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From smart cities to playable cities. Towards playful intelligence in the urban environment

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Abstract

In the last decade, we have seen the rise of urban play as a tool for community building, and city-making and Western society is actively focusing on play/playfulness and intelligent systems as a way to approach complex challenges and emergent situations.

In this paper, we aim to initiate a dialogue between game scholars and architects. Like many creative professions, we believe that the architectural practice may benefit significantly from having more design methodologies at hand, thus improving lateral thinking. We aim at providing new conceptual and operative tools to discuss and reflect on how games and smart systems facilitate long-term the shift from the Smart Cities to the Playable one, where citizens/players have the opportunity to hack the city and use the smart city's data and digital technology for their purposes to reactivate the urban environment.

Keywords

Playfulness, architecture, digital media, smart city, playable city

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Introduction - Contribution of EES to the built environment

Cities are becoming more and more complex, both regarding their social, cultural and political context and in the technological implementations that make them function and be more and more liveable for citizens. Currently, we are facing the need to rethink, with the help of smart technologies, traditional urban models. Indeed, cities have always been the primary drivers of change in economic development and growth, innovation and environmental balance, and numerous urban areas in Europe have seen a significant difference in the structure and organization of public service provision (European Commission 2015).

In the last decades, advanced technologies like the Internet of Things (IoT), sensors and networked information infrastructures have facilitated the diffusion of digital and intelligent features in the urban environment. This is leading to a significant shift in the organization of our society that has been called the "rise of the platform society" (de Waal, 2014). The platform society, based on the 'hacker ethic', can empower the citizen to organize themselves around issues, bringing about a sharing economy, a participation society or civic economy.

What we want to underline is how digital mediations have become common in the urban environment, opening a new dialogue between different stakeholders and researchers involved in various fields like architecture, urban planning, HCI, game design and UX.

Indeed, after the WWII, the transition towards "The Information Society" (Toffler, 1980) has fostered the rise of new urban models, and cities have become a proper 'playground' where different approaches were tested and implemented in order to explore new ways to reach a more efficient, intelligent and sustainable development. The architecture itself and the urban environment has benefited from the IT field and its implementation in the body and essence of buildings (Saggio, 2013).

"Smart City" is only the last famous label to identify cluster-technology driven approaches to urban renewal and development where the use of Big Data incentivized new forms of organization, management and citizens participation. Nowadays, the use of digital technologies by municipalities and governments leads to a more efficient use of resources and a better organization of the urban environment.

What we argue for is the more comprehensive use of the ideas of "smart" and "intelligence" to tackle different aspects not taken into account when referring to Smart Cities. There are some other elements of the smartness in contemporary cities which is not only related to efficiency and management; for example, daily life activities which are undertaken without any specific purpose but just for fun, leisure and social interaction among citizens.

Going beyond the idea of smartness and intelligence only related to economy and services can produce new insights on how we need smart technology to allow residents to reconfigure city services and to make a city playful and playable.

In this article, we will first briefly define where the origin of the idea of a 'playable city', and then we will highlight how embedded smart technology can play a role in the generation and understanding of affective, playful, and humorous activities and events. The last section we will present three case studies where the use of smart technology fosters playful interactions between citizens and city technology in public spaces to create not only smart cities but, more important, smart citizens.

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Playful, Smart and Intelligent cities. Multiple labels, one common intelligent strategy

The use of games in architecture and urban planning is not new. Their implementation has a long history since the 1960s (Abt, 1969; Duke,1975), and has remained a favorite tool for spatial modeling and simulation, and public participation (Devisch et al., 2016; Mayer, 2009; Poplin, 2012). In the last decade, we have seen the rise of urban play as a tool for community building and city-making (Tan and Portugali 2012; Tan 2017), and Western society is actively focusing on play/playfulness as a way to approach complex challenges and emergent situations. Early applications of serious games in urban planning focused on developing strategies to overcome multiple issues and to find effective ways to understand and inform urban patterns. Some first attempts worth naming in this context are Abt's first urban game 'Corridor' (Abt, 1969) - a computer-assisted simulation game, to explore the technological, economic and political constraints on the development of an alternative transportation plan for the Northeast Corridor – and Jay Forrester's (1969) work on urban dynamics and urban simulation games such as the ones developed by Meadows and Randers for the Club of Rome.

The idea of a 'playable city' was first introduced during the 90's by the new generation of video games that, thanks to a significant development in consoles and personal computers, could simulate real cities environment.

SimCity and Grand Theft Auto (GTA) were some of the most popular attempts to mix games and urban design processes. In the first one, the player had to deal with the plan city development distribute resources, regulate energy consumption, and even regulate population. Rockstar game developers for GTA used an entirely different insight; in the game various playable cities - London, Los Angeles, San Francisco, etc. - were implemented and the players could experience a digital environment that was the exact copy of the real one where elements of artificial intelligence were deployed. The main critical issue pointed out on (Nijholt, 2016) these video games is that rarely they took in account how virtual and real residents interacted or took care of their daily obligations and the barrier within games and reality was not completely overcome.

Its valuable to point out how speculative researches regarding the digital city of the future have always been a topos during the last century. In sci-fi literature (Orwell's 'Big Brother,' Bradbury's 'Fahrenheit, 451,' Huxley's 'Brave New World', Dick's 'Do Androids Dream of Electric Sheep?'), it is common to find future cities where smart and intelligent technologies are deeply embedded in the urban fabric and accessible - with different protocols - by different kinds of users. In the early 90s, Singapore claimed itself to become an intelligent island (NBC, 1992) and the concepts of intelligent nations and cities were at that point introduced.

The shift from the intelligent city to the smart one is well explained in Deaking and Alwaer (2011). They underline how this passage is verifiable in the growing attention towards the role of sensors and actuators embedded in physical and the appearance of ubiquitous and disappearing computers. Indeed since the 2000s, 'Smart City' has been used as a label to environments where clusters of Big Data, through the use of sensors and actuators, help to monitor and organize the activity of visitors or simple citizens.

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According to Bowerman et al. (2000), what characterizes smart cities is their "use of advanced, integrated materials, sensors, electronics, and networks which are interfaced with computerized systems comprised of databases, tracking, and decision-making algorithms."

Many researchers (Hollands 2008; Townsend, 2013; de Lange and de Waal, 2013) expressed critical views on cities that are smart, claiming that the smartness of the technology is not for everyone but is controlled by giant stakeholders, and their use is based on a top-down driven process based on a productive/economic side. They stand for urban environments that are characterized by social relations and by the emergence of a variety of practices, and not for a diffused tendency to frame urban-scale interventions as top-down driven processes, often technology-pushed and industry-driven, instead of bottom-up and participatory.

An interesting point of view discusses 'bottom-up' approaches to the concept of smart cities (Townsend, 2014). Townsend stands for open access to data so that citizens' collectives can write programs that address problems or opportunities that are of less interest to city officials and companies but that aim to solve problems that are felt in local city communities. This approach ensures a hacker mentality that characterizes contemporary city-makers that aim to kick-start a range of urban infrastructures, systems, and services using reasonably simple off-the-shelf digital tools.

Playful cities. Intelligent playgrounds in the urban environment

Cities always had spaces design for fun and entertainment. Play happens in specific designed urban sites where citizens are allowed to spend their free time and interact with the others. Oldenburg (2011) defines these spaces as "Third Places". He distinguishes between First Places (our home environment), Second Places (our work environment), and Third Places, in which people gather and meet each other in a playful mood and can establish bonds with the others.

The use of digital technologies - sensors and actuators, artificial intelligence and digital media - allows users to enhance these spaces and make the city more playful and attractive. 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 social interaction is fostered.

Indeed, play is fun and play is everywhere. This statement relates to the idea that the spaces in a playable city will be used in ways not predicted by designers. This is called 'appropriation' (Dix, 2007), when the gamer moves through the space looking for bugs or provoking the environment, and does not follow the routine or underlying narratives (Nijholt, 2015, 2016a, b).

Even though games and play have entered the mainstream in a wide range of different contexts, and the combined study of games and cities (Nijholt, 2016) is gaining more and more attention from academic researchers, we still lack a specific definition of what a game is. We agree that a game is a "form of structured play" (Salen & Zimmerman, 2004) and that four conditions are required to call an event a game (Suits, 1978): 1. A clear goal; 2. The need of performing explicit acts (rules) to reach this goal; 3. A collective agreement among players to embrace the rules and work towards the goal; 4. Players need an assessment loop for continuous motivation. If a recent statement invites people to "play anything" (Bogost, 2016), we see no side effects in attempting to bring game dynamics and mechanics in a complicated and risky field like the architectural and urban planning one.

Since participation and civic engagement have increasingly a significant part of urban planning and

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governance (Gordon and Mihailidis, 2016), we identify the need of using games (both analog and digital/intelligent oriented games) as new tools to trigger participation and to address a variety of aspects in urban planning such as design issues, stakeholders negotiation and deliberation, and self-organisation practises (Glick, 2012; Grahan & Marvin, 2001; Krasny, 2013). The use of play tackles three main fields related to the idea of civic engagement and empowerment: procedures, self-determination, and motivation.

Even though play, playfulness, and playability are gaining more full attention in architecture and HCI we still lack a specific field of study, their boundaries are still blurry, and we are currently facing a substantial overlap between definitions and explanations.

According to Bateson and Martin (2013), play is not only related to children's play. It takes place also when grown-up people join together and engage through playful social interaction. Furthermore, playfulness is not only displayed in physical interactive behavior, but traces of it can also be found when relating to the others with playful thoughts.

Intelligent technology and embedded smartness can help us to visualize our playful thoughts and make them perceptible using new media, fostering the idea that these can be translated in changes - both relational and physical - in our environment.

In connection in addition to that, among the features of Play defined by Bateson and Martin, the sixth one is the more useful in our theoretical speculation and introduce the concept of 'playful play':
Playful play is accompanied by a particular positive mood state in which the individual is more inclined to behave (and, in the case of humans, think) in a spontaneous and flexible way.

In this definition, we notice how 'play with thoughts' is seriously taken into account as one of the principal features of ludic activity. Playfulness requires then smart technologies to realize new events in the real world and its implementation in the so-called Smart Cities is reached through the free access to citizens to these technologies to facilitate them in taking decisions to on how to transform a non-playful situation into a playful one.

Indeed, a smart city becomes playful through its digital smartness, regardless if it has been provided by public/private stakeholders or by hacktivists that hacked the intelligent infrastructures of the city to make them more accessible and open for everyone. This strongly relates to the idea of 'platform society' (de Waal, 2014) that was mentioned above, where the notion of appropriation materializes through non-linear and independent procedures led by digitally activated groups.

Smart technologies should then be developed with the idea of providing new ways to experience the city and stimulate serious play. This is a crucial point to accomplish the paradigm shift that leads to a city that can be labeled as 'playful.' Moreover, according to Grønbæk et al. (2012), a city that aims for being playful does not only have to foster the implementation of playful installations in the urban fabric but motivate citizens to appropriate the physical space they live to discover new paths, write new stories and co-create new perspectives for tomorrow.

At this point, we can introduce a set of strong concepts to highlight to define the qualities of what a so-called 'playful city' should be. These principles are inherited from a group of Dutch multidisciplinary researchers (Schouten, 2011; Tan, 2014) that have been working for years on a hybrid field

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between architecture, game design, HCI and Information Technology.
These principles are:

- Bottom-up approach instead of top-down decision making;
- Co-creation: allowing a large audience to participate;
- Iterative Design: instant prototyping, virtual and real visualizations;
- The wisdom of the Crowd: where information and decisions can come from many sources;
- Civic medium: to connect the virtual and the real worlds;

After having preliminarily organized our 'Playful City' categories through some literature examples and contemporary debates, we now proceed to substantiate them with recent examples from the broad field of application to check whether our model resonates with the latest implementations and realizations.

New media for playful cities. Smart technologies between game design and architecture

The three case studies we analyze in this paper deal with the topic of how to foster playful, bottom-up participation in urban environment. As it usually happens in urban play, a significant narrative part is implemented, with the storytelling phase actively trying to address a new participatory decision-making process. As we will see, they do open up new possibilities for engagement and contribute to the diversification of methods and tools available to the facilitators of these processes. Nevertheless, focusing on "smart citizens" - the inhabitants of the smart city - provides a brand new playful, bottom-up and human-centered way to design the urban space. The so-called "Third Wave" HCI design (Bødker, 2006) has been working for years on this objective.

Furthermore, they want to focus attention on the concepts of civic engagement and citizen participation that can be broadly defined as the sum of political and social practices, by which individuals engage with and influence public affairs, beyond their direct private environment (Gordon, Balwin-Philippi, & Balestra, 2013; Parés & March, 2013; Raphael, Bachen, Lynn, Balwin-Philippi, & McKee, 2010).

Among the main differences, we want to focus the reader's attention on the different technological approach that characterizes these case studies. Shadowing represents a significant example of a high-tech solution where projection and sensors are used to find new ways to interact and relate.

Buiksloterham Matrix is a tabletop game that casts players into roles that span from homeowners, local builders, public officials, etc.

Reciprocal is an interactive plug-in design installation where different intelligent technologies are implemented to let citizens playfully appropriate the city. These games are experienced as suitable formats to illustrate the complexity of urban matters and to make them more tangible. These examples want to cover a wide range of different ways to tackle contemporary issues using different outputs such as digital media, game design challenges and playful architecture.

Shadowing (2014)

'Shadowing' was chosen from a shortlist of eight projects as part of the Playable City Award 2014.

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During the last years, the city of Bristol (UK) has designated itself to be the world's first playable city by introducing some interactive installations in their streets during a 'playable city' period. The installations implemented in the city are truly integrated into the urban fabric. 'Shadowing' gives memory to city lights, enabling them to record and playback the shadows of those (people or even animals) who passed underneath.

Once playful passersby learn about the system, they can try to compose strange shadows playfully to interact with strangers' shadows fostering new ways of appropriation.

The game inspires and motivates players to connect, either physically or virtually, with other like-minded people, thus fostering experiences of relatedness and builds scenario settings to invite citizen/players to take direct action.

Buiksloterham Matrix (2015)

1. www.thehackablecity.nl.

Buiksloterham Matrix is part of the 'Hackable City1' research project that explores the potential for new modes of collaborative city-making in a network society.

The game is a tabletop game that inherits its game mechanics from an open framework called Matrix Game System (Engle 1988), a tool for producing referee-mediated strategic games with an emphasis not on quantitative mechanics but qualitative and rhetorical arguments (Schouten, Ferri, de Lange, Millenaar, 2016).

The game takes place in on a large-scale printed map of the neighborhood, moderated by an umpire and with tokens representing where and when the specific actions take place. The different involved players (private stakeholders, NGOs, ordinary citizens and municipality's delegates) are asked to address the overall objective within 12 turns. At every turn,

Figure 1.
Shadowing implementation in Bristol

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players declare an action to attempt and present an argument to the umpire describing why it would succeed. The game supports creating different what-if scenarios, transforming players' roles from passive recipients into informed decision-makers with the real agency on such a complex, and thorny, topic like planning issues. A sense of empathy and relatedness is fostered by the modeled built environment game-pieces facilitate and by needing to motivate for game decisions verbally. For this reason, the game focuses specifically on the creation of a collective actor (the us).

Reciprocal (2016-2017)

Prototyped and develop by nITrogroup[2], Reciprocal is a plug-in design installation. With the term plug-in design, we refer to the IT definition of 'plug-in': a non-independent program that interacts with another one to expand its native features.

An actual depressed urban condition triggers the project's process as an opportunity to offer citizens a new perspective on public spaces, lighting up qualities that are not perceivable.

Reciprocal has been entirely computationally designed and is based on Leonardo Da Vinci's idea of 'reciprocal structure': a beam system arranged as a triangle, where each member is supported at the outer end by a ring beam or a column and at the inner end by the adjacent one.

2. nITrogroup is a research team founded in 2006 by professor Antonino Saggio. The team deals with the idea that IT and intelligent technologies are the new catalyst for a renovation of the architectural culture and practise. Reciprocal was developed, prototyped and built by: Antonino Saggio, Gabriele Stancato, Matteo Baldissara, Valerio Galeone, Selenia Marinelli, Davide Motta, Valerio Perna, Alessandro Perosillo, Silvia Primavera, Manuela Seu and Michele Spano.

Discussion, Conclusions, And Future Work

The examples presented in this paper clearly show how "traditional" methods for playfully enhance the urban spaces can comfortably co-exist, thus be increased, by the use of interdisciplinary novel tools such as digital media, games and open platforms. Furthermore, the domain at the crossroads on urban planning, civic media, activism, and game design is becoming more and more important (Nijholt, 2017; Tan, 2017; Gordon and Mihailidis, 2016). As a next step, more testing and validation are certainly needed, and we see this process as inherently iterative and practical. We are still in search of developing a more nuanced vocabulary that can accurately set the debate between architects and game scholars, and ambiguities in the terminology currently employed in analyzing games experience. If we want to keep walking this way, focusing on playful interaction and urban play, we are still in need of a shared design terminology.

There is much more work to be done, the potential of this approach is far from being exhausted. We surely need more games, indeed real cases, to set an ever-growing design-oriented dialogue that can lead to further implementations and follow-up studies with the use of smartness and intelligent systems in the design and deployment phase between architecture, design, and play.

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Figure 2.
Reciprocal 1.0 - Gioiosa Marea (Sicily)

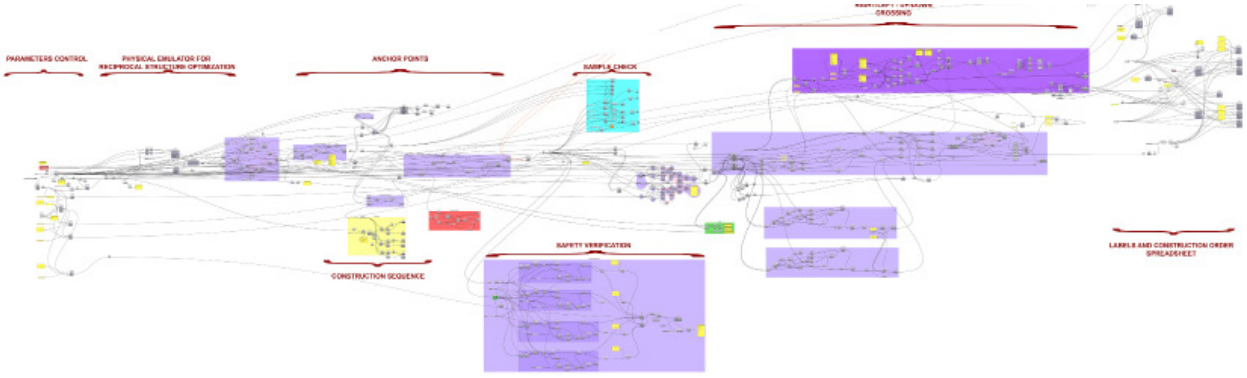

Figure 3.
The algorithm behind Reciprocal developed by nITrogroup – Algorithmic design: Gabriele Stancato

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