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The role of design in supporting the continual emergence of hybrid spaces of interaction within the city

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Abstract: The high connectivity of people, things and ideas provided by ICTs has started a transformation of the physical aspect and the social relations of the city by creating hybrid spaces of interaction largely influenced by human factors. By assuming a human-centered perspective and providing tools and mental approaches suitable to tackle complex systems, the design has been contributing to this process. However the deep correlation between public spaces and social exchanges letting emerge new interaction patterns makes forewarn that, if aware, the design of hybrid public spaces would arguably lead to a sustainable development of future cities. It means dealing with complexity and at the same time with the participation of an increasing amount of people with different levels of expertise. So open and flexible tools derived from several disciplines are needed. As an example of what design for next would be, the paper shows some possible design frameworks.

Keywords: Meta-design, Interaction design, Framework, Hybrid spaces, City

1. Introduction

Cities have been assuming the form of multifaceted spaces of collaboration and creativity where citizens operate in proximity or remotely to improve the urban quality of life. Information and Communication Technologies (hereafter ICTs) boosted this process, as they facilitate the emergence of physical and virtual networks and communities of people mutually changing the social and the physical environment.

Design thinking and design methods are used in successful ways to guide collaborative processes (Murray, Caulier-Grice, & Mulgan, 2010) and it is possible to imagine a more dedicated application of these principles and instruments to support the continual emergence of hybrid spaces of interaction within the city. In this sense, every occasion of connection and social exchange among different stakeholders may be considered as a trigger for a process of urban development enhancing the life of the city dwellers. Design could give shape and consistence to these different occasions by using the

hybrid spaces as catalysts for the creation of sustainable urban environments. To fulfil this objective there are not fixed solutions, but a multitude of approaches to frame and test, in respect of the adaptive nature of the whole urban system.

This paper shows some possible frameworks that are intended to help designers and stakeholders in designing new solutions for the city environments by encouraging the adoption of different points of view. In the first section we present the context from which the study originated summarising the main effects of ICTs and design. In the second section we focus on the importance of public and hybrid spaces in forming a social awareness. Then in the third section we identify some frameworks dealing with the complexity of the city. In the fourth section we present two others frameworks for ideating interactive systems of relation able to trigger the emergence of sustainable urban processes of change. Lastly, in the fifth section we propose our open approach to design.

1.1 Connecting people: The effects in the development of the urban environment

The widespread of an opening and sharing attitude towards knowledge and practice sustained by ICTs has been leading people towards the achievement of a wider role into the development of the urban environment. The crucial value brought by people has been widely acknowledged by the spreading approaches of open innovation, open government, social innovation, and sharing economy. In fact Internet, social media, Internet of Things, and mobile phones have been changing physical and social interaction patterns by creating new ways of connection among different people and places all around the world. In detail, they created distributed systems made of scattered networks of different and relatively autonomous parts. As observed by Manzini (2015), in distributed systems the technological side is linked to the social one through complex and innovative processes, so that it is impossible separate these two aspects. Moreover, as information systems shifted from a hierarchical architecture to a networked one, new distributed forms of knowledge and decision making appear at different levels of the social organizations, transforming rigid vertical models in fluid horizontal ones. This is the drive for the arising of others innovations based on distributed systems in different sectors (Manzini, 2015).

One of the main advantages of the distributed systems is their ability in re-organizing themselves in a (relatively) few time. This is possible as the scattered parts of the systems are not merged in a *unicum*, but are connected in flexible and meaningful bounds. Considering people and media within the context of networked technologies, de Kerckhove (2010) elaborated the concept of *augmented mind* to point out how nowadays cognitive and social processes rely on a connective intelligence. Individuals variously aggregate themselves in respect of specific common objectives by sharing resources and activating potential relations from time to time, so that new opportunities and situations continually emerge.

Although different cultures and ideas may meet and coexist so easily thanks to ICTs, the intervention of the human factor is essential to spread the new emerging behaviours and values. So, also considering the new connective opportunities between the individual and the social (and public) sphere, the design of the city, especially when the latter is required to be smart, can not more be only a top-down process, but it should be a combination of different approaches and visions coming from the different levels of the urban ecosystem.

“The role of city leaders and institutions should not be to “make the city Smarter” but to create an environment within which smart ideas are likely to thrive and succeed, wherever they occur.” (Robinson, n.d.-a)

Robinson (n.d.-b) identifies several principles or design patterns to consider in successful digital urbanism practices, which include tools and structures facilitating the engagement and the participation of people. In effect, digital technologies connecting people, such as social media and Internet of Things, give them a wider access to the decision-making and to the public support of actions concerning the initiatives, policies, and services of the city. Also Batty et al. (2012) identified the development of technologies ensuring informed participation and shared knowledge as one of the main challenges for the smart cities of the future. Indeed:

“[...] the greatest impacts of new technologies will be on the way we organise ourselves in cities and the way we plan this organisation.” (Batty et al, 2012, p.483)

So a wider participation in the design of the city is needed and it implies the use of ICTs merged with traditional infrastructures to engage the community (Batty et al, 2012). According to this scenario, the vision of future cities is oriented towards hybrid environments made of traditional infrastructures and new technologies for the interconnection of informed and communicative entities. Into this context new spaces of relations and interactions are created for people actively intervening into such environments.

1.2 Design supporting people needs

As city become more complex and human beings, with their intrinsic complexity, become more central in the definition and fulfilment of an adequate quality of life, the role of design should be of sustain and inspiration for the social development. Design should be oriented by experts to the satisfaction of people's needs and should give people collaborative tools to play an active and influential role in the improvement of daily public and social life.

However the division between top-down and bottom-up design processes concerning the city services and spaces is increasingly blurred. Nowadays many human interventions, grassroots or encouraged by local Public Administrations (hereafter PAs), aim to enhance the quality of life into the city by transforming its structures according to the emergent needs of people. Especially collaborative practices such as living lab, co-design, and dissemination of shared services and products affect the aspect of public urban spaces in different ways. The design practice and thinking have been key factors for the people engagement in these processes, as they foster creativity and reformulation of the problem space, that are fundamental in dealing with the unpredictability of the human sphere.

The active involvement and spirit of initiative of people are at the basis of the regeneration and the development of the urban environment. However, the satisfaction of their own needs by the experts who administer and govern the city is a rightful expectation for people. These two positions are not conflicting. According to Manzini (2015) we could identify two roles of design, i.e. problem solving (more connected to the physical world) and sense making (more connected to the social world), and both these roles could be satisfied both from expert and diffuse (i.e. non-expert based on natural capacity) design.

Any of these different positions has in common a design-driven approach generally referred as design thinking. It is a methodological human-centred approach and a way of thinking proper of the designer, but also other disciplines and practitioners could adopt it. It uses creative tools and human abilities, such as intuition, pattern recognition, construction of ideas that are emotionally meaningful as well as functional, and self-expression through means beyond words or symbols (Brown, 2009). It is a mental attitude that helps to deal with complexity, since it does not follow a linear process made of right and standard steps. Conversely it is oriented to the creation of value for people by observing

the context of the problem from different points of view. The design of new solutions is the result of the balance between what is desirable from the user's point of view, what is technologically feasible, and what is economically viable, but as these innovations may have an impact on reality, the emphasis has to be put on the human needs and desires and on the discoveries emerging by the exploration of the relationships among these three constraints (Brown, 2009).

This idea of human-centred design has been widely spreading in the last years, by assuming different forms, from less to more collaborative approaches (Sanders, 2008; Norman, 2013). Nowadays it is a fundamental concept especially used for the design of services and solutions affecting the city life, since they do not concern only physical products, but also human-computer interactions and different ways of communications and collaborations.

2. Hybrid spaces of interaction within the city

City spaces supporting social activities and complex experiences of people determine the social *spatialization* of the urban environment (Shields, 1991). The potentiality of city in fostering the emergence of new patterns of interaction is made critical by this spatialization. In effect, due to the situations of density and proximity of people living in the city, the different social elements, well recognizable in the urban spaces, are put in a situation of mutual exchange of values and practices (as encounter-clash). ICTs, by creating connections on a little and a large scale, are able to increase these conditions by getting people and their different perspectives even closer. Moreover, in an open society, the planned and defined places of the city are put in contact and reinvented by new spaces of interaction created by people as a reaction to obsoleted and unsuitable structures. Again, this process is supported and favoured by the use of ICTs, that through physical and digital infrastructures integrate the virtual spaces where city dwellers act and share values with the physical spaces of the city. In fact, ICTs applied to products and services did not completely virtualize our lives, but on the contrary it reorganize the dynamic and the nature of the relations for more effective and meaningful interactions in the physical spaces. In many cases online interactions are a stimulus and a point of contact between people for participating in common activities set in public spaces.

So people relationship with the surrounding environment, particularly explored and promoted by the *placemaking* approach (Projects for Public Places, 2009), is one of the main elements to focus on even in the design of ICTs solutions for the city. Similarly, Antoniadis and Apostol (2014) reflect on the distribution of power generated by ICTs in public spaces and affecting the people life. If carefully designed, hybrid ICTs could support the city life, as they could enable spontaneous information sharing between strangers for improving local knowledge and a sense of belonging. In fact, cities are nowadays a mix of digital and physical infrastructures creating hybrid public spaces of interaction for "people residing in close physical proximity for varied time periods, from neighbours to passers-by and strangers" (Antoniadis & Apostol, 2014).

On a physical level, ICTs create different types of interfaces between people and city, from the displays visualizing shared information to the whole urban public space representing an interface in itself (Volpi, Opromolla, & Medaglia, 2016). Such interface is able to drive and support people networks of relations, allowing the emergence of systems for civic awareness and sustainable processes of change from which the whole society could benefit. In detail, by adding ICTs and persuasive technologies (Fogg, 2009; Pozzi & Bagnara, 2015) to urban elements (e.g., urban furnishing), people could be more attracted and encouraged to a ready and willing participation in worth and sustainable common behaviours. At the same time this addition of functions and

meanings to the urban spaces brings to an increasing complexity that could not be approached through technical instrument, but requires more reflective and creative ones.

Given that, as observed by Pozzi and Bagnara (2015), interaction design cannot be the only solution for the design of complex and multi-layered cities. However the design of technological services and solutions improving the human well-being and creating shared values is the field where interaction design properly operates, and it is made more challenging when put in the urban settings (Pozzi & Bagnara, 2015). In fact, the difficulties and opportunities generated by the very complex system of relations existing in the interconnected cities allow for further considerations of the interaction design's interventions, as "interaction design methods aim at optimising interactions between humans, tools and environments" (Pozzi & Bagnara, 2015). But, rather than focus only on the traditional tools of interaction design, it is more useful to consider also different design approaches and frameworks made for dealing with complexity.

3. Design frameworks supporting the city complexity

Van Onck (1965) uses the word *metadesign* to focus on the "structural" elements of the design within which specific solutions of design based on a collaborative approach can be identified. Metadesign is a conceptual element, which allows to identify a set of design tools that lead to unpredictable results, absolutely customized on a specific situation. It offers the opportunity to approach different kinds of problems affecting the city dwellers and the city environment in an accessible and intuitive way from different points of view, using the lateral thinking proper of the design.

This approach can be useful for the urban development. In effect, in front of the complexity of the city, seen as an ecosystem where different actors at several levels and times pursue their own goals using the resources at their disposal, there are not fixed or determined solutions to urban development, but open frameworks which can be integrated for guiding the design from a variety of domains. So Fu and Lin (2014) propose a participatory framework for the involvement of professionals, communities, and citizens in the smart city design based on the following elements: exploration of the territory, integration of the different stakeholders' issues and resources, ideation of a common solution, implementation, creation of the product and service, evaluation of the outcomes. Hajbi and Dabounou (2015) propose a thematic framework to co-design ICT projects for the community development, by considering five elements: analysis of the context, identification of the stakeholders and of their relations, decisions about the ownership of the project, definition of the sustainability of the project along the time, definition of the social learning.

Beyond these frameworks, different authors provided some design patterns, i.e. more structured ways for specific problems. They are more defined than a framework; however they do not identify specific solutions, but only a set of possibilities to guide the designer toward the best decision for a specific context. Robinsons (2013), for example, identifies some design patterns for smarter cities, each of which defines goals, people involved, ecosystem, soft and hard infrastructures involved, commercial operating model, driving forces, benefits, risks.

Despite of these few examples, the metadesign of hybrid spaces supporting the complexity of the future cities is a field that needs to be explored in depth in the next years, as its roots are settled down in all the different domains the city consist of, and it could surely grow in unexpected ways.

4. Elaborating different frameworks for the design of hybrid public spaces

The future design should aim to the creation of hybrid spaces where Institutions, city dwellers, objects, information, and technologies interact together for the achievement of common interests. In this complexity a hybrid language with open and flexible approaches and multidisciplinary tools is necessary (Antoniadis & Apostol 2014). The elaboration of frameworks for the design of solutions in the urban environment provides a structure that considers all the relevant variables, but with a high level of flexibility so that specific and customized applications can be found.

In this section we propose the general structures of two different frameworks that facilitate the communication among people, Institutions, and designers in the design of interactive systems placed in hybrid public spaces, which can support sustainable processes of change in the city from different points of view. The frameworks can be intended as conceptual tools, freely accessible from expert and non-expert designers to create useful and meaningful urban public spaces all around the world, and especially in those countries where collaborative civic processes are already underway, such as in Europe and other Western countries. In sections 4.1 and 4.2 we present these frameworks, by only proposing their basic and general elements. Our aim is not to discuss their particular characteristics, but to focus on how these frameworks could be consistent with the new role of the design for the urban development.

4.1 Presentation of two different frameworks for the design of interactive systems of relation in hybrid public spaces

The first framework is based on the assumption that game elements spread in the urban environment could engage people in different city issues, for example: building a social consciousness related to the problems of the territory, encouraging people to assume sustainable behaviours in the city or in strengthening relationships with other citizens or the PAs, pushing people in sharing solutions for communal problems. The aim of this framework is supporting designers and other people in finding solutions that, by exploiting the physical affordances of the city elements (e.g., urban furniture, urban spaces, urban patterns, etc.) as game tools, encourage people to positive behaviours. In this way, also through the integration of new technologies, the city elements are *re-semanticized*, assuming a new meaning and value.

The framework is composed by six main elements, each one with specific contents, which designers need to consider in designing solutions for people engagement in the urban environment.

They are:

- Engagement responses: the specific aims that the solution should evoke (e.g., sustainable behaviours, creating new relations, etc.).
- City platforms: the city elements to use as game elements.
- Interaction modes: the behaviours of people in interacting with these city elements.
- Game components: the game mechanics (e.g., levels, points, competitions, etc.) to implement in the solution and that encourage people in making actions.
- Rules: the operation of the game at the basis of the designed solution.
- Outputs: the results of the people behaviours in the game at the basis of the designed solution.

The second framework is based on the assumption that PAs should use the city as an interface to facilitate communication and collaboration with citizens. In effect public spaces characterized by the presence of digital interactive systems integrated into the environment (e.g., urban furniture and

other city elements) could support the interaction between citizens and PAs, by involving the citizens at different levels of participation (e.g., information, engagement, negotiation). In effect, public spaces are made by physical components and interaction patterns, mutually influencing each other and attracting different city experiences. These experiences should be at the basis of exchange processes occurring in public spaces through new types of interactive systems (reinterpreting the urban street furniture or creating new urban elements) aiming to enrich the relation between city dwellers and administrators.

The framework aim to make designers and PAs consider the essential field of relations that the new interactive systems should affect in order to attract the emergent needs and expectancies of citizens, so that PAs could deal with them. It is based on a proxemics scheme applied to a public space context that interprets four levels of distance perceived from a person as the type of relation he or she establishes with the specific place and the rest of the city, and consequently as the type of exchange that should be supported by the interactive system.

The four levels are:

- Personal perception (intimate relation): intimate experience of a person with the place directly affecting him or her that may suggest to PAs the city dwellers' desires. It suggests the design of systems aiming to create awareness and belonging.
- Personal use of the space (personal relation): personal experience that put in direct relation the citizen and the PAs in the specific context, e.g., by using public services. It suggests the design of systems aiming to create satisfying public services.
- Collaborative process (social relation): social experience that put in relation the citizens with different communities or collaborative projects of the specific area. It suggests the design of systems aiming to create shared knowledge and engagement.
- Spontaneous encounters (public relation): public experience of a person generated by a fortuitous connection between different points of view. It suggests the design of systems aiming to create positive disruption.

These two frameworks should be considered as general tools and guidelines that need to be customized on the basis of the specific characteristics of the context to which they will be applied. In details, starting from an analysis of the peculiarities and the needs of a territory, some collaborative workshops will be organized, during which the framework elements could be used as requirements that the designed solutions should meet.

4.2 Discussion

The role of design has been changing. It goes beyond the realization of products and services, and it focuses on the different elements and tools that support the design of specific solutions. So, the challenge for those working in this academic field of design is not so much to create themselves new solutions used by people in their life, as to realize the "toolboxes" that designers can use to create something new. In relation to the city, the focus is not on the specific solutions that promote cooperation and contacts, but on the elements that support their creation. This occurs because the specific systemic attributes of cities are increasingly blurred and undefined, as stated by Minati, Abram and Pessa (2016).

In our opinion, the concept of a framework makes easy the accommodation of these new aspects, as it allows not to predetermine or impose solutions, but to receive the unknown and the unpredictable. It stays at an abstract level of design, but it provides a frame within which to operate for obtaining concrete results by putting together different stakeholders around a table. Indeed a

framework for urban spaces should integrate at a more concrete level of design various methodologies and design tools that can contribute to urban development. Among them: design thinking (because the design process is shared), human-centered design (because the design leads to the creation of solutions on a human level), interaction design (because ICTs support these processes), and design of spaces (because the urban environment is the main platform of exchange among people).

5. Conclusion and future work

In this paper we focus on different aspects that affect the transformation of the city, highlighting the increasingly importance of people in designing human urban environment and the way ICTs contribute in transforming it. The main outcome of these processes is the creation of hybrid spaces in the city that represent important places of interaction and relation among people, designers, Institutions, etc. At the same time the cities become more and more complex systems. These changes lead to wonder about the role of the design. One of the proposals of this work is that it is important rethinking the general role of the design in this context by focusing on the metadesign level, i.e. the structure at the basis of the specific design solutions. For this reason we argue that one of the main contribution of the academic field to the design of the city environment is the realization of tools and methodologies that can sustain expert and non-expert designers in creating new solutions, by providing them different elements to consider during their design activities. In particular we propose the examples of two frameworks of metadesign elaborating some theoretical concepts that reinterpret the city elements, and then their design. Next steps of this work will be addressed to a more detailed elaboration of these frameworks and to a specification of their different elements, also by testing them with expert and non-expert designers.

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