

Digital Technologies for Community Engagement in Decision-Making and Planning Process



Antonella Galassi, Lucia Petříková, and Micaela Scacchi

Abstract The way that we describe and understand cities is radically transforming—just like the tools we use for designing and implementing them. The change is often seen only as a technological aspect, for example, in the concept of smart cities. Smart cities are believed to provide societies with a higher quality of life thanks to modern technologies. However, there is also a human factor that is needed to make these changes go smoothly: acceptance. For many, change and innovation cause fear and disrupt everyday habits. Public participation is crucial both for understanding citizens' needs and for adopting new programs. The ability to try, engage, or entertain with new technologies will move innovation from the abstract level to the level of understanding. A smart city can be a living laboratory that tests new technologies and services where citizens and urban communities are active actors in the process. Innovation can be used by the city to improve its services, mutual communication, and engage citizens in its activities and projects, co-creating urban space and city strategy through new participatory tools. Trends in European cities show that the use of modern digital technologies and interactive tools can be used to involve citizens in urban decision-making processes, e.g., when creating or revitalizing public spaces. Modern participatory technologies that enable citizens to explore, analyze, design, and evaluate spatial information on the basis of shared and open data that bring new challenges and new opportunities to cities, as well as for citizens. Our knowledge of the use of these new technologies, however, is still narrow and limited today. In the following research, the authors intend to explore the potential of digital technologies for community engagement in the decision-making process in smart cities by examining the specific settings upon which social innovation builds. We discuss

A. Galassi · M. Scacchi

Dipartimento di Pianificazione Design Tecnologia dell'Architettura, Università degli Studi di Roma "La Sapienza", Rome, Italy

e-mail: antonella.galassi@uniroma1.it

M. Scacchi

e-mail: mica.scacchi@tiscali.it

L. Petříková (✉)

Institute of Management, SPECTRA Centre of Excellence EU, Slovak University of Technology, Bratislava, Slovakia

e-mail: lucia.petrikova@stuba.sk

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A. Bisello et al. (eds.), *Smart and Sustainable Planning for Cities and Regions*,
Green Energy and Technology, https://doi.org/10.1007/978-3-030-57332-4_27

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the potential of digital participation for community development and propose good-practice examples for facilitating the process of adopting and integrating digital technologies within such settings. Rather than conclusions, some final reflections are proposed, based on how digital technologies can play a crucial role in involving new groups of people, empowering citizens and building new relationships at the local level.

Keywords Innovation · Digital tools · Decision making · Smart cities

1 Introduction

The boom in the field of information and communication technologies (ICTs) has fundamentally affected the development of societies and the way they interact. The 2030 Agenda for Sustainable Development (United Nations 2015) and the Sustainable Development Goals (SDGs) (Griggs et al. 2013) support the concept of ICTs as the potential means to advance knowledge societies and ameliorate the digital divide—a gap between people with effective access to digital and information technology and those with poor access (Fleming et al. 2018). Governments, policymakers, and city authorities, as well as citizens, realize the power of ICTs and digital engagement as the way to improve communication between various urban stakeholders and public institutions and improve public service-delivery capacities. Digital engagement can play a vital role in building more effective, inclusive and accessible institutions to support policy-making and service delivery for the SDGs to all people and, at the same time, build public trust and ensure transparency, participation and collaboration in the planning process. A well-fitted participation process may prevent later dissatisfaction and better meet citizens' expectations. Even if public consultations are not mandatory, the process usually includes some type of public meetings or hearings. However, most of citizens do not attend such meetings for various reasons (inconvenient time, location, unfamiliar subject, technical language, etc.). Additionally, public meetings typically held at city halls are not very popular among generation Y¹ (MacKinnon 2008; Sloam 2012). To address these limitations, we explore the use of two digital technologies, *CvikerAr* and *InViTo*, interactive engagement tools that help citizens better understand various urban development projects and enable them to express their opinions through digital platforms. This paper shares lessons from our research² into some of the pioneering innovations in digital engagement that are taking place across Europe and beyond.

¹The publication *Advertising Age—Ad Age* was one of the first to coin the term “Generation Y” also known as “Millennials,” generally refers to the generation of people born between the early 1980s and 1990s to early 2000s as ending birth years (*Advertising Age—Ad Age*, 30 August 1993, p. 16).

²Common research topics among our departments and especially part of the process of doctoral thesis of PhD student Lucia Petříková.

2 Method

In the context of the rapid advancement in technologies relevant to community engagement, this paper attempts to explore the relationship between new ICTs and participation, by examining the role played by specific kinds of digital participatory tools, CvikerAr and InViTo, to engage wider community in the planning process. In this regard, the research into community engagement in decision-making and planning process is in the spotlight when we talk about smart cities, yet little research has been carried out in the area of digital-supported community participation. Addressing this gap, we study best practice on the use of digital technologies in communities to reveal the significance of digital participation for community-led development in smart cities and the role of communities in decision-making processes. We explore the role of interactive tools, as the digital engagement—‘connectedness’ in the technical sense; and as opportunities for their effective use by various communities in cities—‘connectedness’ in the social sense.³ A summary of individual cases will be discussed.

3 Digital Tools for Community Engagement

The era of digitalization brings new forms of civic participation. The success of a community to deal with challenges that contemporary cities face is predicated by its community members feeling a sense of belonging and place attachment. “The highly profiled identification with the living space and deeply articulated place attachments” implies the rebirth of the civic sense and belonging, a desire for identity and participation (Jaššo and Petříková 2016). The new generation Y is more attentive and active, with predominant bottom-up movements of social, political, environmental, community interest. Community participation has moved from traditional approaches (such as town hall meetings, opinion polls, etc.) (Glass 1979) to more active and engaging approaches such as e-participation⁴ (Macintosh 2004), supported using ICTs. To help address very complex urban challenges, public and private sectors have begun developing tools that use technology to make participation more informed, transparent, and relevant to citizens’ daily lives. Modern ICTs enable citizens to create, share content, and participate in planning processes using a wide range of digital tools. Such tools can make easier for people to share their views with large groups of people, support greater education, enhance connections between institutions and citizens or small communities, give input to decision-making, connect like-minded

³People with “Connectedness” find meaning, purpose, and deeper relationships. They often feel personal responsibility to the connections they make, actively participating. A structural connectedness is based on the idea that policy and community engagement are made within a context of a network of actors and institutions.

⁴E-participation is the term referring to ICT-supported participation in processes involved in government and governance.

people to work with on a common goal and raise attention or money (Bolívar and Muñoz 2018). Modern community tools build up techniques that have been already used to engage communities (such as workshops, meetings, etc.); however, they are not meant to replace them, but rather to complement them. One of the main aspects of e-participation is to motivate and engage citizens in the decision-making process, promoting the following advantages: enabling broad participation; adjusting a range of tools to citizens' varied technical and communication abilities; providing relevant and up-to-date information to citizens to make more informed decisions and deliberation; and enabling analyzing data provided by citizens (Vito 2018).

3.1 *Digital Social Innovation*

Digital technologies are especially well fitted for civic action: from mobilizing various communities and sharing resources to spreading capabilities. Some of these are particularly aimed to deal with social challenges. These are, for example, online platforms for citizen participation in policymaking or new development projects or open data to promote better transparency around public spending (Kuriyan et al. 2011). This is what we call digital social innovation (DSI). DSI is defined as:

a type of social and collaborative innovation in which innovators, users, and communities collaborate using digital technologies to co-create knowledge and solutions for a wide range of social needs and at a scale and speed that was unimaginable before the rise of the Internet. (Bria et al. 2015)

Particularly when the level of public participation increases, the tools become more interactive to foster ever advancing complex discussions. For example, tools based on *open knowledge*⁵ refer to online platforms through which diverse groups of citizens can collectively create, analyze various scopes of issues, or crowdfund social projects. Popular types of digital social innovation include participatory platforms that enable citizens to crowd-map local problems (e.g., unsafe areas, broken roads, polluted zones, etc.), e-petitioning, e-budgeting, e-governance, and the like, while impacting local communities or the wider society. Another interesting example is the *open ministry* concept (also known as crowdsourcing legislation) that enables citizens to co-write and grant citizen-led policy proposals, e.g., this concept is implemented in Finland (Finnish Citizens Initiative Act 2012). Tools based on *open data*⁶ refer to innovative ways to open, capture, use, analyze, and interpret data. This approach has been successfully tried and tested in the city of Vienna, Austria, which has set up over 160 databases to cover issues from budgeting to planning information (Homeier et al. 2019). This led to development of more than 109 open database apps for the city and its citizens. Similarly, the city of Barcelona created an open-data digital tool to

⁵Open knowledge is free to use, reuse, and redistribute without legal, social or technological restrictions.

⁶Open data are freely available to everyone to use and republish, without restrictions from copyright, patents, or other mechanisms of control.

keep citizens informed on processes and to receive their input, which has eventually become a global initiative (Peña-López 2017). The city of Bologna established the so-called “Office of Civic Imagination” with a specific purpose to advance greater participation by creation of “engagement laboratories” throughout the city and the use of interactive digital tools (d’Alena et al. 2018). It works as a customizable platform for communication between city planners and various communities. Some of those communities have later created their own tools, e.g., *YouthScore*, where youngsters rate their neighborhoods based on their youth-friendliness. We can assume that these examples present a promising trajectory toward more inclusive participation with a potential to engage various different stakeholders and enable people to build positive attitudes toward the places where they live, work, or study. The main idea is to allow communities to easily influence decisions that may impact them and where decision-making process becomes more reactive to community input. The premise is that, the more people feel empowered to shape their communities, the more they will participate—and the more they participate, the more inclusive decision-making process will be toward the community voice, with aspiration to motivate more community members to participate.

3.2 Good Practice

As previous examples showed, there are many ways by which interactive tools, along with traditional approaches, can advance civic participation. Based on the outcome of a collaboration between the Slovak University of Technology and the Slovak Smart City Cluster,⁷ we chose *CvikerAr* tool as an example of a local best practice of innovative technology for improving transparency in planning and decision-making processes by enabling community members to better understand specific situations and encourage more collective decisions ahead of individual interests. *InViTo*, the second tool that we present was generated during the LUMAT⁸ project in which the authors participated based on its positive outcomes in multiple case studies (Coppola et al. 2014). This tool is conceived as a toolbox for a visual analysis, exploration, and communication of spatial and non-spatial data to support policy and decision making. These tools are based on the open-data concept with a focus on the visualization of spatial data. A visual interface there is used as a new criterion to display both positive and negative impacts on territories while respecting the complexity of multiple stakeholders’ choices. The interactive form enables users to analyze data themselves. Comparing various scenarios and modifying different features of the subject supports discussion of specific issues related to the community. The tools have shown to be effective, especially when evaluating various planning scenarios.

⁷Slovak Smart City Cluster is an association integrating representatives of business sector, public administration, academic environment, and technology innovators.

⁸LUMAT Project—Interreg Central Europe Programme 2019—Implementation of Sustainable Land Use in Integrated Environmental Management of Functional Urban Areas.



Fig. 1 Illustration of the use of CvikerAr to engage communities in the planning process. *Source* www.cvikerar.com (the illustration elaborated by the authors)

3.2.1 CvikerAr, Poprad, Slovakia

In 2016, the Municipality of Poprad, among other cities in Slovakia, adopted the first smart-development strategy with the aim to provide better services to its citizens and improve the quality of life in the urban environment by introducing smart solutions supported by modern technologies. This has caused the city to be ranked among the European Smart Municipalities.⁹ In addition, the strategy covers topics of smart economy and smart governance. The city runs a pilot initiative in the development of digital technologies for community engagement in the planning process with the mobile app CvikerAr that enables visualizing the real world through 3D modeling in virtual reality. Thanks to its virtual feature, it makes it possible for citizens to view any proposal in its realistic environment before their realization. For example, people can visualize how new building plans or areas will look, how they will affect the urban fabric of the city or choose between different scenarios. This interactive tool, at first, will be tried and tested in a revitalization process for current brownfields (a former area of military barracks) located in the city. So far, the tool has been used in minor projects, e.g., for a proposal for a new pedestrian bridge connecting two residential neighborhoods (see Fig. 1) which allowed various stakeholders and residential communities to engage in the planning process. It enabled citizens to actively participate in decision-making process from the beginning, see different drafts in a “real” picture, analyze, and comment, as well as actively co-design.

3.2.2 InViTo, Torino, Italy

The second example of an interactive tool InViTo is an acronym for *Interactive Visualization Tool*. InViTo has been classified within the category of spatial decision-support system (sDSS) as a Web-based GIS tool (Geographic Information System). It was developed to deal with various spatial issues and disciplines with the aim of sharing the spatial information to visualize urban effects in real time and to improve the territorial decision-making process in general (Pensa and Masala 2014). The main purpose of the tool is to help people build their spatial knowledge by interacting with dynamic maps. Similarly to CvikerAr, it is able to display the relationship between an area and a proposed intervention in real time. Having been designed to encourage

⁹https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en [accessed October 19, 2019].



Fig. 2 Illustration of the use of the interactive map in the InViTo platform during a stakeholders' workshop. *Source* www.urbantoolbox.it (the illustration elaborated by the authors)

discussion among different actors, e.g., urban planners, stakeholders, non-experts, focus groups, and urban communities, it enables the exchange of knowledge in collaborative and participative activities. At the same time, it allows a full interaction between users and the information. For example, citizens can share a map of their neighborhood with access to local information and, by clicking on the map, see further details with the possibility to leave a notice (e.g., comment, complaint, suggestion, etc.). Moreover, it allows citizens to choose an area and receive statistical data associated with the chosen locality. Citizens can access, edit, or save their maps and open them later. It is flexible to use for various applications, purposes, and scales, with the possibility to actively manage and modify data (variables) and create dynamic scenarios. Because of this, it can showcase areas of interest and create immediate outputs. The outcomes can be presented in various forms according to the user expertise and used together with other community planning instruments, during collaborative working activities, meetings, and workshops (LUMAT Project 2018) (Fig. 2).

4 Results

It is clear that all spatial decisions involve a number of different actors, opinions, and interests, and we consider data communication as fundamental to achieve common agreement. With the boom in ICTs in the field of territorial development, the vast amount of complex information is not easily understandable through simple reasoning anymore. Based on the original study of Tang and Waters (2005) and the research carried out under the LUMAT project, we elaborated a new table on the effectiveness of different participation techniques, having evaluated them according the selected criteria—* poor; ** fair; *** good; **** outstanding (see Table 1). The table shows comparisons between the traditional and new approaches to citizen engagement in participatory planning practice.

Traditional methods of participation in the planning process (such as questionnaires, surveys, public meetings and public hearings) have shown to be relatively demanding in terms of time and money necessary for their collection. As we can see from the table, some traditional techniques prove to be more successful than others, particularly workshops and contacts in communities. Others, i.e., public hearings and questionnaires, seem to work less successfully. On the other hand, the field of new participation techniques has been widely introducing a new range of interactive

Table 1 Evaluation of the effectiveness of selected participation techniques

	Participation technique	Providing information	Receiving information	Interaction with communities	Giving assurance to communities	Broad cross-section of opinions	Communication
Traditional	Public hearings, meetings	***	*	*	**	*	one-way
	Workshops, focus groups	****	****	****	**	***	two-way
	Presentations to clubs and groups	***	**	**	**		one-way
	Contacts with people in community	****	****	****	****		two-way
	Questionnaires, surveys	*/**	****	*	*	***	one-way
Up to date	E-participation (e.g., online opinion surveys, e-budgeting)	***	***	**	***	***	one-way
	Digital participatory tools (e.g., CvikerAr, InVito, sDSS)	****	****	****	****	***	two-way

tools for citizen involvement. Among the new techniques, digital participatory tools appear to be most effective in various aspects. The right-hand column shows the level of communication. This level involves two dimensions—one-way communication flow and two-way communication flow. As we can see, the one-way communication in e-participation (without the possibility for interaction) may eventually suffer a communication barrier, in comparison with digital participatory tools that provides the space for immediate feedback. The one-way-oriented approach does not allow such a degree of interaction and feedback on both sides. We assume that modern decision-support tools, such as InViTo and CvikerAr presented in this paper, are emerging as promising tools for solving complex urban issues, collaborative participatory planning and effective spatial analysis in territorial decision-making processes. Based on the outcomes of the research, these tools have proved to be able to make very complex information more comprehensible even to people who are not familiar with the technology by combining interactive maps with pictures and text information in a user-friendly visual interface. They can provide better interaction and mutual feedback, while encompassing a broad space for opinions, exchange of ideas and discussion. The basic knowledge of urban dynamics is essential for addressing specific community-related issues. We believe that the better is the knowledge in the planning process, the higher is the chance of community to make better decisions. Communities may have a better chance to actively influence issues that directly concern them with and come up with new social innovations.

5 Discussion

Of the many different technologies that support participatory approaches to community engagement in decision making, modern participatory technologies are gaining increased attention as a means of fostering more inclusive planning process. There are many good-practice examples of the successful application of digital participatory tools in urban communities; some are used to monitor a local quality of environment (quality of air, water contamination, dangerous pollutants); others use smart mapping based on local knowledge and information to reveal ‘critical’ areas where people do not feel safe, or suffer a lack of greenery, and spaces for new cycling routes, etc. There are, however, challenges that digital engagement will need to address in the future. In particular, this includes how to define a better understanding of what we mean by “participation,” more flexible communication at the institutional level (open governance) and how to tackle the digital divide. As an important factor, we recognize the digital education at the level of communities with the emphasis on underrepresented groups, e.g., elderly people, the poor, minorities, etc., as well as the diversity and inclusion in the development and testing of new participatory techniques. We can assume that the demand for more participatory and more inclusive ways in decision making will continue to grow, either from city authorities, urban planners or citizens, and the technology will advance to bring more inclusive, cheaper, and easier ways to provide a greater participation and more transparency.

6 Conclusion

This paper provides an overview to help understand its wide scope of activities and the new emerging techniques. Rather than draw a conclusion, we wish to end with some reflections on the role that technological innovation can have in the decision-making process. Lessons from international case studies show that digital tools are being used to engage communities in more meaningful participation, while they are improving the quality and validity of decision making. Experimentations with implementation at the local level have shown that digital technologies can play a crucial role in engaging new groups of people, empowering citizens and building new relationships between cities and local communities, as well as local governments and citizens. As the meaning of community engagement is particularly relevant at the local level, local governments have begun initiating platforms to enable citizens to contribute with their ideas and local knowledge, evaluate priorities, and influence allocation of public resources. In this sense, the community is to be considered both actor and beneficiary. We assume that the biggest concern when using such tools is to overcome the citizens' lack of familiarity with digital technology. This is particularly important in territories with no or little experience in this field. Also, it is important to emphasize that the traditional participation techniques should not be forgotten, simply because even the modern digital methods are not a cure-all for all community-related issues. The 'smart' techniques should be integrated simultaneously with the traditional ones. Eventually, the digital engagement in the field of citizen participation is a multispectral concept that brings a set of challenges for modern cities that will require yet deeper research in the future.

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