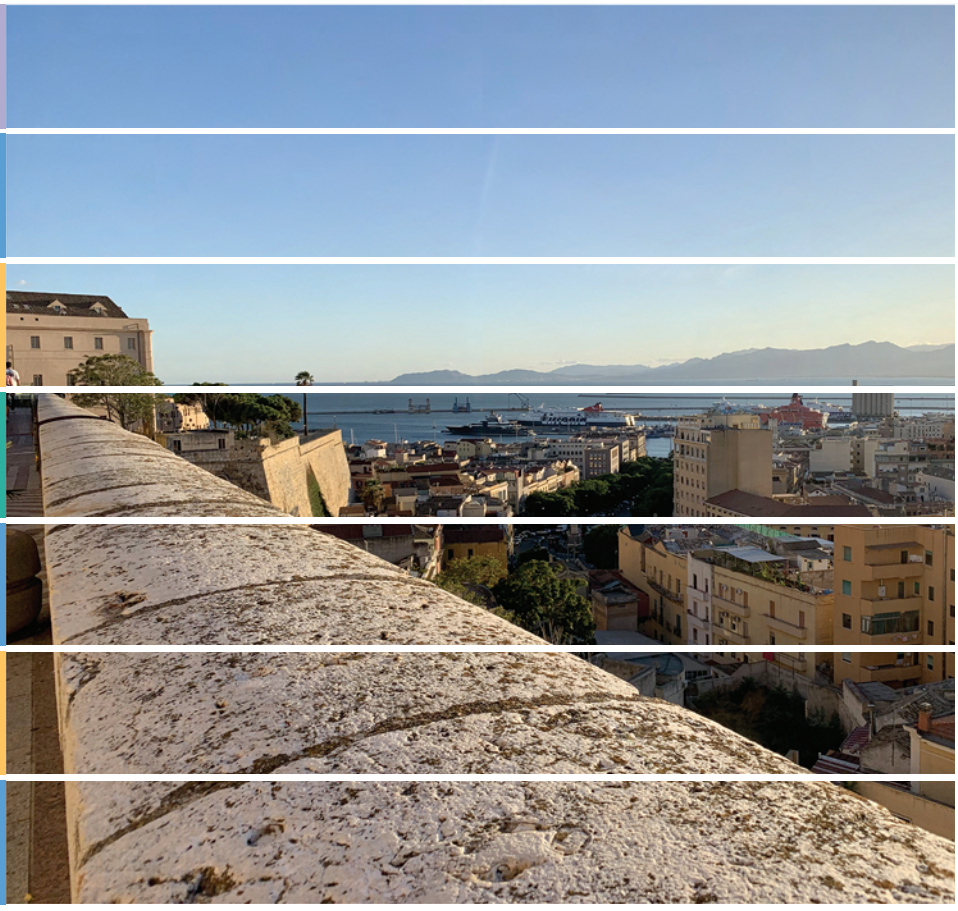
Carmela Gargiulo Corrado Zoppi
Editors

Planning, Nature and Ecosystem Services



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Smart City, Urban Planning for a Sustainable Future

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Carmela Gargiulo Corrado Zoppi

Editors

Planning, Nature and Ecosystem Services

INPUT aCAdemy 2019

Conference proceedings

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This book collects the papers presented at INPUT aCAdemy 2019, a special edition of the INPUT Conference hosted by the Department of Civil and Environmental Engineering, and Architecture (DICAAR) of the University of Cagliari.

INPUT aCAdemy Conference will focus on contemporary planning issues with particular attention to ecosystem services, green and blue infrastructure and governance and management of Natura 2000 sites and coastal marine areas.

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This book is the most recent scientific contribution of the "Smart City, Urban Planning for a Sustainable Future" Book Series, dedicated to the collection of research e-books, published by FedOAPress - Federico II Open Access University Press. The volume contains the scientific contributions presented at the INPUT aCAdemy 2019 Conference. In detail, this publication, including 92 papers grouped in 11 sessions, for a total of 1056 pages, has been edited by some members of the Editorial Staff of "TeMA Journal", here listed in alphabetical order:

- Rosaria Battarra;
- Gerardo Carpentieri;
- Federica Gaglione;
- Carmen Guida;
- Rosa Morosini;
- Floriana Zucaro.

The most heartfelt thanks go to these young and more experienced colleagues for the hard work done in these months. A final word of thanks goes to Professor Roberto Delle Donne, Director of the CAB - Center for Libraries "Roberto Pettorino" of the University of Naples Federico II, for his active availability and the constant support also shown in this last publication.

Rocco Papa
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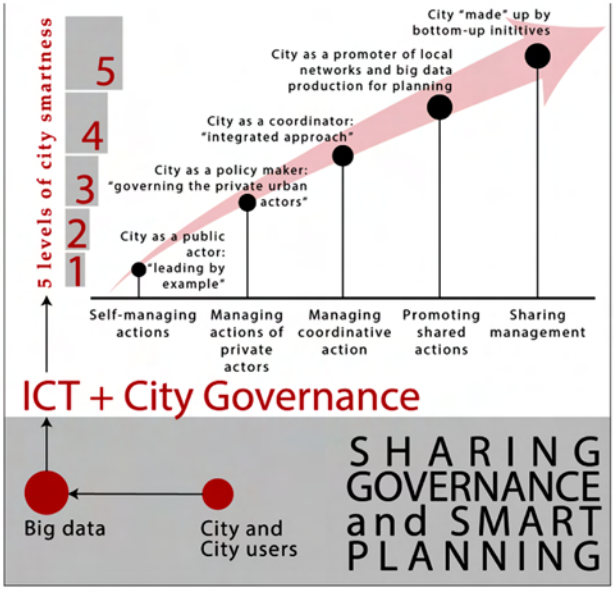

SHARING GOVERNANCE AND NEW TECHNOLOGIES IN SMART CITY PLANNING

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ABSTRACT

The paper aims to analyse the impact of new technologies in developing urban sharing governance, and the consequences on urban planning. New Technologies, smart computing, and monitoring are at the base of the smart city. Socio-economic warns emerge about the dangers coming from technological dominance in relation to the political mission and driven by big companies. The work moves in the opposite direction. The approach focuses on the potential of social inclusiveness in urban planning and urban management, using new technologies. Many authors and local authorities are studying the different paths to better integrate new technologies and increase the "smartness" of cities. Many times, efforts are focused on explaining the opportunities coming from ICT in raising the quality and efficiency of city services. Still now few studies focus on the impact of new technologies in terms of increasing urban sharing governance and how they can review the way in which urban plans are made, for instance, the implications of energy decentralisation. The paper wants to understand the effects of new technologies in opening a new era for urban planning and urban policy-making with a higher impact on citizens' inclusion. We pointed out four grades of improving the Urban Planning quality using new technologies: increase the awareness of urban living impact; increase the monitoring process; increase the urban security and the urban health; increase the sustainable local development. In conclusion, the paper shows opportunities in terms of reducing the risk of technological dominance in urban planning transformation, aspiring to improve the strategic aim of urban planning with a social impact in terms of inclusiveness.

KEYWORDS
Smart City; Smart governance; Sharing governance; Sustainability; Urban Planning

* The other authors are: Clara Musacchio, Francesca Perrone.

1 INTRODUCTION

There isn't a shared definition of Smart city, and what would be the impacts on the Urban Planning. The smart city is based on the increasing awareness about city performance and quality, which depend on physical infrastructures and the availability of data and information. Those are related to the increasing of using information technologies in daily life. Authors define Smart City as "a city well-performing, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens" (Giffinger & Gudrun, 2010); as "a city connecting the physical infrastructure, the IT infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city" (Hartley, 2005); as "a city combining ICT with other organizational, design and planning efforts to de-materialize and speed up bureaucratic processes and help to identify new, innovative solutions to city management complexity, in order to improve sustainability and livability" (Toppeta, 2010). Those definitions explain how ICT assumes in the Smart city a crucial role. Therefore, a major element is the change in city managing, which is about governance improvement (Batty et al., 2012; Nam & Pardo, 2011).

The citizens' role tends to change. They are more than urban end-user with a passive role. Citizens would be key-actors in the urban governance and managing process. They can be considered as urban sensors (Goodchild, 2007), and system managers. Citizens can deliver urban services, inform about the quality of services, attend to decision-making, increase the collective business capacity thanks to new technologies. The ongoing transition to a smart society can deliver also to some problematic issues, privacy security in one side and social iniquity in the other. New technologies open a path of inclusion and sharing responsibilities, but the role of controlling and promoting it is in the local authorities' hands. The paper aims to understand the impact of technologies on new forms of policy, planning, and governance. It is part of ongoing research and it wants to display the different implications of ICT use in Urban planning performance and processes, but also the presence of unexpected problems.

2 FROM SMART CITY TO SHARING GOVERNANCE: IMPLEMENTING URBAN PLANNINGTHROUGH NEW TECHNOLOGIES

The evolution of Smart City aims to overcome the centrality of technology. The technology hegemony encourages a development process towards unpredictable "dehumanized and alienated horizons" (Demichelis, 2018; Fumagalli, 2017). Techno-euphoria strengthens the domain of techno-capitalism in the form of what has been called "surveillance capitalism" (Marconi, 2019). In the current phase, social components emerged claiming more sharing

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governance, but difficulties and criticisms in meeting such instances were immediately evident, especially at municipal level: local authorities tried to optimize their own internal administrative system rather than open to the relationship with citizens (Bolivar, 2018). So, new technologies tend to replay a centralistic social model with the support of new tools but without any form of civic and "bottom-up" pervasiveness.

The convergence between the smart city, smart community and sustainability practices of sharing governance would open new perspectives in the use of technology and influence planning processes, but they request new forms of engagement. To permit citizens being engaged in public action, they must be directly involved in technology governance and networks control. Managing networks becomes a democratic process for building inclusive communities. Social governance connected to the technological dimension emerges, and the "Smart" issue transits from big players to local communities. In this way, "city smartness" results articulated in three levels of public actions for sharing governance (Meeus et al., 2011):

- leading by example;
- governing the private urban operators;
- implementing an integrated approach at the local level. It is characterized by the presence of decentralized functions and inclusive processes.

In the last years, two other levels of inclusiveness emerged. A fourth level can be recognized in promoting local networks and sharing management of big data for planning actions. A fifth level concerns bottom-up and voluntary initiatives that involve citizens, landowners, real estate operators and final users (Header Fig., inspired by Meeus et al., 2011).

Thus, the urban plan is no more a stable product: it becomes a dynamic action, and, in some way, it identifies itself in the participatory process, as a communicative, relational and informational product.

All these planning attributes are supported by ICT, where it supports city managing and the planning process itself.

Urban plans, with technological support, become tools of inclusion, networking, and communication between the social, the public and the private sector. Two applications emerge:

- the plan tends to become a sort of behavioural plan,
- new governance bodies emerge, more contaminated by civic activism, and new forms of citizenship. Digital networks and relations generate new forms of bottom-up initiatives. Technology helps to enlarge the range of actors engaged in urban transformation.

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3 NEW TECHNOLOGIES FOR SMART GOVERNANCE IN THE URBAN PLANNING PROCESS

The Smart city concept does not find practical implementation yet. The opportunities opened have often a marketing aim, and it is difficult to understand the real impact on the urban framework. The research ongoing point out four application fields in which new technologies can increase shared governance within the urban planning process. The four levels of interaction between technologies and urban planning highlighted are not complete, but they represent the most interesting links, at this time. In the four levels of interaction, new technologies play a crucial role for the urban planning development.

3.1 NEW TECHNOLOGIES FOR SMART GOVERNANCE IN THE URBAN PLANNING PROCESS

End-users as sensors of urban quality (local services and environment) have a key role in increasing the shared awareness of urban daily life impacts linked to each citizen behaviours. The opportunity to understand the impact of one's behaviour using new technologies, which provide constant information about the consequence of actions, give the power to self-evaluate personal interaction with the city and environment. It increases the capability of self-changing behaviours throw better performance. For the urban planning process, based on shared goals and commitments, the understanding of self-impacts on urban development and managing is crucial for increasing the inclusion and make it more efficient. At the same time, continuous bottom-up monitoring can be an effective evaluation system for urban plans. It can show the urban planning unexpected impacts and opportunities for improvement. This is evident for the CO2 emission. People who understand the different impacts in terms of greenhouse emission, depending on their choices, can change their action. The cost of avoided CO2 emission is strongly related to the type of technologies used (McKinsey et al., 2010).

Having access to updated information provided by end-users is interesting also for understanding the emotional relationship between citizens and places. This relationship is the base of the place identity concept, which means the value assigned by citizens to places. Bio-mapping1 experiences work on it and aim to draw up emotional mapping, recording and showing people's feelings connected to urban places. They can be created by using data

[1] Emotional Maps by Christian Nold (http://biomapping.net/new.htm).

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coming from mobile devices and social networks. Those mappings can now take advantages from the new developing of Augmented Reality[2] (AR).

3.2 NEW TECHNOLOGIES FOR INCREASING THE MONITORING OF URBAN FACTORS

The shared use of sensors and monitoring systems to control the performance of a settlement or an urban district (Borga, 2013) can inform the local authorities and the urban planning about critical and unexpected elements happened within the city. All information and data provided by sensors (quality of air, traffic problems, lack of public services, etc.) are important to improve the public action. Monitoring the urban quality trend and having access to spread and upgraded data can reduce the cost of data acquisition for Urban Plans elaboration. This configuration changes also the way in which the urban planning is made and its nature, moving toward the "planning by doing" approach instead of a "command and control" one, thanks to the possibility to evaluate continuously the previsions and the real evolution.

3.3 NEW TECHNOLOGIES FOR INCREASING URBAN SECURITY, EMERGENCIES, AND URBAN HEALTH

Emergency and security issues linked to urban areas are now supported by new technologies, monitoring critical situations, problems and dangers. The information provided aim to prevent emergencies, risks and solve them when necessary, but also to inform urban planning and decision-makers for avoiding problems. The information can be used also to improve and boost more secure and informed behaviours, and even healthier. The healthy city concept can take advantages from new technologies application. Health protection under an urban planning view refers to air/land/water pollution reduction and mitigation, risk reduction, unhealthy behaviours reduction. Many of those dangerous behaviours (psychological and physical) are linked to the urban form[3], for example the relationship between urban sprawl, car use and obesity. The urban planning can assume the correlation between settlements and human diseases fostering health prevention through new technologies.

[2] http://www.planningtoplan.net/session-5-back-to-augmented-reality-part-
http://www.isprs.org/proceedings/XXXVIII/part1/10/10_01_Paper_106.pdf;
http://www.inria.fr/en/innovation/industrial-sectors/energy-transport-sustainable-development/demos/artefacto-augmented-reality-and-urban-planning;
http://nguyendangbinh.org/Proceedings/ISMAR/2002/papers/ismar_ishii.pdf

[3] Imperfect Health. The Medicalization of Architecture, of the Canadian Centre for Architecture, Montreal (http://www.cca.qc.ca/en/exhibitions/1538-imperfect-health).

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Emergency refers to natural disaster but also to the lack of needed urban services or infrastructures, the later more recurring. Security refers both to personal security and collective security. Related to urban security is the concept of dependability. It aims to create urban systems, services and infrastructures not only secure but also comfortable to boost and optimise the use. The dependability becomes a synthesis of different characteristics such as reliability, maintainability, availability, performability, safety, security (Avižienis et al., 200).
The massive use of new technologies linked with the security issue shows some criticism and problems, as seen before. Graham (2011)[4] shows how it can bring to social exclusion phenomenon, segregation, racism, discrimination between social classes. Those criticisms can emerge, but the potential of social inclusiveness by using these technologies in urban planning is evident. There is a good chance that this will happen, the same Graham is optimistic in the enlargement of the social context, regarding access to these technologies by social movements and communities.

3.4 NEW TECHNOLOGIES FOR INCREASING THE SUSTAINABLE LOCAL DEVELOPMENT AND THE ENERGY TURN

The energy liberalization process, in relation to the distributed and decentralised energy production, opened new paths for increasing sharing sustainability, sharing governance and boost the local energy turn. It finds opportunities in the changing of the end-user profile, that becomes a prosumer (energy producer, supplier, and user). The renewable resources show interesting potential for local development when connected with bottom-up initiatives: when local communities or citizens enter in the energy chain by becoming social enterprises, community cooperatives, etc. This innovation path is particularly interesting in terms of high impact on people inclusion, and urban governance. Citizens become owners of energy plants, producer of energy services, manager of the business itself. In Europe some experiences exist. In Denmark[5], the energy system is built on many citizens cooperatives supported by national policies. In Europe, Local energy communities (communities which produce, manage, use and sell to third energy) are recognised and supported by EU directives[6] (Hancher & Winters, 2017).

[4] Urban militarism: excluding the 'disordered', Graham 2011 in: http://www.opendemocracy.net/5050/vijay-nagaraj/urban-militarism-excluding-disordered

[5] http://dbdh.dk/images/uploads/pdf-key-articles/best-practice-in-danish-district-heating.pdf

[6] Article 16 of the E-Directive requires that Member States adopt a legal framework that ensures the possibility for local energy communities to own, establish or lease community networks and to autonomously manage them.

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The ICT applied to the local energy production and supply can facilitate this democratization process, especially in managing energy local grid (heating/cooling and electricity) and balancing the fluctuation between RES production and energy demand. The goal is being able to control and manage the local energy-mix and the energy network made up by multi-energy generation systems. The Goteborg[7] experience is one of the most recent and interesting. It is based on a novel district energy system, having as the main focus the balancing of the demand. The Energy District is based on the mutual exchange of energy coming from different productions and from different storage sets between different stakeholders, in relation to the variations in the energy demand. A sort of Energy Exchange Community is formed, also with effects on urban planning and participatory processes.

4 CONCLUSION

From the study emerge some final considerations, related to Urban Planning. They represent the base for future research in the field of Urban Planning development and transformation.

- The massive use of big data and ICT systems characterizes the future of the city, linked to sustainability. They would act on the physical-functional organization of the city, and they would become an important factor in the evolution of urban planning with a sharing democracy impact.
- Some criticism and alarms emerge, related to privacy issue and social discrimination phenomenon. The new ICT age pushes towards new forms of alienation, surveillance domination, urban militarization, and social inequality. In this critical process, the big companies, which manage ICT systems and data are playing a big role. The ICT urban applications, particularly those for security, can bring to segregation, and discrimination phenomena, which find evidence in the city physical organization.
- Those criticisms can be overcoming with the enhancement of the role of local governance, which can control and protect final users, or being the provider of ICT services and the manager of big data provided. The new information technologies and networks can support the development of democracy in planning processes, but they need an institutional framework to support the development and local governance.
- New forms of advanced governance regarding decentralization of functions and the extended participatory processes can find support in new technologies. They can inform and influence urban planning and urban decision. For instance, the effects of Energy

[7] https://www.uia-initiative.eu/en/uia-cities/gothenburg

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decentralization process can open some novelties in urban design and governance in terms of Energy Districts and Local Energy Communities development.

- ICT can support the physical and functional organization of the city to encourage virtuous behaviours (behavioural planning). The planning can generate virtuous behaviours, instead of being shaped by.
- The Smart city concept changes the urban players. There are citizens and the local associations, cooperatives, consortia, committees, etc., on one hand, the producers of advanced technologies and services, on the other hand. The smart city opens the possibility that the traditional urban plans interlocutors are partly replaced in the role of driving urban transformations.
- Specific fields of technological applications can open interesting possibilities for the development of planning processes in terms of raising direct and inclusive participation in planning and urban management. Technology application seeks to go beyond the simple role of support to become an integral part of the planning methodology. Advanced technologies, properly implemented, enhance the dynamic and evolutionary value of the plan; the direction is towards the “planning process” and “planning by doing”. The dynamic characterization of the plan is likely to drive the dialectic of city–behaviours and to respond appropriately to the information obtained in real time. The research in moving in this direction. The next steps look to understand in concrete the consequences of using ICT and city-user big data on the Urban Planning development path: how they can transform the Urban Planning practices, the Urban policy-making and governance, focusing on studying and comparing best practices and examples increasingly influential worldwide.

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