prof. Gavriel Salvendy. For his outstanding efforts, I would like to express my appreciation to the communications chair and editor of HCI International News, Dr. Abbas Moallem.

July 2020 Constantine Stephanidis

HCI International 2020 Thematic Areas and Affiliated Conferences

Thematic Areas:

- HCI 2020: Human-Computer Interaction
- HIMI 2020: Human Interface and the Management of Information

Affiliated Conferences:

- EPCE: 17th International Conference on Engineering Psychology and Cognitive Ergonomics
- UAHCI: 14th International Conference on Universal Access in Human-Computer Interaction
- VAMR: 12th International Conference on Virtual, Augmented and Mixed Reality
- CCD: 12th International Conference on Cross-Cultural Design
- SCSM: 12th International Conference on Social Computing and Social Media
- AC: 14th International Conference on Augmented Cognition
- DHM: 11th International Conference on Digital Human Modeling & Applications in Health, Safety, Ergonomics & Risk Management
- DUXU: 9th International Conference on Design, User Experience and Usability
- DAPI: 8th International Conference on Distributed, Ambient and Pervasive Interactions
- HCIBGO: 7th International Conference on HCI in Business, Government and Organizations
- LCT: 7th International Conference on Learning and Collaboration Technologies
- ITAP: 6th International Conference on Human Aspects of IT for the Aged Population
- HCI-CPT: Second International Conference on HCI for Cybersecurity, Privacy and Trust
- HCI-Games: Second International Conference on HCI in Games
- MobiTAS: Second International Conference on HCI in Mobility, Transport and Automotive Systems
- AIS: Second International Conference on Adaptive Instructional Systems
- C&C: 8th International Conference on Culture and Computing
- MOBILE: First International Conference on Design, Operation and Evaluation of Mobile Communications
- AI-HCI: First International Conference on Artificial Intelligence in HCI

Conference Proceedings – Full List of Volumes

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2. LNCS 12182, Human-Computer Interaction: Multimodal and Natural Interaction (Part II), edited by Masaaki Kurosu
3. LNCS 12183, Human-Computer Interaction: Human Values and Quality of Life (Part III), edited by Masaaki Kurosu
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14. LNCS 12194, Social Computing and Social Media: Design, Ethics, User Behavior, and Social Network Analysis (Part I), edited by Gabriele Meiselwitz
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HCI International 2020 (HCII 2020)

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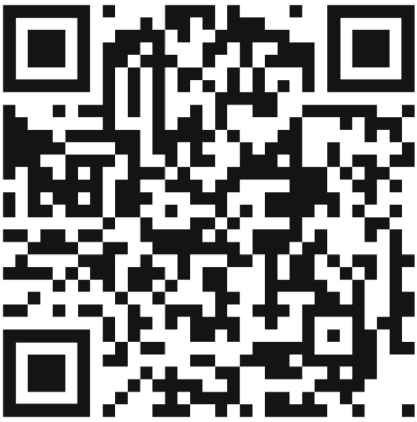
http://www.hci.international/board-members-2020.php



HCI International 2021

The 23rd International Conference on Human-Computer Interaction, HCI International 2021 (HCII 2021), will be held jointly with the affiliated conferences in Washington DC, USA, at the Washington Hilton Hotel, July 24–29, 2021. It will cover a broad spectrum of themes related to human-computer interaction (HCI), including theoretical issues, methods, tools, processes, and case studies in HCI design, as well as novel interaction techniques, interfaces, and applications. The proceedings will be published by Springer. More information will be available on the conference website: http://2021.hci.international/

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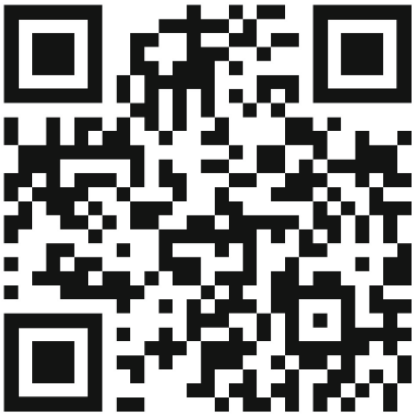

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Tirana Plug-in River: Catalyst Playful Experiences to Revitalize Albanian Informal Settlements

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Abstract. The fall of the Communist dictatorship has changed dramatically the urban structure of the city of Tirana. The original organic structure - and the later Soviet functionalist fabric - has been parasitized by a spread system of informal (and currently illegal) settlements that are perceivable as 'other spaces' (Foucault 2000), completely rejected by the historical city. Indeed, the latter generated a system of closed clusters within the urban environment, leading to the creation of a series of barriers which are either physical, psychological and behavioral. For these reasons, the city of Tirana is a kaleidoscopic and deceiving reality, where the explosion of colors and shapes hides the urban conflicts that run underneath and exacerbate the always present social tension and conflict.

Previous top-down solutions - proposed by the government - have demonstrated their ineffectiveness due to a positivistic approach that could not take into account the complexity of a vital city in continuous evolution. To offer concrete and long-term solutions to these crises, there is the need for catalytic interventions that can help in the creation of different and overlapping frameworks of action: architectural, social, education, and economical ones.

In this paper, we will present the incremental design project 'Tirana | Plug-in River', with the aim of demonstrating how multitasking infrastructure (Saggio 2014) can work as positive vectors in the urban fabric using playful dynamics and mechanics, and bottom-up/civic engagement design processes in the existing city where architecture, art and citizenship interaction can operate as a key for a new urban consciousness and reactivation.

Keywords: Urban catalysis · Gaming architecture · Human interaction

1 Multitasking Infrastructure to Inform Urban Development. In Search for a Contemporary Paradigm Shift

Contemporary cities are becoming more and more complex and have to face a large number of challenges gripping large urbanized territories of the big metropolises. Problems such as hydrogeological instabilities, issues related to sustainability and to the excessive expansion of the built environment, social tensions and conflicts in poor and underdeveloped reality, are just some of the many criticalities that architects have to tackle to

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C. Stephanidis et al. (Eds.): HCII 2020, LNCS 12425, pp. 432–444, 2020.
https://doi.org/10.1007/978-3-030-60128-7_33

propose solutions and reach an operative paradigm shift (Saggio 2013). Moreover, this ever-growing complexity does affect not only the physical image of the city, but also its cultural, social, and political context, in relation even with the new technological implementations that make it function and livable for their citizens.

The machine revolution consigned to us a strongly organized structure of the urban fabric, a mono-tasking vision (De Francesco and Saggio 2016, 2018) for the city, where the leading metaphor is the assembly line: every process in the urban areas can be synthesized as a linear system where the previous one forestalls the subsequent. This model works well for mechanical productive issues but does not take into account a whole series of unexpected events that need a deeper understanding and involve intangible problems like the relations between the inhabitants of urban sectors, and their desires and needs.

Not taking into consideration these relational spaces create a gap which is difficult to fill and fosters the emergence of tensions and conflicts in areas where the lack of strong centralized governance - like Albania - cannot offers dynamic and flexible tools to guarantee durable and effective solutions. What we argue for is to look at the city as an open system (Sennet 2007), elastic and variable through time: an evolutionary model (MVRDV 2007) where spaces have to be relational and their borders porous as a semi-lattice (Alexander 1965), an open structure where every single part is cross-connected with others by different orders of engagement.

Moreover, all these boundaries and issues, worsened by space limitation in the existing urban environment, still represents a severe obstacle in a long-term planning process, especially in complex and layered situations as the European reality. To date, governments, municipalities, and citizens' associations have been following two primary paths to overcome this question.

On the one hand, top-down procedures - defined as the operation of breaking down a system to reach new insights regarding its sub-systems in a reverse engineering fashion (Bresser-Pereira et al. 1993) - have shown in the past a lack of empathy towards people (focusing on policies rather than users); on the other hand, bottom-up strategies - consisting in piecing together of methods to give birth to more complex systems, thus splitting the original systems into sub-systems of the emergent system - sometimes overlooked their consequences for society as whole (Ampatzidou et al. 2015), often focusing on the spontaneous organization of citizens.

In the context of a strategy oriented towards longer-term outcomes, architects should reflect on new trans-disciplinary tools for urban planning and public participation, with the objective of avoiding ghettoization and ready-made functionalist solutions. Our idea is to lay the foundation for a debate to develop an alternative path to overcome the current antagonism between top-down city developments and bottom-up citizen initiatives and to allow citizens and designers to envision themselves as social changes agents.

The key of this approach is not working using grids, but rings (Saggio 2014), to activate not one-way input/output processes but stratified ones, to chase an idea of continuity and interrelation between the different actors involved in the city development and management. Nevertheless, using participation processes - and citizenship engagement systems - as a tool to appropriate the urban fabric environment, infrastructures and resources, not for a personal gain, but rather from the perspective of a common goal or

collective interest, is the key to let professionals, institutions and citizens work together in a more informed process called city-making (Ampatzidou et al. 2015).

As many international realities pointed out during the last decades, every urban transformation starts from a catalyst element (Kristo 2014), able to activate multiple processes in the urban environment: social, economic, architectural ones. If streets, and infrastructures on a broader sense, have always been the favorite weapon of the industrial period to conquer and expand the limit of the productive cities, we believe that precisely these can be the vector a new urban renaissance.

We are in need of a new generation of infrastructures - also described as multitasking infrastructures (Saggio 2012, 2013) - that can regenerate the urban fabric, and revitalize the places that they cross. Certainly, we need to intend the word 'infrastructure in a very wide meaning (not only streets, but also connecting bridges, ecological corridors, fluvial infrastructures, etc.) that not only guarantee a linear connection but allow operating jumps (Saggio 2013), interpreted as stratified three-dimensional movements taking into account - and solving - multiple issues and wounds in the urban fabric, recovering those that are currently named as brown areas or dross capes (Berger 2007) and represents a major challenge for contemporary architects and municipalities.

2 Objectives and Contributions

In this paper, we aim to provide new conceptual and operative tools to discuss and reflect on how new generation infrastructures, and playful dynamics and mechanics - together with bottom-up citizenship engagement and activation processes - can facilitate long-term planning procedures where citizens themselves could take their responsibility and contribute to durable solutions.

Nevertheless, governments are no longer the central directors determining both societal goals and the exact path to achieve them, but instead, producers that should capitalize on the energy of citizens, organizations, companies, and institutions. We want to offer them our research as a tool for a closer dialogue between game design, urban planning, and civic engagement, in which the idea of empowering citizens is particularly urgent. (Schouten 2015).

For these reasons, and for the fact that we are involved in architectural design and education from different perspectives in the Albanian reality, we propose a design experimentation in the urban fabric of Tirana, where the northern part of the river is seen a vector for the renaissance for one of the most problematic areas of the city. Three are the main features of our approach: the use of the river as a multitasking infrastructure and the subsequent proposal for a deep transformation of the whole area; the importance of having urban catalyst as a mean of urban revitalization; the will to tear down the system of closed clusters within the Albanian urban environment, leading to the creation of an alternative to the series of currently existing physical, psychological and behavioral barriers.

3 Playful Urban Renaissance Along Tirana River

Tirana | Plug-In River is a chair project with the class of 'Advanced Architecture and IT studio[1] at POLIS University. The project follows the example of a series of international experience - like the project Tevere Cavo[2] in Rome, in which one of the authors has been a research assistant for several years - where the river is seen as a multitasking infrastructure based on five principles: multitasking, green systems, slow-scape, information technology foam, galvanize[3].

The chosen path of the River is the one in the Northern part of the city where it intercepts the new boulevard, the informal settlements areas located there, and that are still waiting to know what their faith will be, and the natural systems represented by the Mount Dajti in the North. The project aims to activate bottom-up processes in the existing city where architecture, art and citizenship interaction can operate as a key for a new urban consciousness and reactivation, and so, all the students' interventions, aim for involving the citizens and activate the environment engaging multiple processes and civil actions. The philosophy of the experimentation follows two significant ideas: on the one side, it is rooted in an incremental design philosophy where the process does not start from a previously decided master plan but, it is built through time in a progressive development. On the other hand, it follows a Research Through Design (RtD) approach (Zimmerman et al. 2007, 2010), intended as one of the many methodologies and epistemologies that are leveraged in the broader field of design research and has to do with the use of design practice as a form of scientific inquiry. In other words, an RtD approach involves the designing of experimental artifacts as a mean of raising interesting scientific questions and answering them: as John Zimmerman noted how design is a process but also a form of research.

The final result will a series of ludic and playful installation along the river - designed by the students and the other academics involved - that will act as responsive micro-architectures following a plug-in design philosophy (Baldissara, Perna, Saggio, Stancato 2017). For plug-in design, we refer to small catalyst interventions that seek interaction with the users locally and globally and engage multiple processes and civil actions in the urban fabric. Moreover, these proposals incorporate some playful and gamified application – centered on the use of specific game features to include ludic qualities (Deterding et al. 2011) - that have been widely employed within a design and participatory planning

[1] The project is also included in the INNOVATION_Factory (IF) framework. IF is a is an interdisciplinary innovation and research center at POLIS University founded by Professor Ph.D. Antonino di Raimo. Its main aim is to promote all research practices, methodologies and approaches unfolding new content in different fields of science and technology. Innovation Factory acts as a cross-discipline cloud which combines the activities of the three faculties with the purpose of generating and provoking new creative and experimental solutions. The teaching staff behind the Tirana | Plug-In River also includes: architect and Ph.D. candidate Gerdi Papa, and architect Asdren Sela.

[2] Tevere Cavo is a project by the chair of professor Antonino Saggio at 'Sapienza - Università di Roma'. The aim of this experimentation relating in an urban design a series of urban and underutilized areas in Rome, where the river represents a vector for a social, cultural, and architectural renaissance.

[3] For detailed study of these five principles refer to Saggio (2012, 2014, 2017, 2018).

processes. Many studies have shown that their use can be beneficial in situations where these tools could be implemented as part of the planning phase (Ampatzidou et al. 2018) and if their development phase is based on co-creation with multiple stakeholders and participants.

The final aim of the project, in an expected time period of three/four years, will be a vision for the city of Tirana (Tirana 2030) that sees the river as a vector for the city's renaissance and as a urban catalyst to reopen the debate on strategies and tools to activate and rethink urban space and city development. To understand better the reasons that motivate this design proposal is useful to deal with the peculiar evolution of the urban fabric, and why the current city structure is so fragmented and discontinuous (Fig. 1).

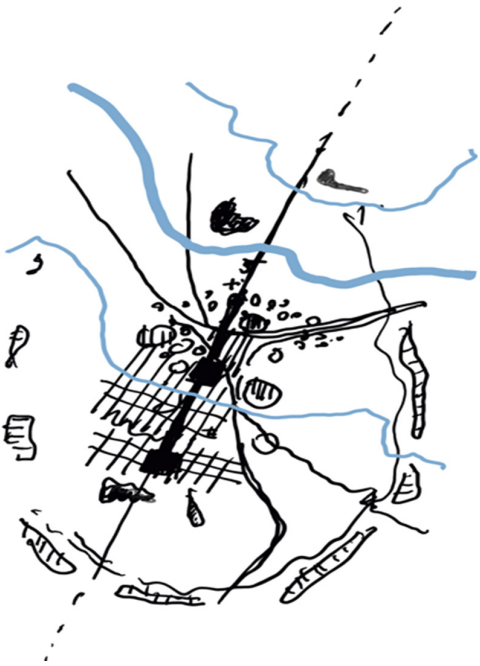

Fig. 1. Scheme: Tirana of three lakes and three rivers

4 Playful Between Spontaneity and Organization. Reflections Over Tirana's Peculiar Urban Development

Initiated as an organic city in the 17th century, Tirana oscillated several times between spontaneity and organized planning. It is a city not easily shaped through plans: a blurred and fragmented situation created by the continuous interaction between organic development and planning decisions. However it has all undergone unbelievable changes offering a unique perspective for urban planning and development with enormous energy within.

Tirana began as an organic city in the 17th century and has since been shaped by the continuous interaction between spontaneous developments and planning decisions. It remained a small town until it was declared the capital of Albania in 1920. Starting from the beginning of the '20s, under the monarchy, the first attempts to move from spontaneous to organized urban planning were initiated.

Typical of this period is the ceremonial complex of the government buildings, the opening or stretching of several main avenues, such as Rruga e Durresit, and the central axis of the boulevard, first designed by Armando Brasini.

The combination of the new axis together with the presence of Lana creek, re-created a structure similar to a "cardum" and "decumanum", north-south and west-east axes that give a clear structure to the city. In fact, this logic reveals a broader system in the city considering the natural elements as part of the organization of the city's morphology. Natural pre-existing systems define the logic of development not only in the orientation of the main public spaces and settlements but also as part of the organization of the life itself inside urban blocks. Mount Dajti towards North-East in combination with the hills of Vaqar creates a natural system of protection. The development of the Boulevard itself crossing Lana river but also having the Grand Lake Park with the Artificial lake of Tirana as an element of closure gave a clear emphasis on the role of such natural element had for the city.

These kinds of interventions were significantly intensified during the period of Italian occupation (1939–1943). The new center, located at the extreme south of the extended boulevard – monumentality separated from the social reality – is still clearly visible in today's urban fabric.

With its actual population of nearly one million inhabitants, Tirana is four times the size it used to be 20 years ago and amounts to more than one-quarter of the country's entire population. Almost 60% of Albania's population is living in an urban surrounding. The transition from socialism to capitalism had a direct impact on the social, economic and spatial structures of the city. Tirana's urban space has transformed rapidly, towards two different directions: On one side lies the transformation of the city center and the primary road axes where commerce, offices, and entertainment have been introduced. New housing complexes have been constructed in these central areas, too. On the other side, since the early 1990s, an informal extension of the city's borders, firstly by small-scale housing and later by large-scale housing, was gradually developed without planning, social and technical infrastructure or provision for public spaces, leading to the creation of a poor urban environment, with no apparent intention to be integrated with their existing surrounding context. At the same time, informal development processes have also taken place within the existing urban fabric, occupying former public land and blocking passages by erecting small, medium or even large-scale constructions. These large-scale housing and commercial complexes were implemented in the periphery of the city by the private sector and had undergone a recent series of actions to legalize them and understand that they are part of the urban reality and have to be integrated in the future urban development plans.

The municipality tried to regain public control with several beautification campaigns in the 2000s and a series of international competitions inviting several star architects to create a new image for the city. Streets, parks and the Lana riverfront were cleared of

illegal kiosks, and thousands of trees were planted, ready to welcome visionary ideas from West, giving a lot of attention to Lana River as an important, and vibrant ecosystem for the city. Unfortunately, that ecosystem didn't face fair treatment concerning infrastructure as it serves as one of the main sewage channels in the city and a considerable problem of pollution and infection risks.

A lot of attention on an international level was drawn to Tirana by the attempt of its former Mayor, Edi Rama, in 2001 to reinvent the city's identity. As an artist he cleaned up the very scruffy avenues with a radical facelift that - through interventions on the major public spaces and by upgrading the public infrastructure - attempted to construct a new image and a new identity for the city center, regenerating the city by attracting new activities and investments, as part of the vision of Greater Tirana and 'Durana'.

Moreover, is important to note the development of the peri-urban expansion of Tirana city and the consolidation of the inner part of the city were the reason for the mayor of Tirana, Lulzim Basha, to announce a competition for the extension of boulevard "Zogu I" to the north as a continuation of the monumental boulevard connecting the two edge lakes of Tirana City. The boulevard should have created a new gate formed by new administrative buildings, moving the public services out of Tirana's City center. Important international studios participated in the competition: KCAP [NL]; Grimshaw Architects [UK]; West8 [NL]; Cino Zucchi Architetti [IT]; Albert Speer and Partners [GER]; DAR Group [UK].

Grimshaw Architects from London won the competition. The project area, including the extension of a three kilometers boulevard and the organization of a seven kilometers riverside park, covers a fifth of the overall area of the city. The winning project was proposing the creation of sequences of 'living rooms' along the boulevard and the river park which reflect Tirana's Mediterranean outdoor culture, strengthen the key identity of urban fabric, and formalize the informal existing settlements. To make this possible, the project proposes a clear expropriation strategy in order to develop important projects for the community and to improve legibility and character.

The impact of Tirana River in the city of Tirana can put in full action the conceptual development of the city in a scheme of three (3) rivers (Lana, Tirana, Terkuza) and three (3) lakes (Artificial Grand Lake, Paskuqan Lake.

The area on which Tirana River is located is quite strategic, not only as a natural potential for the city, but also as a link between the municipality of Tirana and the municipality of Kamza. It can serve not only as a natural and green lung for the wider area of Metropolitan Tirana but also as a catalytic project for the development and integration of the area of Paskuqan - located directly next to Tirana River - and all the previously informal settlements built after the reinstatement of democracy in Albania without being abided to any regulatory plans.

An explicit reference could come from Madrid and the development of Madrid RIO project from West 8 Urban Design and Landscape, a proper multitasking infrastructure within the structure of the Spanish capital. An urban catalyst which managed to not only revitalize its surrounding areas, but also to remedy the existing urban fabric making that area a vital leisure destination for the city of Madrid. Such interventions based in the Urban Catalysis theory area very important in realities such as Albania and furthermore since the complexity of such reality requires a series of layers to be addressed in every

urban revitalization/regeneration in social, economic, landscape, cultural, architectural and urban levels.

It is clear that, to tackle the many issues lying a complex system like the city of Tirana, is necessary to address multiple tangible and intangible problems. For this reason, we propose a holistic design methodology that takes into account studies regarding the psychology of architecture - and concepts such as 'well-being' - to lower social tensions and conflicts and reach long-term outcomes in the reorganization of the informal settlements in the Albanian reality.

Five Points for a Social and Psychological Well-being. An Overview on the Relationship Between Mental Spaces and Architecture.

The political and economic changes in Albania clearly reflects in the urban configuration and architecture of the city of Tirana. The undefined structure and informality along the areas of the Tirana River does not affect only the image of the whole city - and damage the river landscape - but also created a precise psychological and mental state that does not allow the inhabitants to develop these areas furthermore. This state is associated with two main aspects: on the one hand, the sense of well-being and, on the other hand, the insecurity of losing their dwelling because of being illegal.

World Health Organization defines health as "a state of complete physical, mental and social well-being". For obtaining this state, the presence of two main elements is essential: a sense of 'feeling good', which consists in the state of feeling confident with oneself; and to 'function well' which includes having and maintaining good relationships with the community and others. Nevertheless, it is essential to define the necessary aspects for a space to provide individual and social well-being. To provide this, spaces should have the characteristics below:

1. Comply: where the urban environment is capable of performing human activities in everyday life;
2. Communicate: to deliver relevant information by making it easier for people to utilize space, and provide opportunities for socializing and for guaranteeing secure exchange information within each other, with or without their desire;
3. Comfort: in such a way to meet their psychological needs and to easily perceive the environment, to ensure good mental stability;
4. Challenge: activate opportunities for individuals to develop and reach their goals;
5. Continuity: to be flexible in adapting with the people's need through time, and provide all the necessary resources for them.

It is necessary to point out that the inhabitants of informal settlements' dwellings may not provide all the characteristics mentioned above. Furthermore, there is a lack of organized and secure public spaces system for all the generations, which leads to an antisocial environment by lowering the probability of collaboration with each other.

If well-being is not provided in private and public spaces, this deficiency will reflect itself in the psychological patterns of the residents and as a result in their behavior. Lefebvre argues that social relations are spatial and connected to the physical space, along with it, socio-economic characteristics of a society are reflected physically in spaces and demonstrate the living manners of the individuals.

Therefore, space is a product of social relations and social-political activities. (Lefebvre 1991) The informal settlements are areas in such condition that keep growing spontaneously, without the regard of the state planning and laws. This areas lack essential services and city infrastructure, and are usually situated in geographical - and environmentally - sensitive zones, and, since there is no political regulation/control performed, the inhabitants have no security of tenure for their dwelling or land. (Brown 2015) This phenomenon leads to an ever-growing social tension and conflicts, in areas that are classified as spontaneous, disorganized and illegal. These aspects are very definitive for the psychological and behavioral pattern between the inhabitants themselves and possible unknown visitors.

4.1 A Personalization. An Urban Catalyst to Provide Short-Term and Long-Term Outcomes for the Informal Settlements Along Tirana River

"Personalization" is the primary phenomenon in the settlements of Tirana River, and it also represents one of the leading causes of social tension in the community. This peculiar action leads to conflicts between inhabitants and their social structure and affects the life of the whole community with changes regarding the parameters of a person's life and his/her behavior that subsequently leads to disputes among individuals. When a citizen personalizes his space, conflicts arise concerning the boundaries of landowning. Another interesting aspect of this behavioral pattern is the stimulation of the urge to the others to customize their private space. This link to a shared feeling of standing out through personalizing their dwelling to establish a hierarchic social structure based upon recognition. This complex process distorts the image of the city and the unifying architectural language is missing and nearly impossible.

Because there is an illegal framework for approaching their dwellings, there is a common sense of fear of losing their property between the inhabitants. This insecurity translates into an unwelcoming behavior or - even violence - against the others that are not part of the community, who are identified as an upcoming menace to the existence of their dwelling. The result of this repulsion brings a sense of fear and uncertainties to visitors and creates an overall dangerous image of the neighborhood.

This process has a double-sided outcome: on the one hand, the inhabitants are isolated and not opened for the future development of their areas, on the other hand, the rest of urban fabric tends to refuse and expel them from the civic life of the city. Furthermore, the existing psychological state does not allow the informal settlements' people to understand the significant role that the collaboration in a community means with a view of developing their neighborhood and public spaces.

The negative phenomenon of the community, such as personalization, can be twisted to become the crucial catalysis for a more positive growth of the informal areas. But firstly, the inhabitants must be empowered about the vital role they play in transforming and improving their spaces.

To do so, it is fundamental the presence of a social group that could facilitate the dialogue between the community. The perfect example of this case is the workshop held in the city of Struga, Macedonia, organized by the Social Club Kombinati. The aim of the two weeks activity "Urban Shelter" was to represent a focal point for grass-roots and community-based organizations, NGOs, creative people and citizens, to socialize

and familiarize with the cultural values and address the identification of various ethnic communities, in neighborhoods where there was a lack of dialogue between inhabitants.

In a nutshell, the overall aim of the whole experimentation was to implement bottom-up site-specific interventions; provide solutions for better quality of public spaces; assure community engagement processes and facilitate mutual interaction through catalyst urban design actions. The workshop outcomes found shape in raising the inhabitants' awareness of their chance to be the positive vector for a different development of their city's potential. For its bottom-up – and site-specific features, we argue for the same methodology to be performed even in the informal areas of Tirana River, where the 'Tirana | Plug-in River' is just the first attempt to bring together architecture, design, and socio-psychological studies, into a holistic design process.

The first step to fulfill our goal is to understand the people's needs, also through the implementation of digital tools – and smart data gathering systems – such as online or site surveys. Questionnaire surveys are useful to obtain quantitative data, which can be compared over time or with the results from other sites. The polls must include questions about the inhabitant's point of view on the main absences of space typology and activities needed. This part is fundamental because it is necessary to detach from the positivistic state of mind which does not take into account the qualitative side of the gathered data. Moreover, the comprehension of this information can work as a reflection phase for the community to identify the critical problems concerning their community and spaces. This phase should be enrich by a dialogue phase between the different stakeholders involved, to help the community to be aware of their needs and to lower conflicts between them.

The next step is to use participatory methods which are necessary to influence the residents' behavior and to change the urban design of their spaces. These solutions may be divided into two main groups according to their feasibility: immediate solutions, that can be done in several hours and short-term solutions, which can be implemented in several weeks. Let's briefly describe these two strategies to highlight their pros/cons and possible outcomes regarding their application in the Tirana's riverside.

Immediate solution: The first target to be involved is represented by the most willing group age, the younger generation of teenagers and children that can start with the early necessary intervention: the cleaning of the area.

This primary step is crucial because the citizens themselves should be conscious about the environment they live in and of the importance of the natural element in their life.

Of course, for its peculiarity of being an informal area, the environment is quite polluted and it will take a lot of time and appropriate appliances to clean the river, but through this process the people become more aware of the environment they live in. When the young group target starts the action, the sense to be involved will be present even in other group age.

The next immediate solution can be creating DIY (do it yourself) urban furniture, such as sitting elements with wooden pallets, playing facilities with tires, putting boundaries between the parking area and the public space with stones and gardening, etc.

The short-term solutions include the improvement of the walking paths, the painting process of the main facades of the buildings creating a unifying language, the building picnic facilities, and collective orchards, etc.

Another strategy that the project aims for implementing is the use of digital technologies - sensors and actuators, artificial intelligence and digital media – to allow users/citizens to improve the quality of these spaces and make the urban fabric they live in more playful and attractive for themselves and for the rest of the community. These systems change the space and time of play entirely, transforming the city in a whole playground where ludic processes can be real-time activated and spatial renaissance is addressed through social interaction and inhabitants' activation (Perna 2018).

For a first implementation – also because of cost issues – the starting materials for this interventions can be easily found and gathered through recycling. They can come in various forms and functions and adapt to fit the new uses the community needs. Wooden pallets collected from markets or supermarkets can be transformed into as outdoor furniture through simple woodworking techniques. The same material can be even used to build benches, tables, orchard organizers, fences and bicycle parking, etc. Moreover, to make sitting elements, playground areas for children, flower pots, materials - as tires – can be gathered in scrap tire yards which are populates the area, through a design process that recalls many international experience like the one from Rural Studio in the US (Saggio 2002). Other materials that can be used through DIY – Do it yourself - techniques can be beer cases, plastic bottles, stones, etc. All of these resources and methods can transform the spaces to either temporary or final solutions.

Furthermore, this can also activate a process of a circular economy within the informal settlements itself. The selling, and diffusion, of this spontaneous 'piece of art furniture', can provide the inhabitants with an alternative economic system that can be used to fund the implementation of smart tools in the environment. The objective is to lead the community to a long-term development plan that can be effective in a different period.

All of these techniques and simple intervention not only improve the quality of spaces of the informal settings but have a quite significant psychological and social impact in the community. Firstly, the citizens start to feel the importance of their role in the personalization of their own space and are empowered in the relationship they should have with the environment.

Secondly, these methods foster a sense of collaboration and communication between inhabitants themselves and push them to reflect on the importance of the community collaboration in maintaining or even creating spaces.

5 Conclusive Reflections and Future Research Agenda

Since Inspired by Action Research (Foth and Brynskov 2016) our speculative research strategy's purpose is to solve a particular problem while – at the same time - produce guidelines for effective practices within the architectural and design research.

We found inspiring to address the informal settlements topic from multiple points of view, and different theoretical frames, to deliver complex architectural and design solutions. As a next step, more testing and validation are certainly needed, and we see this process as inherently iterative and practical, and deeply related to our academic

experience with students involved in different educational levels (master students; Ph.D. candidates; lecturers, etc.). This is why, in lieu of a conclusion, allow us to finish the paper with a reflection on our experimentation so far, and on what we expect this paper could set the scene for a positive research agenda for the river Tirana.

From the get-go, we did not want to frame the selected topic from a one-way perspective, but we aimed to sparkle a broader dialogue to include not only architects but experts coming from different fields, to facilitate a lateral design thinking phase that could link to more effective and long-term solutions through the implementation of psychological, IT, and playful design studies.

Following Donald Schon's (1983) assumptions, we strongly focus on design as a reflective practice where the designer critically reflects on the action to improve design methodology and thinking. Indeed, the design phase is a process but also a form of research, and the design of games and playful interactions in relation to architecture and urban development can undoubtedly offer a contribution to address the contemporary crisis in the informal urban fabric of Tirana.

In sum, with this work we argue for a more inclusive design process that can – at the same time – empowers and involves citizens themselves through tearing down the physical and mental barrier affecting the Albanian society. Our primary aim is for setting an open dialogue for a new design research agenda for the informal areas where the river, as a multitasking infrastructure, can be the necessary urban catalyst to explore unexpected – and anti-positivist – design solution and produce long-term outcomes.

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