

6-29-2023

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Recommended Citation

Jakonen, O. (2023). People-Centric and Inclusive Approach to Planning of Smart Cities. *CSID Journal of Infrastructure Development*, 6(1). <https://doi.org/10.7454/jid.v6.i1.1087>

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PEOPLE-CENTRIC AND INCLUSIVE APPROACH TO PLANNING OF SMART CITIES

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(Received: March 2023 / Revised: June 2023 / Accepted: June 2023)

ABSTRACT

The smart city continues from intelligent, creative, and sustainable urban development imaginaries and started as a technologically oriented urban development framework. Since its conception, debates between academics, planning practitioners, and private firms have expanded and questioned original notions of ‘smart’ to consider people-centeredness, participation, and inclusion themes broadly. These discussions in smart cities have pointed to a need to question and revise many of the aims, approaches, and methods related to smart urban development. This review asks what elements and factors could be required for a city to be considered smart and people centric. The participatory design enabled by digital tools, a holistic appreciation of place-specific complexities, and considerations of how different demographics can appropriate ‘smartness’ as part of their everyday lives could be considered as such factors. Alongside describing participatory design principles more broadly, this paper considers the case of aging and seniors as an example of a group often viewed as deviating from the “average” user. This demographic often does not benefit from smart city design approaches targeting the “average” city user. Furthermore, the paper considers the potential pitfalls of participatory approaches.

Keywords: Digital technology; Participation; Participatory design; People-centeredness; Smart city

1. INTRODUCTION

An increasing number of cities are striving to improve the quality of life of their residents, improve city governance, and increase economic activity and liveliness in their towns (Söderström et al., 2014; Anthopoulos, 2017). As a result, they have branded themselves as smart cities. The smart city is an urban development imagination that provides comprehensive future visions and guides current developments (Caprotti, 2019). It is a continuation of such urban notions as the creative, intelligent, wired, or ecological city (Hollands, 2008; Vanolo, 2013; Söderström et al., 2014) but often with different conceptual origins (Haupt, 2021). While there is still conceptual ambiguity, the novelty of smart cities has been suggested to lay in the potential of concepts of networked technology, such as the Internet of Things and its many applications (Cardullo & Kitchin, 2019). However, the smart city and its “smartness” should be defined as transcending networked technologies. Instead, a real smart city undertakes development from a social and political problem-solving perspective while using technology as a tool (Suopajarvi, 2018).

Participation and people-centric approaches have been suggested as keys to success in the cities’ efforts to become smart. These notions highlight the human and user perspectives in technology-

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DOI: 10.7454/jid.v6.i1.1087

driven urban visions. They have garnered interest from academics, practitioners, and private firms aiming to promote the sustained relevance of their products and services (Sepasgozara, 2019). However, this research work has been somewhat fragmented, focusing on specific elements of people-centric smart urban development. This review attempts to synthesize important findings from this research work by continuing from these discussions.

Most importantly, it is asked how smart city development should be approached for it to be considered people-centric and what some main criteria of a people-centric smart city could be. It is done by exploring smart cities through discussions on people-centeredness, effective participation, and inclusion in the existing literature. A people-centered approach considers the needs of city users and the effects of solutions and urban development on them (Leikas, 2008; Ji et al., 2021). Effective participation is understood as a crucial element of a people-centered approach. Participation can be effective when citizens and other stakeholders successfully communicate their views, preferences, and opinions in two-way communication with planners. It guides the design of the products and services. Inclusion is understood as equitable participation of all relevant stakeholder groups and the practices ensuring this occurs. (Bouzguenda et al., 2019).

Any city could promote itself as a smart city without real involvement from the citizens. While many definitions exist in the research literature, there are few descriptions of how to become a smart city. Even fewer descriptions exist of the role of people-centric approaches in its development. Smart city development will positively impact residents, commercial actors, and the city overall. These can be achieving sustainable economic development, a higher quality of life, utilizing natural resources wisely, and new opportunities for effective urban governance and inclusion (Caragliu et al., 2011).

While there have been some efforts for standardization, there needs to be a more universally acknowledged definition of smart cities (Yigitcanlar et al., 2019). The existing definitions differ in their emphasis on different areas, such as community and community spirit, decision-making, technology, productivity, innovation, quality of life, well-being, sustainability, accessibility, governance, and urban development (Anthopoulos & Fitsilis, 2013). A popular alternative approach has been to conceptualize the smart city as concerning virtually all aspects of the city, where smart (technological) solutions to the economy, mobility, environment, people, living, and governance are provided (Giffinger et al., 2007; Vanolo, 2013). This classification can be useful, but as citizens are involved in all these areas, equipping people with the tools to be “smarter” should be considered for all these areas, not as separate.

2. LITERATURE STUDY

Despite the diversity of definitions, defining a smart city to guide local efforts is essential to identify and assess objectives as well as mechanisms of impact and its components. The formulated definitions, are often the following:

1. The direction and aim of (smart) urban development
2. The areas that are affected by transformation by “smartness”.
3. Mechanism(s) of how smart urban development objectives are achieved

Many definitions emphasize increasing productivity and technology (Anthopoulos & Fitsilis, 2013), but themes of people-centeredness or inclusiveness can be found only in some definitions. Indeed, there is a concern in the research literature that smart city projects focus exclusively on adding and intensifying the use of technology while neglecting their sociocultural effects (Foth, 2018; Effing & Groot, 2016; Ylipulli et al., 2013; Ogie, 2016). A definition by Caragliu et al.

(2011) combines technological development, inclusion, as well as ecologically and economically sustainable development:

“[A smart city is] a city that is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance”.

In practice, it is often unclear to the participating actors what the goal of smart city development is or how to achieve it. Smart city projects are often promoted without a commonly identified definition and objectives. The concept is also often used too ambiguously in urban development discourse (Van den Bergh & Viane, 2016). Therefore, a local manifestation of a smart city should consider adopting a definition that guides local projects, including participation.

The review first starts by exploring elements of people-centeredness in a smart city. After this, participatory design is presented as an important element in people-centeredness and the effort of cities to become smarter. The review then provides an overview of the role of new technological and traditional participatory methods in facilitating planning and interaction in a smart city. Next, potential pitfalls are explored based on existing case studies. To demonstrate the importance of the preferences of different user groups and how to avoid “average user thinking,” the case of planning for aging and seniors are presented. Finally, the conclusion summarizes the findings.

2.1. People-Centeredness

The efficiency and success of a city depend on integrating both “hard” technical and “soft” sociocultural infrastructures. The latter can be understood as social capital (Caragliu et al., 2011). The world’s leading cities enable atmospheres that can be used to develop a vibrant and sustainable city (Caragliu et al., 2011; Effing & Groot, 2016). Hard infrastructure investment, such as implementing smart grids, is insufficient to achieve a smarter city (Salim & Haque, 2015).

People-centric development requires national and municipal governments to look at smart city development through the eyes of the public. The public’s needs and preferences, as opposed to an expert-exclusive approach, should also guide the development of services and solutions (Ji et al., 2021). Many companies and city governments undertaking smart city development have responded to criticisms of technocracy by labeling their smart city development projects as people-centric (Cardullo & Kitchin, 2019). In the research literature, smart cities are often roughly understood as technology-centric or people-centric (Brynskov et al., 2018; Van den Berg & Viane, 2016). In a people-centric smart city, solutions are primarily sought with sociocultural tools rather than only technological ones (Hollands, 2008). However, in a real-world setting, this distinction is often fuzzy or a local brand of a people-centric smart city superficial (Cardullo & Kitchin, 2019).

A people-centered approach to the smart city is an approach that puts user needs and discovers user requirements at the heart of the design process (Leikas, 2008; Ji et al., 2021). People-centeredness can mean different things in different contexts. For example, in e-government, people-centeredness can refer to centralizing services and transactions in one place so that citizens do not have to go to several places or ensure that information is reliable and easily accessible (Chen, 2010). People-centeredness means putting the convenience of administrative transactions at the heart of technical design.

The ease of use of information technology is also a part of people-centeredness. Foth (2018) argues that the design of urban technology and urban interaction should focus more on improving the capabilities of citizens rather than the usability of information technology. For example,

digital tools are designed as intuitive, easy to use, and with room for creativity. In that case, they can solve the already recognized problem and bring about more positive developments than initially anticipated. As such, citizens should not be treated as mere objects of design but as actors who can bring about positive change.

Cities aspiring to be smart cities have an increasing selection of technological smart city solutions to choose from. From this variety, they should choose solutions appropriate to the city's local cultural context (Paulos et al., 2008). For example, this cultural fit can be explored through workshops (Pouke et al., 2018). If a cultural fit is established, the task becomes to deploy the technology and facilitate its adoption by citizens (Sepasgozar et al., 2019). In this case, the value of people-centeredness to designers is to understand the citizens and develop technologies that are as well-received as possible. Each city has unique characteristics to which solutions must be tailored (Varela-Álvares et al., 2017; Salim & Haque, 2008). Furthermore, solutions must be fair and equitable for the citizens and parties they concern (Schuler, 2016).

2.2. Participatory Design

At its core, involving citizens in planning is rooted in the idea that effective participation is key to city inclusion, safety, resiliency, and ecological sustainability (Shamsuzzoha et al., 2021). Participation in smart city development can be implemented using the same principles as other participatory urban development activities. With smart cities, however, the problem has often been the outright neglect of participation due to the emphasis on large-scale ICT infrastructure procurement.

The principles of people- and user-centeredness can be implemented through participatory planning. *Participatory design* is a holistic design method that ensures the suitability of solutions for users in the design phase. Participation should involve as many stakeholders as possible. Relevant stakeholders are those affected by smart urban development and city services. In particular, end-users should be included and involved in the process (Leikas, 2008). Participation should occur at as many design stages as appropriate, preferably already at pre-planning (Foth, 2018). In some cases, however, involving users only at the design and testing stages may be appropriate (Kopeć et al., 2017).

Techniques for participation can include interviews with citizens, experts, and focus groups, usability, utility, and accessibility surveys, encouragement towards sharing feedback and comments, setting up support services, and defining service quality criteria planning and implementation (Jaeger & Bertot, 2010). Participation can be organized by interacting with representatives of stakeholder organizations (indirect participation) or by, inviting interested parties through various media, or by using an online survey (direct participation) (Münster, 2017). Direct participation has a higher risk of excluding or filtering out potential users and participants, but it may have a better chance of creating a sense of community through collaboration (Foth, 2010).

It has been suggested that transitioning from a linear process model of urban development to iterative participation is needed (Münster et al., 2017, Brynskov et al., 2018). A pre-design analysis, briefing, professional design, and execution characterize a linear process. The iterative design process, on the other hand, refines designs through user feedback or other participatory "bonus rounds". These can be used to further develop the outputs from earlier stages. Iteration is enabled by the involvement of end-users and stakeholders in as many phases as possible.

One case example of participatory planning is the Oulu City Library project, which aimed to develop new services for the library or to reimagine and present existing services in a new way. The result was a virtual library that presented library material in a new way. In addition to the

library users themselves, the process involved researchers, city officials, and library staff. (Pouke et al., 2018).

The process started with initial interviews and meetings with library staff, followed by two workshops with participation from all stakeholders. Collaboration in the workshop focused on formulating ideas about the new services and how the library could be experienced in a new way. In the second workshop, the prototype was further developed. The process was considered participatory and iterative by the researchers and participants. It ensured that participants were able to re-evaluate the plans to maximize relevance. A decisive element to a successful final product is iterative design, where different stages of the product are evaluated using feedback or direct involvement (Pouke et al., 2018).

Participation can be about providing toolkits for citizens and users. This can mean enabling creativity to create new technological devices, providing tools for dialogue on the directions of the smart local city, or participating in collecting data for urban development through smartphones and other sensors (Brynskov et al., 2018). A combination of qualitative and quantitative data often provides the best insight (see, e.g., Dembski et al., 2020). A clear distinction must be made between voluntary and automatic data collection (Ogie, 2016). Data collection only constitutes participation when done knowingly by users. Furthermore, sensor data cannot be used to interpret the meanings people attach to their actions or substitute for experiential data.

A well-organized participation approach can tap into the latent skills of citizens and pool their efforts (Paulos et al., 2008). It is often called crowdsourcing: breaking down a large task or problem and encouraging people to solve it, for example, using various participatory applications (Simonofski et al., 2017).

Participation is useful because it enables accessing local knowledge to support research and urban development that goes beyond formal knowledge. This local knowledge consists of unwritten rules, stories, and ways of understanding in which citizens make sense of their city. In the participatory design process, the role of this knowledge is to refine expert knowledge by enabling perspectives that urban developers would otherwise be unable to consider. For example, it draws attention to how the designed solutions affect citizens. It also provides an opportunity to find cheaper solutions rather than relying on extensive investment. Importantly, it highlights the unequal position of local communities in terms of resource provision (Paulos et al., 2008) and how smart urban development may contribute to it.

Trust between the administration and the citizens is paramount for local knowledge to be utilized and applied. The administration must have confidence in the potential of participation and trust in a functioning culture of civic participation. On the other hand, citizens need to trust the administration's sincerity in promoting goals of the common good and make use of local knowledge. Using local knowledge and communicating its role gives citizens more confidence in smart city development.

3. METHODS

Citizen-ability refers to the ability of citizens to improve their city or tackle its problems (Foth, 2018). To harness the skill of citizens, various participatory tools such as workshops, hackathons, maker spaces, living laboratories, or participatory geographic information systems have been introduced with which to enable and involve citizens. As the effectiveness and reach of only using traditional methods have been questioned, the available participation toolkit for planning smart cities involves methods of digital citizen participation (Bouzguenda et al., 2019) alongside traditional methods.

While combining different methods is highly recommended, each method is best suited for a specific purpose. Workshops are interactive face-to-face participatory tools and are effective because they enable more personal, higher level, and deeper interaction and non-verbal communication (Münster, 2017). Workshops are appropriate if they are organized to involve end-users and relevant stakeholders (Pouke et al., 2018). Hackathons are one form of a workshop. They are intense, semi-competitive events where the most concise possible briefing or problem statement is given to develop a new solution. The briefing and problem are defined by an external party, not the participants themselves (Cardullo & Kitchin, 2019).

Living laboratories (living labs) are platforms for experimentation in a real-world setting, for example, in the home or a specific part of the city. In living labs, the interaction between users and technology can be observed, and the observations can be used to develop new and useful products and services (Van den Bergh & Viane, 2016; Kopeć et al., 2017). At their best, living labs provide a holistic understanding of what works and what does not about a product or service. Users or policymakers may negatively receive living laboratories if city residents cannot participate in designing these products and services. The experiments may also be politically sensitive (Fredericks & Foth, 2013). For the development of smart and sustainable cities to succeed, pilots need to scale and expand from singular experiments to integrate with everyday practices (Van den Bergh & Viane, 2016; Brynskov et al., 2018).

Makerspaces are dedicated spaces that support ideation through peer learning, learning by doing, and technically oriented activities. They are intended as forms of longer-term participatory creativity. They provide tools and support for developing digital solutions if they are designed to focus exclusively on digital innovation. Makerspaces offer the possibility to form ideas without the need for deep and broad expertise (Caldwell & Foth, 2014). Expertise can also be provided by the organizers of maker spaces (Brynskov et al., 2018). However, the threshold for participation can often be quite high, and these spaces may therefore exclude many groups of city users. Therefore, they are more likely to only serve active citizens.

Information and communication technologies enable participation remotely and by a wider audience (Münster, 2017). In Iceland, promising results have been obtained on the performance of an online platform for urban participation (Effing & Groot, 2016). The *Betri Reykjavik* platform allows citizens to submit improvement and development proposals to the local government and other users to voice either support or disagree with the proposals. The platform collects open feedback and showcases proposals already implemented to encourage further input by citizens. From the perspectives of people-centredness and participation in a smart city, these kinds of services enhance the smartness of a city.

Participatory Geographic Information Systems (PGIS) allow citizens to obtain real-time, place-based information, provide location-based feedback and participate in planning specific places and areas with urban developers (Foth et al., 2018; Münster et al., 2017). These services should be easy to use and accessible. They require knowledge of how to use computers and mobile devices. PGIS applications and services enable new experiences of space and distances and facilitate a new perspective on development needs (e.g., Dembski et al., 2020). Participants communicate their feedback by commenting on city objects, drawing, modifying parts of a 3D model, or giving comments to planners or other city residents (Dembski et al., 2020; Münster et al., 2017; Kopeć et al., 2017). Spatial information applications can also be used to support land use planning (Brown et al., 2018).

The *Täsä* app, piloted in 2015, is a case example of a participatory app where users can report problems, suggest new ideas, communicate opinions, and answer surveys in Turku, Finland (Adensskog et al., 2017). Such apps could serve as the city's place-based social media (Foth,

2010). However, participatory apps must be reliable to gather an active audience (Adenskog et al., 2017).

Young people often prefer technology to integrate with their daily routines, preferably invisibly (Ylipulli et al., 2013). Gamification has been developed to reach and engage young people (Santti et al., 2020). Integration and gamification may work if the applications used contain elements that are familiar to young people. Gamification can enable a new perspective on spaces and places when integrated into everyday practices. It can attract new participants and engage them longer-term through rewards, but it needs to be done right (Münster et al., 2017). In the case of the Täsä app, feedback illustrated that elements of gamification on the app were missed by many citizens (Adenskog et al., 2017).

A collaborative culture of doing things together can be enabled through place-based collaborative applications. Online-based community networking services can potentially promote local community interaction (Foth, 2010). Place-based community networking services allow residents to manage their local social networks alongside other digital and non-digital means of communication. Such a community communication service works when it combines global communication services with place-based communication.

For digitally-enabled place-based community services to work, users need to be able to find each other voluntarily and spontaneously. These services work best for existing communities. (Foth, 2010). A communal spirit can be built by matching common interests, skills, activities, and existing networks. It can be organized either through an existing digital platform model for communication or, alternatively, local communities can develop their own communication platforms. Ultimately, place-based community communication services provide a way for voicing and identifying community needs.

4. RESULTS AND DISCUSSION

4.1. Challenges and Pitfalls of Participation

A recurring participation problem is that, in most cases, only the most active citizens are involved in the planning process (Kahilainen & Kytä, 2006). For participatory smart urbanism, in addition to personal characteristics, sociodemographic factors such as occupation, gender, age, and ethnicity influence technology access and use. The concept of the digital divide is used to refer to unequal access to the internet, devices, and software and the resources to maintain them. Increasingly, there are also major differences in motivation, skills, and habitual patterns of technology use. (van Deursen & van Dijk, 2014, 2019; Ertiö & Ruoppila, 2014). Bridging these gaps as part of smart city development will broaden the user base for different smart city technologies.

Institutional factors may inhibit participation processes from the perspectives of planners, officials, and citizens. For planners and city officials, resources, flexibility in time and place, non-hierarchical power relations, or supporting informal social structures and interactions may be constrained by the rigidity of established planning institutions. This may lead to superficial citizen “engagement theatre” that serves only to look good on the outside (Kamols et al., 2021). From the citizen’s perspective, while clear to planners, rigid urban planning processes may be difficult to understand, approach and follow (Halttunen et al., 2010). Drafting appropriate documents requires expertise, and these documents can be inaccessible to citizens (Staffans, 2004). This makes it difficult to understand participatory political processes.

Furthermore, only some have the time or expertise to contribute (Jaeger & Bertot, 2010; Halttunen et al., 2010). The problem of lack of time applies particularly to face-to-face interaction. People aged 18 to 45 may be busy and more mobile between cities. Therefore, they

may need more time to be able or willing to commit to imagining the future of their neighborhood in a participatory process (Fredericks & Foth, 2013).

Digital participation platforms or even social media can complement face-to-face participation, reduce the friction of distance, and encourage participation (Halttunen et al., 2010; Fredericks & Foth, 2013). They offer cities the opportunity to reshape relationships with their citizens. This means that participation through mobile devices is largely desired by citizens. For example, in the case of the *Täsä* app, citizens understood the potential of the app and hoped for more mobile participation (Adenskog et al., 2017).

Social media as a tool has been criticized for fostering superficial communication between and within stakeholder groups and for having little value to urban developers. However, social media can increase participation in face-to-face events by reaching many who do not or cannot find out about such events through other channels. (Fredericks & Foth, 2013). Indeed, social media may often be more suitable for informing citizens and stakeholder groups than effective interactive participation. These tools are needed as attempts to involve people often need to reach enough people, especially in public sector projects. This may be due to a lack of information, time, understanding, or accessibility. They also often reach only some user groups. The participatory process is self-selective and attracts active citizens, which means that the information may not represent the views of the relevant stakeholders as some groups may be completely absent from the data (Kahilainen & Kyttä, 2006; Münster, 2017).

Citizens interpret the planning process from their perspective, which may result in planners and participants talking past each other (Münster, 2017). This is problematic, as garnering local knowledge in these processes is essential to participative planning. The balance between local experience and expert knowledge needs to be reconciled with the objectives of smart city development. What are the participants' expertise limits, and when is it justified to prioritize knowledge from officials and experts?

The participation process itself may be flawed. If there is a lack of transparency or fairness, the outcome may be worse than the initial starting point. This can be considered with sufficient resources and care for the process itself. Practical case examples illustrate potential problems for participative processes. In Ghent, Belgium, the problem was maintaining stakeholders' involvement in the smart city project. Although the city's smart city strategy included a clause about putting smart citizens at the center of decision-making, it was difficult to realize this clause in practice.

Moreover, smart city initiatives often remained experimental and could not scale (Van den Bergh & Viane, 2016). In Dublin, Ireland, the focus of smart city development has been too much on corporate interests and consumerism, despite the ideal of people-centeredness, according to researchers. (Cardullo & Kitchin, 2019). This has led to flawed pseudo-participation. Consultation with citizens only took place after the objectives of the projects had already been decided.

In a municipal smart city project in Sarpsborg, Norway, it was difficult to maintain a relevant conversation on social media and keep it on track. In addition, participation did not reach a wide enough audience, and city representatives felt the knowledge collected needed to improve (Berntzen & Johannessen, 2016). In Oulu, Finland, seniors, and young people considered interactive smart displays and the content they provided irrelevant. Furthermore, seniors' lack of digital competence was a barrier to technology-mediated interaction with the city, and they did not know how to use the city's Wi-Fi network (Suopajarvi, 2015). The smart displays did not provide content of enough substance or relevance, even though the citizens had been asked in advance what kind of content they wanted. (Ylipulli et al., 2013). Upon asking, citizens do not always know what they want. In some cases, this points to the need for expert design knowledge.

An equally important argument can be made for even deeper participation: had citizens already been involved at the pre-planning stage, the city displays might not have advanced to the implementation phase due to their lack of added value, and resources would have been diverted elsewhere. Furthermore, technology development and deployment are difficult because laboratory conditions often differ from use and need in a real-world setting (Salim & Haque, 2015). Overall, the case example of Oulu illustrates the importance of early participation and an iterative design process.

Participation requires interaction rather than one-way communication. Urban displays or bedazzling visualizations of the future will not be truly inclusive without interaction between planners and citizens. (Ylipulli et al., 2013; Foth et al., 2018; Münster, 2017).

4.2. The Ageing and Seniors in the Smart City

A major pitfall is ignoring different target groups' various needs and preferences. The impact of resources and sociodemographic characteristics such as gender, age, and ethnicity on the opportunities to participate in the smart city is an important factor (van Deursen & van Dijk, 2014, 2019). Efforts to include and involve a wide user base must be sensitive to the reduced capacity of young people, linguistic minorities, immigrants, or marginalized people to participate. Seniors are, in many countries, a growing demographic whose participation often involves issues of reduced or lacking IT competence. Here, seniors and the aging as a user group for a smart city are considered fruitful because it challenges the notion of an average user and forces planners to consider group-specific needs. Therefore, this paper will examine the impact of aging on smart city participation.

For city officials, seniors and older people are often perceived as a homogenous group, predominantly needing protection and security and with little interest in wider social issues. They are often seen as reluctant to adopt new technologies (Suopajarvi, 2017, 2016). Smart city development enables some practices at the everyday level and may exclude others (Suopajarvi, 2018, 2017). With the introduction of digital systems, interfaces, and e-services, face-to-face transactions have already become more difficult or even impossible (Leikas, 2008). Running "offline" errands may seem the most practical way for seniors and going online may be difficult. Seniors may find it difficult to find the information they need from e-services. The lack of continuity as a theme in the discussions on smart cities is also often a concern for senior citizens (Suopajarvi, 2018). Therefore, planning should also be in service of the experience of citizens that not all that is familiar and dependable will be displaced. One option is to incorporate familiar elements into the designs of new technical solutions (Suopajarvi, 2015) and – following the notion of supporting citizen-ability – to invest in the IT skills of seniors (Kopeć et al., 2017; Foth, 2018). However, the typical set of IT skills of seniors will likely broaden and improve over time.

Consideration should be given to how different urban social groups, including seniors, can incorporate smartness into their daily lives rather than merely adapting to it (Suopajarvi, 2018). Without participation, urban developers' own experiences of the elderly are the only sources of information to draw on when other information is not available (Suopajarvi, 2017). So the needs of seniors may be seen as uniform. However, it is important to recognize differences between senior groups at the planning stage, for example, in terms of physical and mental condition and health. Workshops and usability studies can highlight the needs of different types of seniors.

The needs of the elderly include compensating for impaired sensory functions, alleviating problems caused by memory impairment, alleviating motor problems of the body, the need for support in installing software and hardware, and the need for analog and easy-to-use operating logic (Leikas, 2017). These needs concern seniors differently concerning differing physical and

mental conditions (Suopajarvi, 2015). In addition, seniors need human contact to support their use of information technology (Kopeć et al., 2017).

A key question in the involvement of senior citizens is what role senior citizens should play in smart city projects. As a rule of thumb, seniors are themselves best suited to answering most questions concerning them (Suopajarvi, 2018; Kopeć et al., 2017). The role of the elderly should be adjusted concerning the objectives of the local smart city development. Is the goal to build a 'technologically smart' smart city independent of its inhabitants, or will it emerge as smart only when senior citizens succeed in facilitating their daily lives through smart solutions? For example, the question is of central relevance to developing social and health services.

Smart city planning should consider whether it will benefit the elderly or instead make their daily lives more difficult and how participation to answer these questions is best organized. Efforts should also be made to predict the unintended consequences of smart city solutions and to identify alternatives to solving urban problems. The experience of self-efficacy concerning IT capability is a major determinant of willingness to use smart city technologies. This experience is influenced by each person's work experience, education, income, gender, place of residence, health, and potential disabilities. It is also shaped by the support from family and personal social networks to use technology. (Leikas, 2008).

Older people are interested in technology when it carries perceived benefits (Suopajarvi, 2015). However, even when perceived benefits are recognized, some aging seniors might refrain from using these services due to concerns about trustworthiness, privacy invasions, and personal information security (Suopajarvi, 2015). For many, direct or indirect positive experiences and increasing IT skills will help to alleviate their fears about changes brought by smart city development. (Leikas, 2008). Teaching technological literacy and experiencing one's role as part of meaningful urban development contributes to the participation of seniors (Kopeć et al., 2017).

5. CONCLUSION

Smart cities are part of a continuum of urban imaginaries and have grown in popularity since the mid-1990s. For long, the concept has been technology-oriented and often continues to be so. Since the 2010s, they have taken on a broader set of meanings beyond mere ICT infrastructure, including people-centeredness, inclusion, resource efficiency, and themes of ecological sustainability.

This review has attempted to capture central notions from these discussions by asking what elements and factors could be required for a city to be considered smart and people-centric. It is suggested that the principles of participatory design utilizing digital tools, a holistic appreciation of place-specific complexities, and considerations of how different demographics and appropriate 'smartness' as part of their everyday lives could be considered as such factors. In light of research in this field, smart city development can achieve its objectives if projects consider citizens' needs and daily practices, not just the solutions offered by equipment suppliers. Municipalities should also consider these when coordinating interaction and contributions among stakeholders. These considerations are rooted in the idea that effective participation is the key to inclusion, safety, resiliency, and even promoting ecological sustainability in cities (Shamsuzzoha et al., 2021).

Having clear ambitions for smart city development is important. A city aspiring to become a smart city should negotiate and communicate its objectives and means to achieve those objectives to stakeholders and citizens. One way to do this is to introduce a commonly recognized local definition of a smart city. Smart city development should be people-centric. People-centeredness means defining and placing user needs and requirements at the heart of the design process to achieve a socially, culturally, and economically sustainable smart city. Participatory, iterative

design can help to create a culture of collaboration in cities, which will help citizens to embrace the smart city. Smart city development should assume that end-users, whether young people, the aging and elderly, or immigrants, can identify their needs and provide insights that will contribute significantly to the refinement of appropriate solutions. This should be reflected in the participatory processes of authorities developing smart cities.

The success of efforts towards building a people-centric smart city could be measured with multiple indicators. As many elements associated with building soft infrastructures are qualitative, studies mapping inclusion through experiences by different user groups could be employed. Measuring the success and relevance of each participatory process to participants may be integrated into the process itself. Potential quantitative indicators could include participation and satisfaction rates or measuring funding directed toward participation. Combining quantitative and qualitative data is often the best approach to measurement.

True participation is also involved in the pre-planning phase, where participants “get to steer the ship, not just rearrange the deck chairs” (Cardullo & Kitchin, 2019). Smart city development policy should evaluate whether this is sufficiently enabled or whether participation should be expanded. This avoids experiments that are irrelevant to users, as the case of Oulu illustrates (Ylipulli et al., 2013). However, participatory design should involve stakeholders other than end-users, such as businesses, government officials, academics, and educational institutions. Without mutual trust between stakeholders, participation will not work. Citizens need to trust the interest of city officials and the government in collecting and using local knowledge and communicating its role in local decision-making. Contrariwise, governments must place trust in the usefulness of citizen participation for smart city development.

Information and communication technologies enable reaching groups not participating in “traditional” participatory events. Using social media is an effective way to inform citizens about opportunities for participation. Participation platforms such as the spatial data app Täsä in Turku, Finland (Adensskog et al., 2017) or Betri Reykjavik in Reykjavik (Effing & Groot, 2016), Iceland allow citizens to make their voices heard and offer perspectives that urban developers may not be able to consider. For the citizens, participatory technological applications can give them a new perspective on their city and its development potential. For urban developers, they are an opportunity to gain experience alongside expert knowledge for more solutions that stand the test of time and to learn about more inexpensive local solutions (Paulos et al., 2008).

The digital divide is defined as the resource gap in available devices, motivation, IT skills, and patterns of technology use. It affects target groups that can be challenging from the perspective of smart city development, such as senior citizens, linguistic minorities, and migrants. Bridging the digital divide in these four areas should be one of the objectives of smart city development. Measuring these gaps provides an indicator of the potential of citizens to participate. For senior citizens, the challenge is information technology and computer literacy and following motivational challenges. Seniors can be involved in workshops like any other citizen group but guiding and preparing them to maximize their participation is useful. Participation motivates seniors, and traditional involvement allows for the kind of face-to-face interaction that people appreciate. It is important that smart city development not transform everything but also continues to enable existing practices. Otherwise, seniors may feel that the projects are not for them. Usability studies are one way to check the usefulness of technology.

Future studies could research how people-centric approaches can be integrated and improved at the policy level. By investing in inclusion and people-centredness, cities have the potential to achieve significant efficiency and image gains in smart city development. Doing it right will ensure that the smart city concept can be more than just a catchword. Investing in cooperation and trust between stakeholders and gathering citizens' views and suggestions, new information

technology solutions can ensure that implemented smart solutions are equitable, fair, and sustainable. Bold initiative and institutional recognition of the value of participation are needed to take stakeholder cooperation to a new level.

ACKNOWLEDGEMENT

This author wants to thank Sampo Ruoppila and the City of Salo for their collaboration and assistance in the making of a preliminary version of of this paper.

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