

Chapter 5

Inclusive and Accessible SMART City for All



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1 Introduction

Urbanisation and growth of cities is a serious and long-standing trend. The social and economic inequalities are most visible in cities. According to WHO, the urban population is globally predicted to climb to 70% by 2050 [1]. The world population is predicted to reach 9.3 billion people by 2050 and at the same time most countries will reach a highest increase in ageing population. By 2030, 25% of the European population will be over 60 years old; meanwhile the overall population is predicted to drop [2]. With the ageing population comes a higher percentage of health-related issues, impairments as well as disabilities. As a result of the increasing number of urban population, it is urgent to build cities that keep in mind special needs of their citizens, particularly the most vulnerable of them—the disabled and the elderly.

Urban settlements and especially urban centres are highly differentiated and involve various social groups of citizens with their specific lifestyle needs, interests, attitudes and ability to move around in space. The city which directs its development towards a higher quality of life and moves towards a smart city must reflect the needs of specific population groups that react much more sensitively to situation and conditions in areas, especially public spaces. This chapter examines the smart city concept from the perspective of specific groups of citizens living there. It provides the overview of different interpretations of smart cities and identifies the target groups and their requirements for the quality of space.

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2 Sustainable Development in SMART City for All Concept

To support inclusive, sustainable urban development in smart city concepts, it is necessary to demand high-quality public space accessible for all citizens. By public space we understand spaces in urban infrastructure that are open and accessible for all citizens regardless of their physical and mental abilities, age, gender, race, ethnicity or socio-economic level. A quality public space is able to meet a variety of different users' needs. People with special needs are not characterised by a homogeneous group of users but they consist of individuals and groups with different requirements for the quality of urban environment, especially public spaces. Starting from a position of people's capabilities rather than their disabilities, the previous research has outlined the following principles addressing a wide range of quality attributes of public space [3–5].

2.1 Social Interaction

The urban environment must reflect the diversity of people who use it and provide a place for social interaction. The more inclusive the space is the more social interactions occur. A quality urban design offers space that people use to form strong, vibrant and sustainable communities. A quality space is designed with everyone in mind. Therefore, it is essential to involve as many people as possible during planning processes, not excluding the disabled people, seniors and families with small children. Well-maintained public space and green areas are good for health, well-being and community life. Inclusive public space is open, safe, accessible, functional and enjoyable to use. It is a place that enhances interaction between different social groups, where people of different age can meet and where various activities occur. It is designed with wide and smooth pedestrian paths for easy movement of different mobility impairments. It provides a shady, secure place for older people; has a good lighting and clear orientation signs; is designed with universal equipment; and is clean and well maintained.

2.2 Urban Safety

One of the most important attributes of the quality of space is the urban safety. The urban safety relates to any kind of user safety in relation to the urban space, especially in public areas. It includes a wide range of issues related to the safety of the physical environment such as barrier-free accessibility, crime prevention and universal design principles [3, 4]. A quality public space should be easy to get to and through. If people have difficulties to get to and around a place they will probably not (want to) use it at all. Inclusive urban planning must recognise barriers that

people are mostly affected by. People with special needs need places which fit a purpose and are easy to understand and convenient to use. People suffering from mental illnesses or sensual impairments often struggle with a design that is confusing and counter-intuitive. A safe urban public space works with signage, lighting, visual contrast and materials; has simple and clear street signs (directional indicators) to help people with sight, hearing or mobility impairments to orientate; and has sidewalks with clear sight lines to make women, seniors and teenagers feel safe. It is designed with citizens' participation. It creates neighbourhoods that are designed with easy orientation to help people with disabilities find a way around. Technical attributes such as ramps and toilets are important but always in relation to the accessibility, safety and quality of the whole space. Urban safety also means well-connected streets that connect public spaces so that vulnerable people feel safe.

2.3 Accessibility

To meet accessibility requirements of all users it is essential to implement standards that treat everyone on equal terms. The accessibility of any place is defined by its visual and physical connections to its surrounding. Accessible public spaces are easy to get by means of public transportation, cycling or walking. Accessibility of public space depends also on parking options for disabled, walkability of a place, distance from public building entrances and barrier-free access options. For people with special needs it is necessary to have sufficient information (possibly even before leaving their home) about public transportation timetable, barrier-free possibilities, opening hours and public services. An accessible public space is not occupied by parking cars, has pedestrian paths that connect adjacent areas, provides people with a variety of public transportation options and has stops comfortably located in proximity to a place.

2.4 Mobility

While it is necessary to address the needs of wheelchair users and other mobility-impaired people, smart cities also need to recognise problems of people with learning difficulties, mental illnesses, and visual and hearing impairments when it comes to inclusive and accessible mobility and movement in a space. A flexible mobility consists of a well-designed, barrier-free public transportation system and walkable zones in urban areas which are intuitive and easy to orientate in. Inclusive public transportation system provides options for everyone regardless of their age or physical or mental abilities, and is accessible (provides vehicles with ramps), affordable, safe (during a day and night) and easy to use. It provides safe and comfortable places to wait, and stations with clean, barrier-free toilets, and stops are well lit and clearly signed with a voice countdown system and an emergency phone.

3 Understanding SMART City Concepts

The term “smart” became a direction in many urban agendas and policies of modern cities in order to direct the transition towards sustainable development goals. Smart city concepts are used all over the world with different interpretations, contents and values. Literature agrees that, generally speaking, a smart city means competitiveness and sustainability achieved by the use of information and communication technologies (ICT), and by development of human and social capital [6, 7]. Caragliu and Nijkamp highlight that a city can be defined as “smart” when “*investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable development and a high quality of life, with a wise management of natural resources, through participatory action and engagement*” [8]. Smart Cities Council defines a smart city as “*one that has digital technology embedded across all city functions*” [9]. Singh identifies eight key aspects that define a smart city as “*smart governance, smart energy, smart building, smart mobility, smart infrastructure, smart technology, smart healthcare and smart citizen*” [10]. The Centre for Smart Cities writes that a smart city “*offers sustainability in terms of economic activities and employment opportunities to a wide section of its residents, regardless of their level of education, skills or income levels*” [11]. Jaššo and Petříková point out that a sustainable smart city is a “*meaningful network of links between physical environment, communication networks and social community*” [12]. Husár et al. on the other hand, consider the concept to be too vaguely defined arguing that the research on smart cities has been sparse and there is a shortage of critical analysis on what “smartness” means [13]. Similarly, some authors see the existing research to be more focused on the technical, economic and engineering dimension rather than social or political analyses [14].

Those interpretations generally sum up three main approaches to a smart city:

1. The high-tech-centred approach with a big emphasis on new technologies and ITC infrastructure that are key to achieve a smart city
2. The people-centred approach where a great deal of social and human capital determinates a smart city
3. The mixed approach that characterises a smart city as an integration of both elements above

We consider the third mixed approach, for a guideline of this chapter arguing that a city must achieve a healthy balance between technology and social capital in order to assure right conditions for sustainable urban development.

3.1 SMART Cities and People with Special Needs

All human beings possess a different range of abilities being able to do different things at different ages. Thus, an ability is a relative concept. When the ability relates to something considered as “normal behaviour”, everything else (disability,

handicap, age, etc.) becomes synonymous of abnormality. Mother with a baby in pushchairs, person carrying heavy loads, but also a young, healthy and fit man—almost everyone has experienced struggles in urban area at some point in his or her life. In this sense, we all can relate to some kind of disability. Wylde et al. assume that up to 90% of population becomes “urban disabled” in some way or another in their life [15]. According to the UN reports, 15% of the world’s population lives with some kind of disability [1].

In the past, urban planning illustrated an urban user to be a young, physically fit, educated, middle-class (usually) male adult who embodied the anthropometric stereotype. The term originated with the birth of the Welfare State, and for majority of the twentieth century it was considered natural while any other conditions were ignored.

Against that, a term “environmental pressure” was used for a position of those who had to deal with environment built with regard to young, healthy and fit people. Later then, design for special needs, obviously, demonstrated requirements of all those people who did not fit the previous definition of an urban user—mentally and physically disabled, older people and women. With this perspective, people with physical and mental (sensory or cognitive) impairments became “people with special needs” [16].

Today, however, literature varies on what “special needs” means. Some explains that people with special needs are “*people who need special help or care, for example because they have a disability*” [17], and others by “special needs” describe a much wider community that includes:

- Physically disabled
- Mentally disabled
- Blind, visually impaired, low vision
- Deaf, hearing impaired, hard-of-hearing
- Elderly, seniors (include people suffering from disorders such as dementia, Alzheimer’s, Parkinson’s, poor vision, hearing impairment, balance problem, etc.)
- Homeless, shelter dependent (including shelters for abused women and children)
- Culturally isolated (includes people with little or no interaction outside of immediate community)
- Children, unattended minors
- Geographically isolated (with no access to services or information, immigrants)
- Poor, extremely low income, unemployed
- Single parents with no support systems
- Transient special needs—includes people temporarily classified as special needs due to a transient condition, status or illness (includes tourists as well) [18]

In this light, not only people with physical and mental impairments but also all above-mentioned categories can be considered as people with special needs. Each of the user category is characterised by its individualities, special needs and spatial requirements related to the urban environment and therefore any smart city needs to address those in order to achieve inclusive, accessible and sustainable urban development.

4 Design for All

Only until recently the special-needs approach was considered a reasonable solution for so-called architectural disabilities. Architectural disability is a term that describes a physical infrastructure (urban design) that treats people with barriers. The word “disability” relates to dysfunctional buildings (badly designed, built and poorly maintained) and enclosed, barrier and bounded places. Architectural disability makes the built environment inconvenient, uncomfortable and unsafe, and discourages people from using it [19, 20].

Despite good intentions, the problem was that the special-needs approach was based on needs not rights, which led to solving problems and not basic causal relations. Because of that, it was necessary to move from the rather fragmented design for people with special needs to “design for all” (also known as universal design or inclusive design). In 1997, a team of researchers interpreted the “Seven Principles of Universal Design” [21]. The manual proposed design that “*enabled the equitable use of products and services by all, flexibility in their use, that products and services should be simple and intuitive, provide perceptible information, have a tolerance for error in use, require low physical effort and that designs should be at a size and allow for such space that would allow their use regardless of a user’s body size, posture, or mobility*” [21]. Design for all aimed to create urban environment that would be usable by all without the need for “special design” adaptation. It described a design where all users despite their abilities could handle their everyday activities comfortably and safely. The main objective of design for all was to reduce environmental pressure and architectural disability, and to promote better social equity and justice [22].

4.1 SMART Design for All

Smart technologies have diffused into everyday life of people and significantly influenced urban settlements. They are supposed to improve the quality of life and have a strong influence on how people live and interact with each other, with their environment and public services. By 2025, demand for smart city services is expected to grow by more than 30% across Europe, Africa and Latin America [23]. However, the global transformation towards high dependency on technology may result in serious negative impacts on citizens, because if smart services are not accessible for all, they may deepen inequality, exclusion and isolation.

When we talk about smart technologies for people with special needs, cities need to be particularly attentive about their implementation and make sure that those smart technologies will not treat one’s health and well-being. To become more inclusive and accessible, smart cities need to address smart services for people with special needs across different areas: housing, transportation system, healthcare, public participation and citizens’ engagement, community support services, public

services, public space, leisure and culture. Smart cities should build on the principles of design for all and when implementing smart services move their urban agendas towards SMART design for all. SMART design for all links the core principles of design for all and the use of smart technologies in order to provide better quality of life for all, particularly people with special needs.

People with special needs most often meet with barriers of mobility limitations and visual and hearing impairments and they are highly sensitive of their urban environment. Smart technologies might help overcome mobility, visual and cognitive problems. Below we summarise some of the current technologies that are addressing problems of people with special needs in urban areas. Examples of smart technologies for:

1. Visual problems:
 - (a) Perceptible (audible and vibrational) signals for pedestrian expanded to systems capable of telling people where they are
 - (b) Accessible shopping for visually impaired people via mobile technologies (navigation system and a product recognition system)
 - (c) Assisted city applications fit to blind users
2. Hearing problems:
 - (a) Systems which convert voice to text or translate sign language
3. Cognitive problems:
 - (a) Gadgets that are able to guide elderly people on their everyday tasks
 - (b) Rehabilitation systems and video games to boost cognitive functions
4. Mobility problems, problems with navigation:
 - (a) A mobile technology that provides audio instructions to visually impaired citizens who travel by means of public transportation
 - (b) A smart parking technology that uses sensors by which city authorities can monitor parking lots and inform the disabled about available parking spots so that they can find it right at the time
5. Personal and home accessibility:
 - (a) Systems for regulating the heating, air conditioning, lighting and water temperature via smartphones
 - (b) Products that enable to control lighting systems, blinds and doors by tablets or key fobs or a voice recognition technology
 - (c) Gadgets that can address requests in voice language and ask to play music, read an audio book, order a ride or groceries
 - (d) A smartwatch with an emergency button to contact a live support team and get medical help 24/7

Using smart sensors, navigation solutions and modern communication technologies, people with special needs have a chance to live more independently and

become more engaged citizens. Apart from those, SMART design for all can also facilitate better social interaction and social activities. Studies have proved that social interaction helps seniors as well as disabled to keep good emotional and physical health together with good cognitive functions [24]. Smart technologies can help the elderly and disabled people maintain social interactions with families, friends and close communities; actively participate in their environment; and exchange new experience with others.

In conclusion, smart cities need to develop complex strategies on how to make mainstream and smart services accessible for all and how to use smart technologies and services to serve for people with disabilities, seniors and other disadvantaged people to improve their social life, safety, healthcare and participation in urban life. If cities succeed to promote smart information to all citizens, SMART design for all has a high chance to become a part of everyday life.

5 Critical Discussion

The quality of public spaces significantly influences the quality of people's lives. It has been widely researched that inclusive urban planning has a significant role in strengthening social inclusion [25]. But even in the modern world led by smart technologies, urban inequalities are still being "built" into new places. The reason why urban planning has been constantly failing to meet challenges of increasingly diversified society may stem from the fact that historically the attention was paid to design which would suit "normal" people. The response to that was the effort to design for "special needs" which again led to the separation of the mainstream society and minorities. Many critics also argue that a disability is first and foremost a prejudice invented and nourished by a society that dispraises disadvantaged people [26]. This assumes that a person becomes disabled by the barriers they must face, not by their impairment. Until such basic issues survive in modern cities, smart concepts remain nothing more but empty words.

6 Conclusion

Contrary to expectation, we are at a point where the idea of smart cities is still developing and the process of implementing smart solutions is still in progress. As we researched in the first part, there are different definitions of smart city concepts and what "smart" means. New technologies are clearly the cornerstone of smart cities worldwide; however by "smart" we understand cities that are primarily inclusive and accessible for all. The smart city is not a product but rather a complex process of city transformation which needs to reflect specific needs and requirements of its citizens. The attention in many recent definitions of smart city has also switched towards more "human factor"-related issues.

We have recognised the need for more inclusive and accessible smart city models that would emphasise the importance of social inclusion and social cohesion in sustainable urban development policies and agendas. We call for a greater focus on different social groups, particularly the most vulnerable of them—people with special needs, who have always been overlooked in mainstream policies. We believe that inclusive and accessible smart cities will be able to create space for the acceptance of those specific groups. However, this requires both citizens' engagement and new ways of cooperative and collaborative approach in urban-related issues.

Including the needs of specific social groups in urban planning moves the concept of smart cities much closer to the concept of smart cities for all. SMART design for all, inclusivity, social interaction and accessibility are some of the key aspects of this concept. The equality in terms of urban planning is essential for a smart city that directs its development towards more sustainable urban future.

It is clear that smart cities won't happen overnight and therefore it is time to rethink the current development towards more integrated model where people with special needs are well communicated and addressed in both global and local smart city policies.

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