

The darker sides of smart city development

Digital participatory planning tools helpful side and side effects

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Abstract: Participatory planning is one of the latest directions of the urban planning field which began in the second half of the 20th century. Participatory planning back then used old fashion ways in doing so. Lately, urban planners start using digital participatory planning tools. These tools start to get spread worldwide for their help in the urban planning process. In the same time urban planners start having concerns regarding these tools and their side effects. One of these concerns is the issue of data privacy in digital participatory planning tools. This paper will explore the helpful side of digital participatory planning tools and their role in improving the urban planning process. Second, it discusses one of the side effects of these tools that is the issue of data privacy. Third, trying to find a solution for this issue and its side effects. The Swiss city of Zug experimented a solution which could be a possible solution. The experience of international experts of digital participatory planning tools spread worldwide will be collected. Once these tools are closer to solving their issues, these tools can be upgraded significantly in a way opens up a wide advancement towards effective urban planning.

Keywords: Participatory planning, digital participatory planning tools, data privacy.

Introduction

Digital participatory planning tools start to get spread worldwide for their benefits in the urban planning process and for their help in achieving the overall goals of urban planning. Urban planners urge to research these tools more and more to know their value due to the lack of the appropriate research regarding them. In the same time urban planners start having data privacy concerns in these tools. This research paper builds the background for digital participatory planning tools. Starting with a brief history of these tools, definition, their helpful side and benefits, their data privacy issue and ending with a possible solution for this issue. Solving data privacy issue in these tools is demanding because it stands as an obstacle in the way of upgrading these tools which could lead to a wide advancement towards effective urban planning.

This paper presents an early stage of a more in-depth research of digital participatory planning tools. For this reason, some of the methods followed do not have a final result yet but the conclusion will include expected results of these methods.

Literature review

Digital participatory planning tools:

The early stages of participatory tools described by Roger Katan and Ronald Shiffman (2014) they stated that back in the 1970s the use of mass media-television, newspapers, and radio- or getting the answers to questionnaires as methods and how it did not achieve maximum participation. To achieve that the need for sustaining involvement of people and for constant contact and engagement of people at all levels is required. Later on and in recent times, according to Nader Afzalan (2015) “*web-based technologies and social media have intrigued planners and decision makers in their potential for use as tools to resolve issues inherent in participatory planning processes. This potential lies in the ability of these tools to capture local knowledge and facilitate information sharing, social interactions, and collaborative processes (Afzalan & Muller, 2014; Boyd & Ellison, 2007; EvansCowley & Hollander, 2010; Evans-Cowley & Manta Conroy, 2006; Palfrey & Gasser, 2012; Townsend, 2000).*” The previous statement also agreed by Falco & Kleinhans (2018).

The definition of digital tool: it is an online platform, or a website, or mobile application that uses the internet and depending mostly on Information and Communication Technologies (ICT) in which it allows the use of computers and other electronic equipment and systems to collect, store, use, and send data electronically. There are two main stages in these tools data collection and data analysis.

Digital participatory planning tools are internet-based platform that:

- Can build a bridge between the residents and urban planners.
- Allow the residents to communicate and exchange ideas, raise debates, suggest solutions and share their local-knowledge with urban planners.
- Allow urban planner to collect local knowledge information and data to analyze it statistically and systematically to be used in the urban planning process.

The definition above comes from the description of the early Finnish digital participatory planning tools such as: SoftGIS, OPUS forums, The Urban Mediator, Tell a Story, WebMapMedia and Shadew. (Kahila & Kytä, 2009; Staffans *et al.* 2010; Saad-Sulonen & Botero, 2010; Halttunen *et al.* 2010).

The definition of digital participatory planning tool from strictly participation perspective is defined according to the level of the participation allowed in the tool, which can be taken from Arnstein's ladder of participation stages. Digital participatory planning tools nowadays allow the first two stages of the eight rungs ladder of Arnstein (1969). Respectively, they allow firstly to educate and let the citizens hear about the plan, then informing, consultation and placation which means allowing citizens to hear and be heard but without any further power to make their voices carried out or comes to reality. The third stage is not yet taking into consideration in nearly all of nowadays tools, but definitely considered in the Swiss e-voting tool in the city of Zug which will be discussed later in the data collection part of this research.

The early age of digital participatory planning tools was discussed in the book *Digital tools in participatory planning* (2010). Three different approaches digital tools had back then. The first one is data collecting tools to be used by urban planners, tools empower wider urban planning participation and tools and platforms allows co-develop urban planning participation. But nowadays most tools allow the three approaches together with additional advanced features.

Wallin, Horelli & Saad-Sulonen think that these tools clearly changing and improving the way that urban planner work beside its notable side in obtaining information and its widespread communication for reaching participants. And conclude with the believe that the development of digital participatory planning tools will change the field of participatory urban planning in both practice and research. Simultaneously, Staffans, Rantanen and Nummi (2010) stressed that the urban planning institutions cannot depend only on their own information and data anymore.

For those who have skeptic point of view regarding digital participatory planning tools comes the need to point out the linkage between digital participatory planning tools and Geographic Information System (GIS). The reason for this linkage is to show the importance of these tools and their promising future. The current situation of digital participatory planning tools is similar to the early age of GIS back in the late 1960s and how very few used it back then, and how later on all urban planners start depending strongly on it (Yeh, 1999). Nowadays almost impossible to plan without the help of the GIS. It revolutionized the way urban planners think and prepare their urban plans and so will digital participatory planning tools do. This linkage will be explained technically in the next section. In fact, a number of digital participatory planning tools named with the composition of words including the word GIS such as: Participatory GIS, Participatory planning GIS and SoftGIS.

Another evidences on the success of digital participatory planning tools is there worldwide spread. Falco & Kleinhans (2018) have detected 113 digital platform, which are currently active and used in urban development and spread around the world. But current literature regarding digital participatory planning tools is still limited. Digital participatory planning tools need to be addressed and researched more to learn about their benefits and effectiveness in participatory planning. (Afzalan & Muller, 2018). For this reason, Falco & Kleinhans (2018) Stated that their goal is to conduct more in-depth research regarding digital participatory planning tools. The need for these tools is confirmed for the application, functionality and spread of participatory e-planning (Panagiotopoulou & Stratigea, 2017).

Digital participatory planning tools' helpful side:

The benefits of digital participatory planning tools from the current available literature is discussed one by one in the following paragraphs, but some of these benefits could be very broad assumptions, due to the lack of the appropriate research in the literature. In order to have insights regarding these benefits. Table 1 list some of the Finnish digital participatory planning tools and some of the benefits which were researched in the *Digital Participatory Planning Tools* (2010) book by Wallin, Horelli and Saad-Sulonen (2010).

Table 1 Digital participatory planning tools benefits:

Tool Name	Tool type	Tool Aim	Benefits	Literature
SoftGIS	Web-based SoftGIS	Build a bridge between the residents and urban planners. By allowing residents to generate information about their own living environment	Collecting local knowledge, information and data Mapping data collected to be used in GIS	(Kahila & Kytä, 2009).
OPUS Project	Internet-based platform	Connect online discussions on forums to the actual planning and development processes in terms of their timing and locality. Gathering and combining local information and knowledge on urban planning on Internet forums.	Collecting local knowledge, information and data Better decision-making	(Staffans, Rantanen & Nummi, 2010).
Tell a Story (TaS)	Mobile phone application	Support communication during the early phases of urban Planning and tested these technologies in the field.	Collecting local knowledge, information and data Reduce marginalization	(Halttunen, Juustila & Nuojua, 2010).
WebMapMedia	Web mapping application	Support participatory planning	Increase equality Enhance Participation	
The Kotikatu System	Local website	Connect people and create and channel discussion around different topics for the sake of their neighborhood	Collecting local knowledge, information and data Reduce marginalization Increase equality Enhance Participation	(Kanervo, 2010).
Recommendation Machine	Web-based platform	Plan and co-produce ubiquitous services of everyday life and events, in the context of community development of two Helsinki neighborhoods.	Help in consensus building between different parties of the community	(Horelli & Wallin, 2010).
Meeting Point				

Source: Own elaboration

Benefits of digital participatory planning tools on the urban planning process:

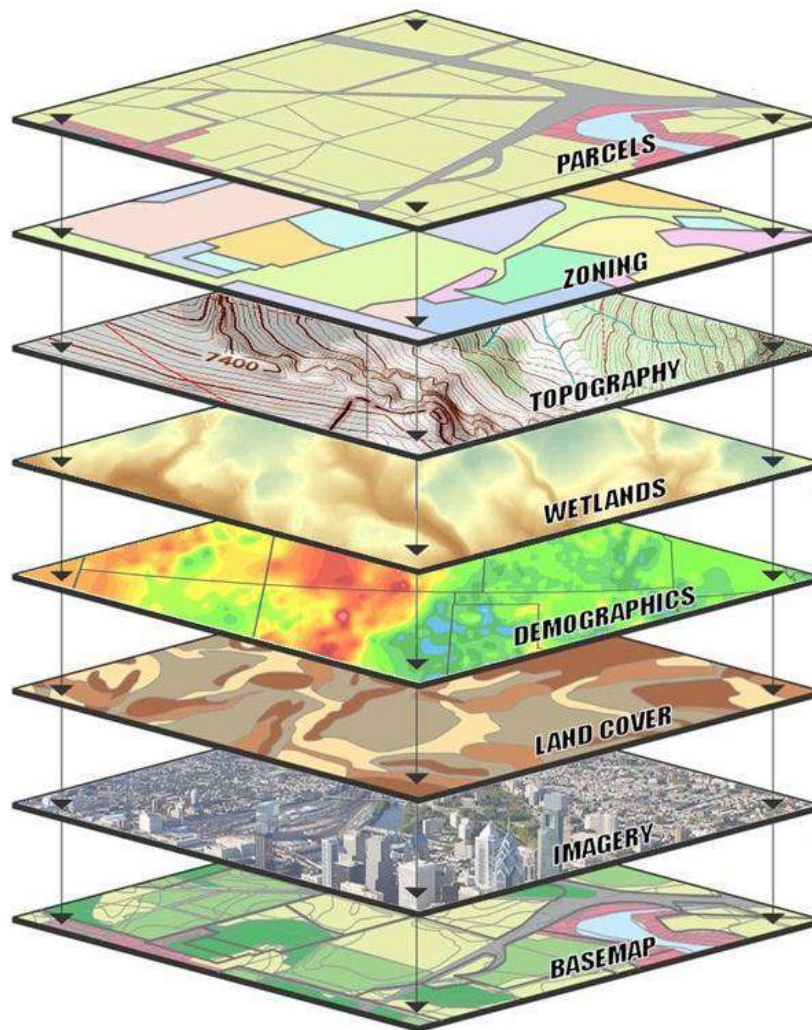
Collecting local-knowledge, information and data: the benefit agreed on by all tools. digital participatory planning tools can help in obtaining location-based data which the urban planners are not capable of obtaining it because they are strangers to the location. Collecting this local-knowledge, information and data to be learned from and used by the urban planners which can benefit the urban planning process and will be explained how in the next paragraphs, along with better decision-making resulting also from the benefits of these tools. (Kahila & Kytä, 2009; Staffans *et al.* 2010; Kanervo, 2010; Wallin *et al.* 2010; Afzalan & Muller, 2018). The instant data collected by digital participatory planning tools can help the urban planner in identifying and defining local needs so they can plan to the need (Fischer, 2000; Rantanen & Kahila, 2009). In which can avoid wasting efforts and resources.

Mapping data collected to be used in Geographic Information System (GIS): In order to explain how data collected by digital participatory planning tools can improve the urban planning process. Digital participatory planning tools are linked to Geographic Information System (GIS). Some researchers even consider these tools as a part from GIS, such as Kahila & Kytä (2009) the SoftGIS tool which comprises and produces a special layer in the GIS to be used by experts, such as urban planners. This special layer will be explained together with the way these tools work in the special layer example later on. According to the *Urban and Regional Planning Education* (2016) book digital participatory planning tools are the transformation of conventional mapping and GIS tools. Usually as long as there are more layers in the GIS which are considered in the urban planning process, the plan supposed to be more effective and the project is more likely to be successful as shown and explained in the above examples of the special layer. In the same way of thinking and using the same logic adding more layers obtained by digital participatory planning tools to the GIS which are could be very useful for current and future planning. For instance, the softGIS (Kahila & Kytä, 2009) is working exactly for this purpose. While Rantanen & Kahila (2009) emphasize on valuing local knowledge by urban planners. Simply the data collected by digital participatory planning tools can be turned into maps and layers to the other layers of the GIS software which will lead to a better and more effective urban planning process, for the reason of considering more data and more input in the planning process. Which it will be explained in the Special Layer examples.

Special layer example: In order to have a clear vision of what this special layer is: I have made an imaginary simple example and illustrate it with some figures of actual layers for further understanding. This example was made after proper researching and understanding the mechanism and the technicality which these tools function and work.

The example begins with listing Geographic Information System (GIS) typical layers, then an explanation about this example with listing the three layers which the special layer consists of and ends with a discussion about the result of this special layer.

Geographic Information System (GIS) typical layers can be: One layer for each of the following: streets, parcels, zoning, topography, wetlands, demographics, land cover, imagery, flood zones, client locations, competition, shopping centers, office parks, demographics, etc. [Figure 1]. When these layers are drawn on top of one another, it allows understanding of the aspects of a certain location.



[Figure 1] Image credit: Ontario County, NY (2016).

Digital participatory planning tools can add to the GIS's layers a special layer. This special layer is based on an instant data and information provided by participants. Basically, this special layer is obtained after mapping participants' instant data and information. In which could be valuable and can help in better planning and better decision-making.

The following simple imaginary example can give a quite understanding of what this Special Layer is: Imagine that urban planners through their annual check, they have noticed that the number of women who marked themselves pregnant is above the usual rate. Through a quick calculation, they found out the need for a new kindergarten in the next couple of years. The goal for the urban planners is to make the most sustainable, ecological, environmental, convenient and low-cost project. The urban planners start the planning process by asking the people of the city to participate and provide them with data, through the following question:

Mark your home location if you are one of following: pregnant, unemployed kindergarten's teacher, unemployed worker, interested in teaching or working in a kindergarten.

The result of mapping the above data is the following three layers: [Figure 2]

Layer 01. Pregnant women

This layer is for women who marked themselves pregnant women and provide the digital participatory planning tool with this data.

By observing the pregnant women's home location. we will find that most the pregnant women are in the center area.

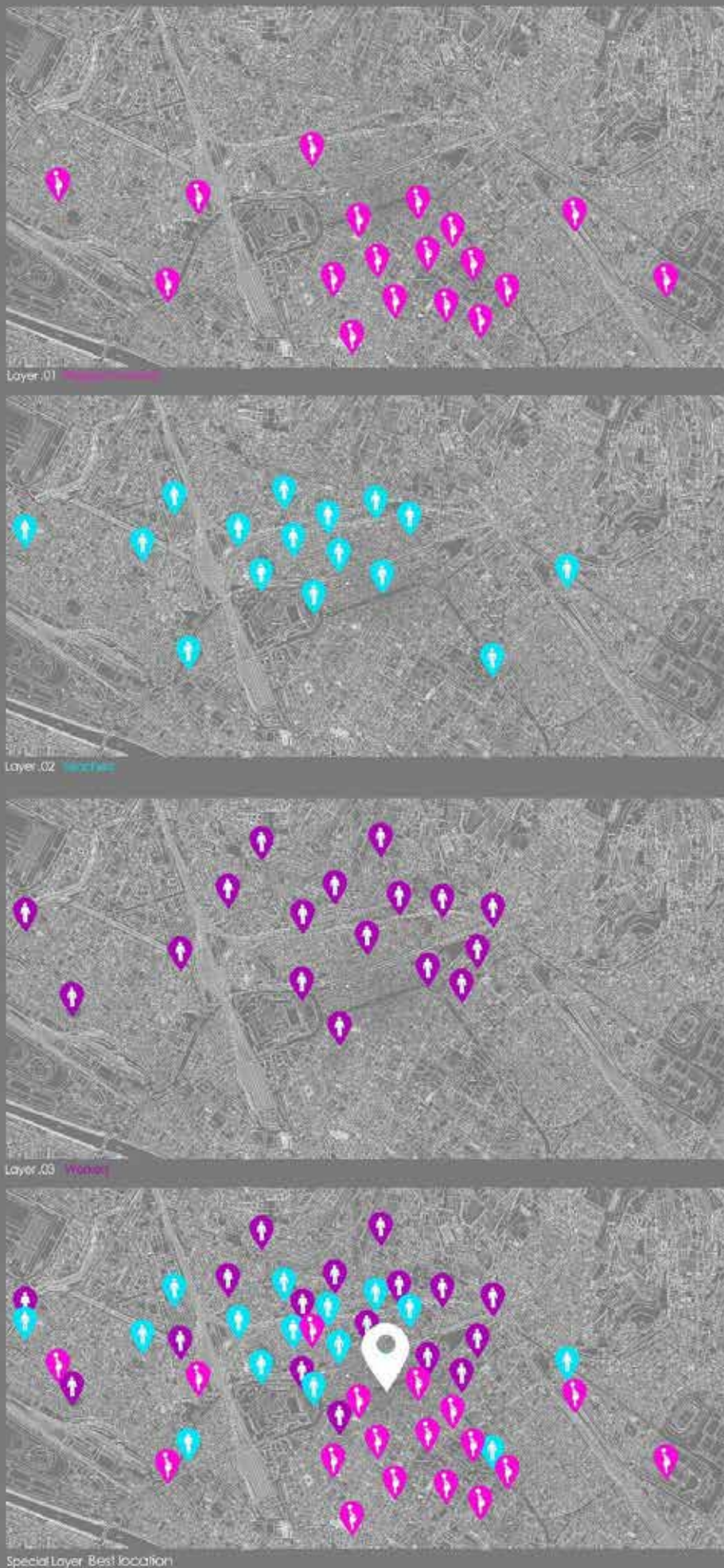
Layer 02. Kindergarten's teachers

This layer is for the kindergarten's teachers. This data obtained through the following possibilities: First, by calculating the number of the unemployed teachers and second by calculating students who are studying kindergarten teaching.

By observing the kindergarten's teachers home location. we will find that most teachers live in the northern part of the city.

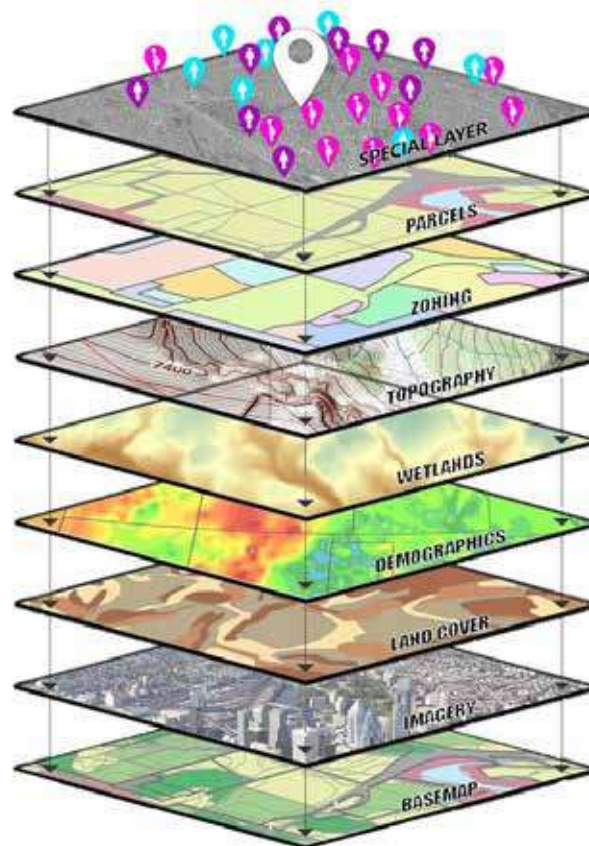
Layer 03. Workers

This layer is for the workers needed for this kindergarten. This data obtained through the following possibilities by calculating the number of the unemployed workers, and people who are willing to work in a kindergarten. By observing the kindergarten's workers home location. we will find that most workers live also in the northern part of the city.



[Figure 2] Special layer. *Source: Own design*

The benefit of this Special Layer can help the urban planner allocating the most suitable location for the new kindergarten: After overlapping the three layers: 01,02,03 The digital participatory planning tool can determine the most suitable location for the kindergarten. The kindergarten location will be a walking distance for all the people involved: which will cut and minimize the use of cars, buses and other transportation. In addition to: Environmental solution: which will protect the environment and reduce the pollution of the area. Save money: cut unnecessary expenses related to kindergarten buses, parents' cars, etc. Save time: time to reach the kindergarten (children and their parents, teachers, workers, etc. Satisfaction: for most people involved. This Special layer could be added to the GIS layers as another important factor to be considered in the planning process of the project. [Figure 3]



[Figure 3] GIS typical layers with the special layer on the top.
Image credit: Ontario County, NY (2016). Except for the Special Layer.

Benefits of digital participatory planning tools on urban planning goals:

Marginalization, equality and public participation: From Table 1, Halttunen *et al.* (2010). Believe that ICT could reduce marginalization through allowing the participation of those most isolated. When the marginalization is reduced the equality hits a higher level by their inverse relation. Digital participatory planning tools can ensure equality (Kahila & Kytä, 2006; Kanervo, 2010). ICT reduces inequality through giving everyone especially the disadvantaged segments of the society same chances

and equal opportunities. Because they can reach a larger number of people. Especially those who cannot participate in public meetings for the reasons of time, place or other restrictions. Beside attracting youth who are fond of technology and technological solutions. For this reason, Kanervo (2010) Staffans *et al.* (2010) Afzalan & Muller (2018) claim that use of digital participatory planning tools could enhance public participation. Several scholars agree on that ICT has the potential for enhancing public participation (e.g. Ann Macintosh: is emeritus professor of Digital Governance at the University of Leeds).

Consensus building: Another benefit of digital participatory planning tools is consensus building. (Horelli & Wallin, 2010; Afzalan & Muller, 2018). Which can lead to reduce unnecessary conflicts between citizens, stakeholders and urban planners beside building trust in the society.

(Saad-Sulonen, & Botero, 2010) Based on the result of their case study of Malminkartano in Helsinki believes that digital participatory planning tools and citizen participation in planning has a positive outcome on the participatory planning process. Although digital participatory planning tools can help planners achieve their public participation goals (Afzalan & Muller, 2018). Babelon *et al.* (2017) argue that e-participation outcomes remain weak or indeterminate. And urge future research to further explore and assess digital tools towards knowing their potential value in urban planning. So, for this reason digital participatory planning tools will be furthered researched in the questionnaire of this research to gain more evidences and insights to support these benefits and overall helpful side. In other words, finding an answer for the question of:

- How could for the digital participatory planning tools help in improving the urban planning process?

Digital participatory planning tools' data privacy issue and its side effects:

The meaning of the term information or data privacy was defined by Westin (1970) "*Privacy is the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others.*"

Due to the limited literature addressing digital participatory planning tools and their benefits, there is also limited literature addressing the side effects of these tools. In this limited literature there are increased concerns from urban planners and researchers regarding the side effects of these tools specifically data privacy. Data privacy is the most assured and pushing issue in this era in the literature, which also has general agreement on.

Data privacy is one of the main issues that digital participatory planning tools are suffering from is data privacy and it is preventing its improvements. Data privacy affecting the participation process and the way digital participatory planning tools work firstly and secondly affecting the safety of the city and the society.

Data privacy concerns: The data privacy concerns are not a recent thing; urban planners expressed their concerns more than a decade ago. But these concerns were increased remarkably lately. Urban planners expressed their data privacy concerns specifically in digital participatory planning tools (Afzalan, 2015; Afzalan & Muller, 2018; Blatt, 2012; Foth, 2006; Fredericks & Foth, 2013; Kahila & Kytta, 2009; Khan *et al.* 2014; McNutt, 2014; O'Sullivan, 2006; Shilton, 2012; Zavattaro & Sementelli 2014). Broader kind of concerns came from Angelidou (2014) Van Zoonen (2016) Viitanen & Kingston (2014) who expressed their data privacy concerns in the whole smart city context and its technologies

which includes data related to participation. These concerns include beside data privacy, the possibility of selling this personal data and personal information. Second, data security and the risk of getting this data stolen. Third, data management and data analysis. These concerns exist in both phases in data collection and data analysis.

The above data privacy concerns are a lot considering the literature exists regarding digital participatory planning tools. The question here is why. Could be because of their possible effects on the participatory process, the urban planning process, urban planners and the participants. These effects will be examined and furthered research by the questionnaire of this research:

- How could for data privacy issue in digital participatory planning tools effects the urban planning process and urban planning overall goals?

In favor of understanding data privacy issue's relation and linkage to digital participatory planning tools, the following discussions give quite insights regarding their effects and consequences. Data privacy effects on the urban planning process and on urban planning overall goals:

Participation rate and data Quality: When participants get skeptic regarding their participation data, they might stop participating or they might participate with fake or inaccurate data to protect themselves in which can lower participation rate and lower data quality which are the two main challenges of digital participatory planning tools. So, in order to obtain a higher participation rate and a higher quality of data, participants need to be assured that their data is secured and handled well, so they can contribute and participate more and with an accurate data. Once these tools obtained high quality data, they will produce high quality information and vice versa. Otherwise, the whole effectiveness of these tools is on the line. Staffans *et al.* (2010) consider the quality of the information as one of the most important aspects in these tools. However, Kahila & Kytä (2009) urge more improvements for digital participatory planning tools to guarantee the quality of the information they produce.

Data privacy effects on the society:

Urban planners' responsibilities: Digital participatory planning tools are not like any other platform. These tools collect critical and sensitive personal data from the participants such as: location, income, race, etc. In case this data fall into the wrong hands they can cause a serious damage and a serious harm to the participants and the city. This put urban planners who run the digital participatory planning tool under massive responsibilities. Angelidou (2014) Elmaghraby & Losavio (2014) agree that Smart City technologies can grasp from people real-time demographic data in way violate their privacy.

The above-mentioned consequences of data privacy issue will be further researched in the questionnaire of this research. The next two paragraph will emphasize on the seriousness of the data privacy issue according to the European law and Information and Communication Technologies ICT field.

General Data Protection Regulation (GDPR) ¹: A recent shake-up event in the data field was the European Union's new data privacy law. which replaced the old one of 1995, which was agreed on and adopted in 2016, and started to be applied in 2018. Personal data refers to any information that relates to an identified or identifiable, living individual. Sensitive personal data is data related to your: race, religion, sexual orientation, location, income, health record, contact info, political opinion and others. GDPR gives you the right to the following: to know who is processing your data and why, access your data, to object, to correct your data, to delete your data and to be forgotten. Simply, GDPR law allows you take back control over your data. The reason behind GDPR law is the massive increase in the collection,

storing, analyzing and trading of personal data by companies and governments. In addition to the concern of the possibility of getting your information and data stolen if a database got hacked. The GDPR law marked the turning of the personal data privacy and protection issue to the surface.

Data privacy from the perspective of Information and Communication Technologies (ICT) field: is also quite serious and a hot topic recently. The International Federation for Information Processing (IFIP) which was established in 1960 under the auspices of UNESCO and one of the leads gathering in the field. It has created a yearly international conference focuses on security started in 1986 but in 2003 it starts to be focused on privacy. Data privacy remained steady till 2019 and it became one of their aim. The 2017 IFIP summer school was dedicated to the exploration of new legal solutions to encounter data privacy issue. ("IFIP Information Security Conference & Privacy Conference - IFIP Technical Committee 11"). In their publication *Privacy and Identity Management. The Smart Revolution. (2017)* a blockchain solution was presented. Neisse *et al.* (2017) believe that blockchain technology could be a solution for enforcing the GDPR data privacy law because it allows transparency, auditability, and immutability features.

Blockchain Technology: in order to discover this technological blockchain possible solution, let's go back to the definition of Blockchain technology: "*Blockchain*" is a cryptographic data structure often employed in Distributed Ledger Technology (DTL) that is constructed through successive cryptographic hashing of blocks of transactions. Blockchain benefits from Identify Management point of view (Dunphy & Petitcolas, 2018) could ensure data privacy.

While Dhillon *et al.* (2017) consider that "*the fundamental shift that blockchain technology represents is a method for moving away from an attempt to have a central trusted authority in a massively distributed network. But instead to have multiple sources of trust that must all agree, based on an algorithm that this transaction can be trusted as valid.*" Early examples in 2017 extend beyond financial transactions to cover other aspects of FinTech, RegTech (regulation), InsuranceTech, GovTech (eVoting, licensing, records and certification), HealthTech, and many others. The question here is:

- Could Blockchain technology be the solution for data privacy issue in digital participatory planning tools?

To sum up, although current literature suggests that digital participatory planning tools could have a helpful side on the urban planning process. But only limited literature available regarding them and the need for expanding this literature is demanding. Especially since these tools are technologic-based and technology research is time sensitive and it changes in a short period of time.

Methodology

The methodology will be based on qualitative approach. It will depend on several types of evidences such as documents, surveys and a questionnaire. The methodology followed is need to examine and find answers for the questions of this research paper. The questionnaire method consists of close-ended and open-ended questions and it will be explained in details next.

The questionnaire instrument:

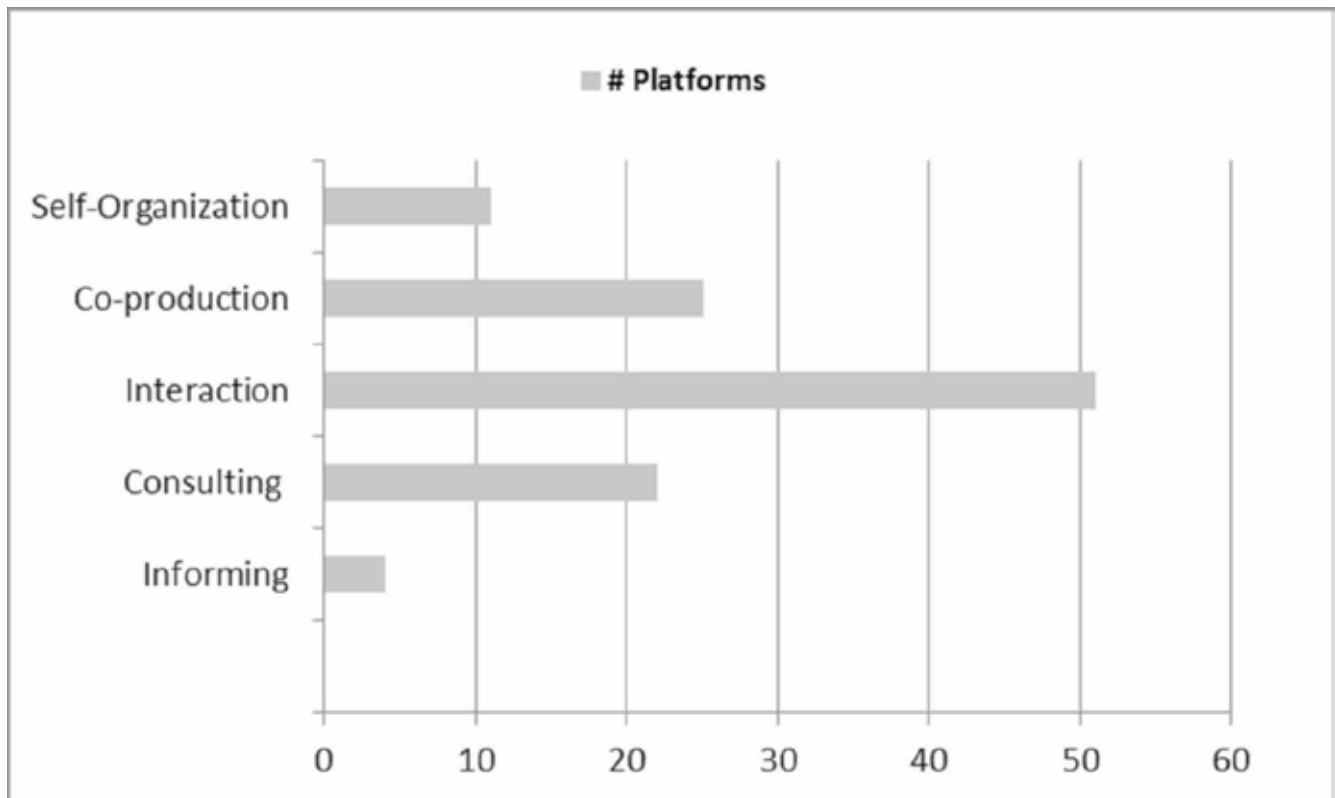
The instrument chosen is web-based self-completion open-ended questionnaire. The reasons behind choosing the methodology are coming from its advantages in saving time, provide fast analysis, cheap, accurate and it could be more effective for such topic which handling sensitive issues. In addition, it allows answers to be richer, longer and more revealing specifically for open-ended questions (Brace, 2004).

Questionnaire design and objectives:

The questionnaire was designed following the instruction of Don Dillman (2011) in his book Mail and Internet survey. The questionnaire will be forwarded and aimed towards 113 international experts in digital platforms. These digital platforms are currently active and used in urban development and spread around the world. They were detected by Falco & Kleinhans (2018) and they are going to be the unit of analysis. The total number of 113 digital platforms are spread over the seven continents as shown in [Figure 4]. according to the level of participation allowed in them [Figure 5].



[Figure 4]² Geographical distributions of digital platforms. *Source: Digital Participatory Platforms for Co-Production in Urban Development: A Systematic Review by Enzo Falco and Reinout Kleinhans (2018). DOI: 10.4018/IJEPR.2018070105.*



[Figure 5]² Number of platforms per level. *Source: Digital Participatory Platforms for Co-Production in Urban Development: A Systematic Review by Enzo Falco and Reinout Kleinhans (2018).*
DOI: 10.4018/IJEPR.2018070105.

Questionnaire purpose:

The purpose of this questionnaire is to explore first, the helpful side of digital participatory planning tools. Second, exploring digital participatory planning tools' data privacy issue and its effects. Third, evaluating whether Blockchain technology could be a possible solution for this issue.

Welcome to the study of exploring digital participatory planning tools

What are the benefits of your participatory planning platform on the urban planning process?

(Please, select all that apply)

- Collecting local-knowledge, information and data that is useful for the urban planning process
- Mapping collected data to be used in Geographic Information System (GIS)
- Analyzing collected data help in planning exactly to the need
- Add another benefit

What are the benefits of your participatory planning platform on the urban planning overall goals?

(Please, select all that apply)

- Reduce marginalization
- Increase equality
- Consensus building
- Reduce unnecessary conflicts
- Enhance public participation
- Add another benefit

Approximately, could you indicate the number of the participants in your platform according to the following years?

Number of Participants	Year
	2015
	2016
	2017
	2018
	2019

What are the consequences of data privacy issue in participatory planning platforms?

(For example: this data got stolen or hacked and fell into the wrong hands)

(Please, select all that apply)

- Put the urban planner under massive responsibility
- Put the participants under risk
- Put the city under risk
- Other *(please specify)*

What are the possible effects of data privacy issue in participatory planning platforms?

(For example: When participants get skeptic regarding their data safety, they might stop participating or they might participate with fake or inaccurate data to protect themselves)

(Please, select all that apply)

- Lower participation rate
- Lower data quality
- Other *(please specify)*

Are you currently applying certain solutions to encounter the issue of data privacy in your platform?

- Yes *(please specify)*
- No

Can Blockchain technology be a solution for data privacy issue in participatory platforms?

- Agree *(Please explain why?)*
- Disagree *(Please explain why?)*

Would you like to provide further comments, evidences, data, case studies, pictures, videos?
(e.g. to enrich any the above questions purposes or your answers to them)

(attach a file)

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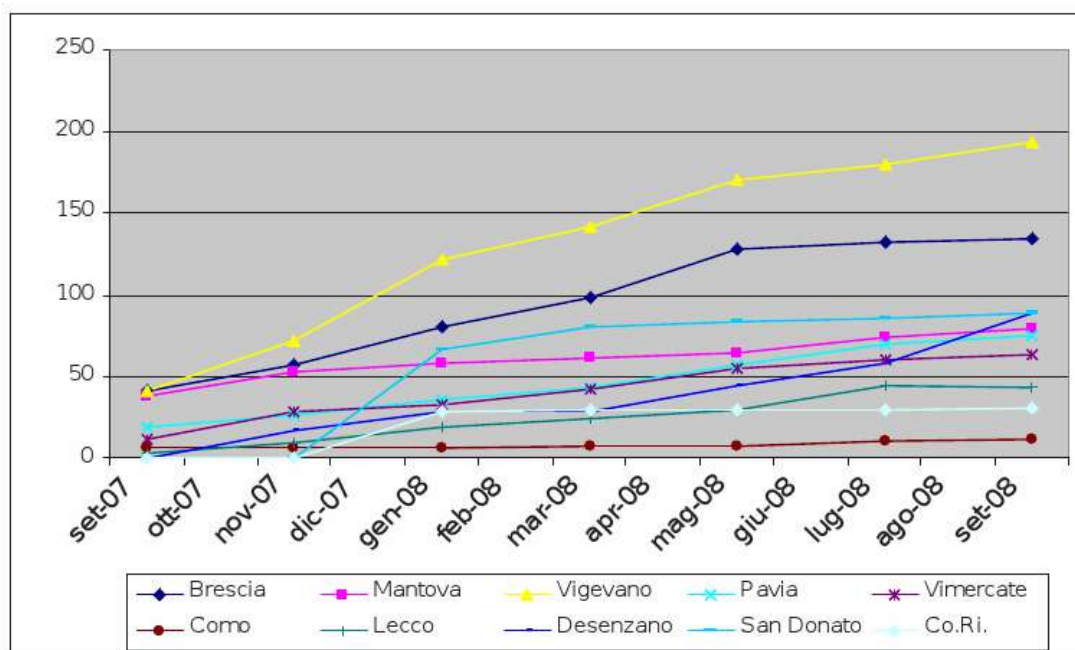
Results and discussion

The promising future of E-participation:

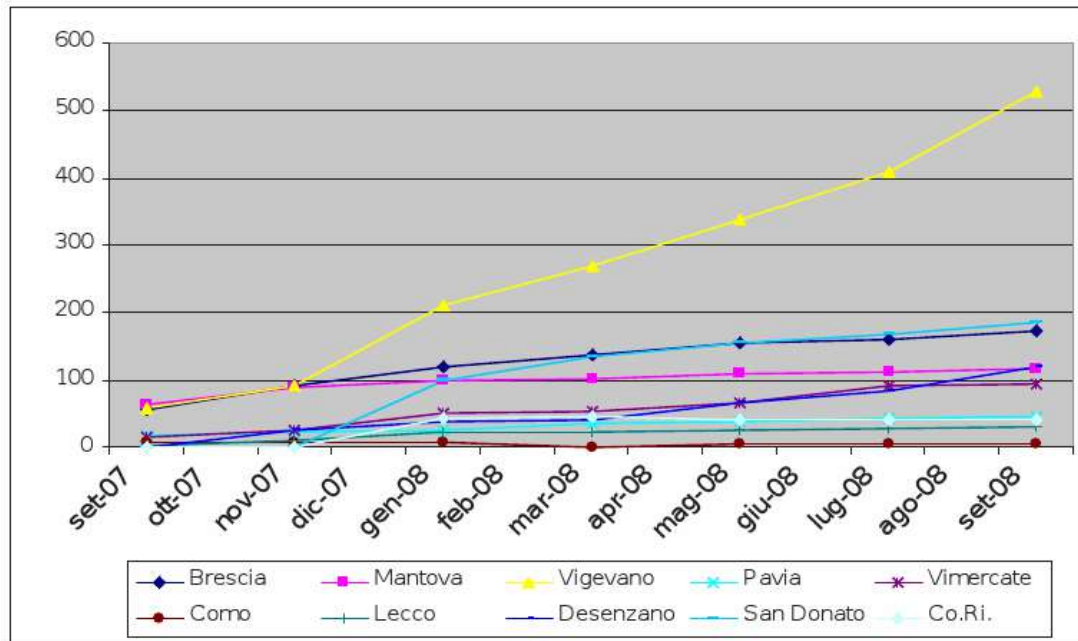
As an evidence on the promising future and growth of e-participation at the urban level, De Cindio & Peraboni (2009) Presented two graphs of the following:

- Number of registered participants [Figure.6];
- Number of messages sent in the CityMap [Figure.7].

In a large field experiment involving ten different municipalities' websites in the Lombardy region, in the North of Italy, for a duration of one year.



[Figure 6]³ The number of registered participants. Source: *Fostering e-Participation at the Urban Level: Outcomes from a Large Field Experiment* by Fiorella De Cindio and Cristian Peraboni (2009). Copyright © 2009, Springer-Verlag Berlin Heidelberg.



[Figure 7]³ the number of messages sent in the CityMap. *Source: Fostering e-Participation at the Urban Level: Outcomes from a Large Field Experiment by Fiorella De Cindio and Cristian Peraboni (2009). Copyright © 2009, Springer-Verlag Berlin Heidelberg.*

The graphs show some basic participation indicators of the activity in the ten websites plotting their e-participation trends. The graphs could tell on the gradually increase in the number of participants and the e-participation over time.

The Swiss possible solution for data privacy⁴ issue in digital participatory planning tools:

In June 2018, the city of Zug in Switzerland made a e-voting platform uses an innovative encryption technology that on one hand anonymizes the votes and on the other hand allows tamper-proof tally and secure audit. This technology is called blockchain and it was created by Luxoft Holding, Inc (NYSE:LXFT) a global IT service provider, partnered with the City of Zug and Lucerne University of Applied Sciences in Switzerland.

The reasons behind choosing the Swiss e-voting platform as role model are the following:

- It's the pilot blockchain-based platform.
- It's an official platform used by government.
- Its purpose is to drive the adoption of this kind of technology in government.
- It is a state-of-the-art platform which was experimented in the middle of 2018.
- No literature on using blockchain-based platform in digital participatory planning tools.
- It is a blockchain based platform uses decentralization which means no authority can see citizens' personal data ("World Economic Forum", 2017).
- The platform is decentralized and deployed on three different data centers in the cloud: two in Switzerland and one in Ireland. By distributing the data into three different data centers,

security and data loss risks are distributed geographically, making the system more robust. What's more, the platform can permanently delete voting data within an agreed time, in accordance with Swiss law.

- “As a result, we believe this technology cannot be owned by a single company. We will make the e-voting platform open source so people can understand what makes up the technology and how it works, ensuring full transparency. Looking ahead, our alliance will encourage more people to develop blockchain-based applications for Governments worldwide.” said Vasily Suvorov, Chief Technology Officer at Luxoft.

50 Giant companies' stand of Blockchain:

Most recently in April 2019, *Forbes* magazine marked the Spring of blockchain technology with a new list features 50 big companies -with minimum revenues or valuations of \$1 billion and U.S. operations, e.g. Amazon, Facebook, Google, Intel, HTC, Microsoft and IBM- that are leading the way in adapting decentralized ledgers to their operating needs. All of these companies plan to use the privacy features of blockchain to profit from their customers' data while protecting their identities. The list of companies' sectors varies from: finance, technology, insurance, transportation, media, retail, healthcare, food to energy. (Del Castillo *et al.* 2019). This list was made through contacting key leaders and consultants in each of these giant companies with positions vary such as: president, VP, General Manager, CTO, CIO, EVP. This list gives insight on the potential of Blockchain technology regarding data privacy issue.

Conclusion

The above-mentioned results and the questionnaire expected results lead to the following conclusion. Digital participatory planning tools can have benefits and a helpful side on the urban planning process and on the urban planning overall goals by providing urban planners with useful information. The future is promising and open for digital participatory planning tools and their importance will be similar to the importance of the GIS. But with the limited literature available regarding these tools comes the urgency to research them more and expand their current literature. Expand their literature towards knowing their benefits and value together with their helpful side in improving the urban planning process (Panagiotopoulou & Stratigea, 2017). Data privacy is quite serious issue in digital participatory planning tools. Because it could affect the urban planning process, the urban planning overall goals and the society. Blockchain technology could be a solution for the issue of data privacy in digital participatory planning tools. The final results of the more in-depth future research will provide additional evidences that support this conclusion.

References

- Afzalan, N., 2015. *Participatory plan making: Whether and how online participatory tools are useful*. University of Colorado at Denver.
- Afzalan, N. and Muller, B., 2014. The role of social media in green infrastructure planning: A case study of neighborhood participation in park siting. *Journal of Urban Technology*, 21(3), pp.67-83.
- Afzalan, N. and Muller, B., 2018. Online participatory technologies: opportunities and challenges for enriching participatory planning. *Journal of the American Planning Association*, 84(2), pp.162-177.
- Angelidou, M., 2014. Smart city policies: A spatial approach. *Cities*, 41, pp.S3-S11.
- Arnstein, S.R., 1969. A ladder of citizen participation. *Journal of the American Institute of planners*, 35(4), pp.216-224.
- Blatt, A.J., 2012. Ethics and privacy issues in the use of GIS. *Journal of Map & Geography Libraries*, 8(1), pp.80-84.
- Boyd, D.M. and Ellison, N.B., 2007. Social network sites: Definition, history, and scholarship. *Journal of computer-mediated Communication*, 13(1), pp.210-230.
- Brace, I., 2018. *Questionnaire design: How to plan, structure and write survey material for effective market research*. Kogan Page Publishers.
- Del Castillo, M; Kauflin, J; Hansen, S; Stoller, K; Knapp, A; Ponciano, J; Feldman, A; Strauss, K; Debter, L; Wolfson, R; Pollack, D; Schiffrin, M, 2019, BLOCKCHAIN 50. Forbes Inc, 30 April.
- De Cindio, F. and Peraboni, C., 2009, September. Fostering e-participation at the urban level: Outcomes from a large field experiment. In *International Conference on Electronic Participation* (pp. 112-124). Springer, Berlin, Heidelberg.
- Dillman, D.A., 2011. *Mail and Internet surveys: The tailored design method--2007 Update with new Internet, visual, and mixed-mode guide*. John Wiley & Sons.
- Dhillon, V., Metcalf, D. and Hooper, M., 2017. *Blockchain Enabled Applications: Understand the Blockchain Ecosystem and How to Make it Work for You*. Apress.
- Dunphy, P. and Petitcolas, F.A., 2018. A first look at identity management schemes on the blockchain. *IEEE Security & Privacy*, 16(4), pp.20-29.
- Elmaghraby, A.S. and Losavio, M.M., 2014. Cyber security challenges in Smart Cities: Safety, security and privacy. *Journal of advanced research*, 5(4), pp.491-497.
- Evans-Cowley, J. and Hollander, J., 2010. The new generation of public participation: Internet-based participation tools. *Planning Practice & Research*, 25(3), pp.397-408.
- Evans-Cowley, J. and Manta Conroy, M., 2006. The growth of e-government in municipal planning. *Journal of Urban Technology*, 13(1), pp.81-107.
- Foth, M., 2006. Facilitating social networking in inner-city neighborhoods. *Computer*, 39(9), pp.44-50.
- Fredericks, J. and Foth, M., 2013. Augmenting public participation: enhancing planning outcomes through the use of social media and web 2.0. *Australian planner*, 50(3), pp.244-256.
- Halttunen, V., Juustila, A. and Nuojua, J., 2010. Technologies to support communication between citizens and designers in participatory urban planning process. *Digital tools in participatory planning*, pp.79-91.

- Horelli, L. and Wallin, S., 2010. Developing a new approach to E-planning within community development–The case of Ubiquitous Helsinki. *Digital tools in participatory planning*, pp.109-134.
- IFIP Information Security Conference & Privacy Conference - IFIP Technical Committee 11. (n.d.). Date of access: 12/02/2019. <https://www.ifipsec.org/About-IFIP-TC11/>
- Kahila, M. and Kytä, M., 2006, May. The use of web-based SoftGIS-method in the urban planning practices. In *Proceedings of the conference on urban conditions and life changes*.
- Kahila, M. and Kytä, M., 2009. SoftGIS as a bridge-builder in collaborative urban planning. In *Planning support systems best practice and new methods* (pp. 389-411). Springer, Dordrecht.
- Kanervo, A., 2010. The Users as Co-producers on a Neighbourhood Website–The local perspective to ICT-tools and urban planning. *Digital tools in participatory planning*, pp.93-108.
- Katan, R., 2014. *Building Together: Case Studies in Participatory Planning and Community Building*. New Village Press.
- Khan, G.F., Swar, B. and Lee, S.K., 2014. Social media risks and benefits: A public sector perspective. *Social science computer review*, 32(5), pp.606-627.
- Kleinhans, R., Van Ham, M. and Evans-Cowley, J., 2015. Using social media and mobile technologies to foster engagement and self-organization in participatory urban planning and neighbourhood governance.
- Kumar, A., Meshram S, D. and Gowda, K., 2016. *Urban & Regional Planning Education: Learning for India*.
- McNutt, K., 2014. Public engagement in the Web 2.0 era: Social collaborative technologies in a public sector context. *Canadian Public Administration*, 57(1), pp.49-70.
- Neisse, R., Steri, G. and Fovino, I.N., 2017, September. Blockchain-based Identity Management and Data Usage Control. In *IFIP International Summer School on Privacy and Identity Management* (pp. 237-239). Springer, Cham.
- Ontario County, NY. GIS Data Layers Visualization, Date of access: 24/08/2016. <http://www.usgs.gov/media/images/gis-data-layers-visualization>.
- O'Sullivan, D., 2006. Geographical information science: critical GIS. *Progress in Human Geography*, 30(6), pp.783-791.
- Panagiotopoulou, M. and Stratigea, A., 2017. Spatial data management and visualization tools and technologies for enhancing participatory e-Planning in smart cities. In *Smart Cities in the Mediterranean* (pp. 31-57). Springer, Cham.
- Palfrey, J. and Gasser, U., 2012. *Interop: The promise and perils of highly interconnected systems*. Basic Books.
- Shilton, K., 2012. Participatory personal data: An emerging research challenge for the information sciences. *Journal of the American Society for Information Science and Technology*, 63(10), pp.1905-1915.
- Staffans, A., 2004. Vaikuttavat asukkaat. *Vuorovaikutus ja paikallinen tieto kaupunkisuunnittelun haasteina. Yhdyskuntasuunnittelun tutkimus- ja koulutuskeskuksen julkaisuja A*, 29.
- Staffans, A., Rantanen, H. and Nummi, P., 2010. Online environments shake up urban planning. *Digital tools in participatory planning*, 37.
- Stratigea, A. and Στρατηγέα, A., 2015. Theory and methods of participatory planning.

- Townsend, A.M., 2000. Life in the real-time city: Mobile telephones and urban metabolism. *Journal of urban technology*, 7(2), pp.85-104.
- Van Zoonen, L., 2016. Privacy concerns in smart cities. *Government Information Quarterly*, 33(3), pp.472-480.
- Viitanen, J. and Kingston, R., 2014. Smart cities and green growth: outsourcing democratic and environmental resilience to the global technology sector. *Environment and Planning A*, 46(4), pp.803-819.
- Horelli, L. and Wallin, S., 2010. Developing a new approach to E-planning within community development—The case of Ubiquitous Helsinki. *Digital tools in participatory planning*, pp.109-134.
- Wallin, S., Horelli, L. and Saad-Sulonen, J., 2010. Digital tools in participatory planning.
- Westin, A.F., 1970. „Privacy and Freedom “London. *The Bodley Head*.
- World Economic Forum. Date of access: 18/09/2017.
<https://www.facebook.com/worldeconomicforum/videos/this-swiss-city-is-the-first-in-the-world-to-issue-blockchain-/10154933259931479/>
- Yeh, A.G.O., 1999. Urban planning and GIS. *Geographical information systems*, 2(877-888), p.1.
- Zavattaro, S.M. and Sementelli, A.J., 2014. A critical examination of social media adoption in government: Introducing omnipresence. *Government Information Quarterly*, 31(2), pp.257-264.

Endnotes:

¹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119, 4.5.2016.

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³ These graphs are parts of an article that was published in the book by: Macintosh, A., & Tambouris, E. (Eds.). (2009). *Electronic Participation: First International Conference, ePart 2009 Linz, Austria, August 31–September 4, 2009 Proceedings* (Vol. 5694). Springer. The permission of reuse was adapted by an online license agreement with the copyright holder Springer 2009.

⁴ Experiment stated in two media releases: one by Luxoft and one by the communications department of the city. Obtained through direct contact with the town clerk of Zug city.