

Citizen Participation in Urban Planning-Management Processes

Assessing Urban Accessibility in Smart Cities

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Abstract: The concept of Smart City, supported by the latest technological advances in the field of Information and Communication Technology, offers great potential to meet the challenges of cities in the economic globalization context. As a consequence, the present work is focused on the deployment of these technologies through public participation activities to generate knowledge for the processes of urban planning, design and management. The methodology proposed in this work allows obtaining information about accessibility problems directly from citizens, based on their own experience. Citizens have a communication channel that allows them to inform, at any time and in any place, about all the accessibility problems they encounter when they move around a city in their daily activity. The work presents a Case Study focused on a experience of citizen participation which has been developed to evaluate the accessibility of urban environments in Benalúa neighbourhood of Alicante in Spain. A diverse group of neighbors of different ages, gender and abilities have participated in the experience. After the experimentation it was concluded that the research offers new forms of communication to facilitate information flows between the Administration and citizens, allowing their integration and feedback.

1 INTRODUCTION

In the current context of economic globalization, cities must assume new roles and a greater responsibility by adopting new policies and strategies (Martinez-Fernandez et al., 2012). Cities are the entities with the greatest capacity to innovate and operate in increasingly open and competitive environments. In this sense, the concept of Smart City —hereinafter SC—, supported by the latest technological advances in the field of Information and Communication Technology —hereinafter ICT—, offers great potential to meet the challenges of cities in this new global context.

People are the main resource that cities have in order to create competitive advantage (Florida, 2005; Cossetta and Palumbo, 2014). In recent years it has been estimated that participation has been growing significantly in all public spheres. There is a worldwide consensus on the need and benefits

about incorporating citizens into public management. Therefore, the design of cities of the future represents a collective challenge today, which not only involves governments but also includes citizens. Therefore, the concept of public participation must be now understood as integrated into the normal functioning of societies, as part of everyday urban processes and dynamics. In this regard, the use of ICT and their integration into the functioning of the city is essential. It is a fact that changes and technological advances are leading to a new model of society that is increasingly informed, with greater citizen awareness and predisposed to participation (Castells, 2011).

At present, new technologies of computing, sensing and telecommunications provide knowledge and intelligence to the city (Gabrys, 2014) and play an important role in many aspects of their daily management (Neirotti et al., 2014; Angelidou, 2015). The deployment of these technologies in the context of SC to generate knowledge for the

processes of urban planning, design and management based on public participation activities is the object of this work.

The improvement of the quality of life is one of the most recurrent and demanded urban issues. One of the most important aspects that influence the quality of urban life is the inclusion of all citizens. Therefore, cities require an inclusive urban life (Colantonio and Dixon, 2011) and in order to achieve this, they need to be accessible (Steinfeld and Maisel, 2012). Accessibility is a quality of life element with universal interest, and a right of all citizens (United Nations, 2006). Difficulties of accessibility, deterioration of the built environment, or difficulty of social relations, are some of the problems that directly affect the quality of urban life.

In this context, this research studies the capture of urban accessibility diagnoses from public participation processes through the use of the latest ICT, with the objective of generating knowledge for the planning, design and management—maintenance—of accessible cities. The rest of the work is organized as follows: Section 2 explains the motivation and objectives of the work. Section 3 gives an overview of the work related to assessing the accessibility of urban environments. Section 4 describes the proposed methodology. Section 5 explains the experience developed in an urban environment as a Case study from which a diagnosis of accessibility has been obtained. Finally, Section 6 shows some conclusions of the paper.

2 MOTIVATION AND OBJECTIVES

Today there is consensus on the advantages and benefits of citizen participation in urban decision-making. In this regard, regulations have even been developed. The city is the entity where the space of participation acquires greater importance. However, in most cases citizens do not achieve to be an active part of urban planning, design and management processes. Therefore it is necessary to have an impact on opportunities in order to achieve effective citizen participation and promote actions that are based on citizen participation.

It is demonstrated that new ICT offer great potential to meet the challenge about how citizens can participate in the construction of the city. All cities want to be SC and deploy these technologies to improve many aspects of their daily management. However, they do not have enough simple and

economically viable technological proposals. In this sense, the aim of this research is to offer effective methods for citizen participation using the latest technological advances in the field of ICT that can actually be implemented in medium-size cities—cities with urban centre sizes in population between 100 000 and 250 000— (Dijkstra and Poelman, 2012). Therefore, our main goal is to research for really smart and inclusive cities through the implementation of sustainable technological methods, without excessive cost and respectful with the environment.

Inclusive design promotes the creation of accessible spaces open to all citizens. But the concept of inclusive city refers not only to facilitating the use of these spaces but also to involve the citizens in their conception, development and maintenance (Fletcher, 2006). This means that all the agents involved: planners, designers, users and managers, must participate in the processes of planning, design and maintenance of the city. The inclusive city is therefore a responsibility of all, and tools are necessary to make possible communication between all agents.

The purpose of this research is to make way in this direction, proposing new channels of open communication. Inclusion and citizen participation to improve the quality of life (Arnstein, 1969) is an aspiration of most European countries. In this context, this paper aims to promote—in the context of the SC and with the use of the latest ICT—the active participation of citizens in the processes of improving urban accessibility in order to achieve the inclusion of all citizens, and their identification with the urban environment.

This proposal is part of the objectives of the *European Disability Strategy 2010-2020: A Renewed Commitment to a Barrier-Free Europe* (European Commission, 2010a), developed in the framework of the strategy *Europe 2020: A Strategy for smart, sustainable and inclusive growth* (European Commission, 2010b).

3 BACKGROUND: TECHNOLOGY USED FOR ASSESING URBAN ACCESSIBILITY

Assessing the accessibility of urban environments has been associated mainly with processes to inform citizens about the number of urban opportunities—available services, offer of activities, commerce—

at a certain time and place. The accessibility of an environment grows as the number of opportunities that it offers increases, regardless of the capacities of the citizens/users. These processes have been mainly based on the calculation of proximity relations and intensity of use, and have been mainly used by technologies of Global Positioning Systems—GPS—for positioning and Geographic Information Systems—GIS—for the visualization of the data and the spatial analysis. One of the applications of greater impact has been the one of planning of itineraries—travel times—. Most of the proposals offer an application for users' mobile devices in order to interface and interact with the system. From its origin, the main challenge of these processes was to improve the individual assessment of the accessibility of the environment, but with improvements always focused on the average citizen without disability (Kwan, 1998; Kwan and Weber, 2003, Kwan and Lee, 2004; Ford et al., 2015).

Progressively, the dimension of disability began to be taken into account with the introduction of the concepts of absolute and relative access, to measure the differences in time in the performance of specific routes or the impact of the removal of certain obstacles (Church and Marston, 2003). The main limitations of these technologies are related to the differences of scale, acceptable in specific actions but not effective for the urban scale.

Increasingly, the evaluation of the aspects that affect the operation of the city is based on the evidence, on the behaviour or movement of the citizens (Gilart-Iglesias et al., 2015; Pérez-delHoyo et al., 2017b), beyond street observation and audits (Mackett et al., 2008), surveys or questionnaires (Coppola and Papa, 2013; Beale et al., 2006), interviews (Venter et al. 2002; Hashim et al., 2012) or mathematical or statistical studies based on the data obtained (Prasertsubpakij and Nitivattananon, 2012; Soltani and Allan, 2005). These participatory evidence-based processes are undoubtedly a challenging field of research for improving the accessibility of the urban environment. Self-reporting tools have allowed obtaining information from certain places with the collaboration of citizens (Shigeno et al., 2013). Other proposals use social network communities to generate and complement the information about accessibility issues in cities (Menkens et al., 2011; Prandi et al. 2014). These proposals also obtain information from the user by means of self-reporting tools.

Cloud computing paradigm is one of the most promising technologies to build new services for users and enterprises (Targio et al. 2015; Marston,

2011). Mobile devices enable access to a wide range of applications and services (Mora et al. 2015; Makris et al., 2013). The proliferation of systems and the high penetration rate of mobile devices in the hands of citizens provide users an opportunity to conduct a citizen-centric digital revolution in many aspects of daily life.

4 METHOD

4.1 Characteristics of the Proposed Methodology

The main objective of urban and territorial development is the people who live in a certain geographic space and, consequently, the degree of success of the actions developed must be measured in terms of the quality of life achieved, expressed in terms of facilities, services, characteristics of the environment, among other factors (Fernández, 2012). In this sense, the present work proposes a methodology focused on people for the analysis and diagnosis of the accessibility in urban environments. That is, a method of citizen participation to assess whether the characteristics of the urban environment, the existing facilities and services, are favourable and accessible to all citizens.

On the other hand, the concept of participation implies that all the stakeholders that intervene in the urban process can interact. It is not enough to keep citizens informed, then new channels of open communication are necessary (Fernández, 2012). Therefore, the methodology proposed in this research offers new forms of communication to facilitate information flows between the Administration and citizens, allowing their feedback. In addition, the methodology allows systematic and scalable participation.

4.2 Method Description

The method includes two parts that are described below:

4.2.1 Method of Citizen Participation to Evaluate the Accessibility of Urban Environments—Capture of Accessibility Information—

To assess the accessibility of urban environments it is necessary to obtain information about the real state of their characteristics. In addition, in order to guarantee the maintenance of accessibility

conditions, it is necessary to evaluate these urban environments periodically.

In general, Administration safeguards that accessibility standards are met when designing urban spaces. There is a control by the Administration so that the existing regulations are fulfilled, before and after the execution of those urban spaces. However Administration does not have the resources to develop a periodic evaluation of those spaces in order to keep their accessibility settings in good condition. The development of a process of citizen participation to assess the accessibility of urban environments can undoubtedly improve this situation, considering that are the citizens who coexist daily with these accessibility problems.

The methodology proposed in this work allows obtaining information about accessibility problems directly from citizens, based on their own experience. Citizens have a communication channel that allows them to inform, at any time and in any place, about all the accessibility problems they encounter when they move around city in their daily activity. The method is conceived to integrate all citizens in the participation regardless of their abilities; it is not therefore a method directed exclusively towards people with permanent or temporary disability.

To collect data an Android application, “App” has been designed. In this way, citizens have a simple user interface for mobile devices that allows them to report any accessibility problems they encounter in the city. The idea behind this functionality is that the accessibility issues are notified at the same time they were detected by users. The application reports the location of this claim and a picture of it. The “App” for Accessibility-Issues Self-Reporting Service has been described in an own previous research conducted by this research group (Mora et al., 2016). The operation of the application is shown through a Case study in Section 5.

4.2.2 Method for Managing Accessibility Information by Administration

Having the real information about accessibility problems in urban environments available, allows the Administration to carry out a proper maintenance of these public spaces in order to keep effective accessibility. In addition, information flows are produced systematically, so that accessibility information is always kept up to date.

Administration can have the information provided by citizens at their disposal through a Web-Application for Accessibility Monitoring. The way the information are organized and displayed is shown in Section 5.

The method described in this paper (Figure 1) is part of a comprehensive System for Monitoring Urban Accessibility which consists of a distributed architecture taking advantage of the new ICTs in a context characterized by deployment of a wireless communication infrastructure and the cloud computing paradigm in SC environments. The general overview of this System has been described in an own recent previous research conducted by this research group (Mora et al., 2017).

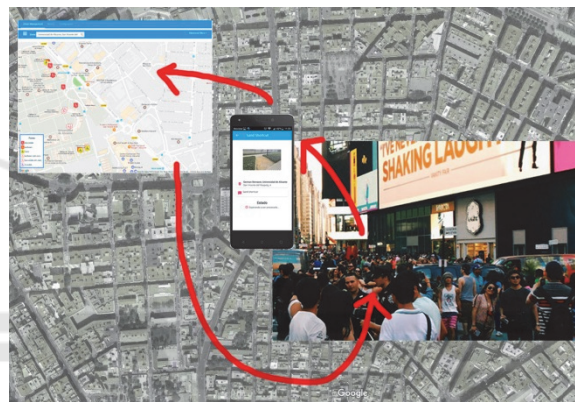


Figure 1: Citizen participation method proposed for assessing urban accessibility in Smart Cities.

4.3 Diagnosis of Participatory Accessibility

As part of this work, an experience of citizen participation has been developed to evaluate the accessibility of urban environments in Benalúa neighbourhood of Alicante in Spain. A diverse group of neighbours of different ages, gender and abilities have participated in the experience. It was proposed to take a route that, starting from the centre of the neighbourhood, crossed the streets that led to the main facilities and services. Citizens had to identify the architectural barriers and accessibility deficiencies that found during the proposed route. All the participants had a mobile phone and could install the “App” for Accessibility-Issues Self-Reporting Service in a simple way. The experience carried out is described in Section 5.

5 CASE STUDY: BENALÚA NEIGHBOURHOOD IN ALICANTE

In this section we present the study that was carried out in Benalúa neighbourhood in the city of Alicante —Spain— (Figure 2). In order to determine the degree of social inclusion, inaccessible points between the different connections of the neighbourhood were identified. The starting point of the experimentation was the most representative square of the neighbourhood —this square is located in the centre of the neighbourhood and is the place where the neighbours meet for any activity or celebration—, and the routes from that square towards the nearest places of services of the area.

The application developed has allowed us to map the different points that prevent citizens with motor disabilities from following the optimal and habitual routes towards destination points, i.e. city equipment. These barriers avoid the complete integration of the resident citizen in the neighbourhood of Benalúa.



Figure 2: Neighbourhood of study in the city of Alicante —Spain—.

5.1 Research Scene

The neighbourhood of Benalúa is located approximately one kilometre away from the historic centre of Alicante. It is a residential neighbourhood that belongs to the expansion district of the city, built on the basis of a grid formed by blocks of (100x40) meters and streets of 10 and 15 meters.

The neuralgic centre of the neighbourhood is a square that occupies the extension of a block. In the rest of the blocks, mostly residential, there are facilities that serve not only Benalúa neighbourhood but also the city of Alicante —Courthouses, National Police, and Water Service, among others—.

Most of the residential buildings in the neighbourhood were built in the 60s, 70s and 80s of the last century, so it is not a new neighbourhood. The neighbours are of very diverse incomes and careers, and it is characterized for being quite inclusive.

The reasons that give the neighbourhood a high degree of quality, in relation to many others consolidated in the city, derive directly from its original planning that has allowed its operation in order to adapt to new demands, while housing important equipment for the operation of the both neighbourhood and the whole of the city.

5.2 Case Study

The next Figure 3 shows the paths followed during the monitoring tests for accessibility analysis that will allow identifying the degree of inclusion in the neighbourhood of Benalúa.



Figure 3: Routes followed in the study.

As Figure 3 shows, the study started in the main square of the neighbourhood, shaded in red. Also the city services included in the experimentation are highlighted in the figure with a cross.

The routes followed in the study were determined from the optimal routes suggested by google maps. The first route studied included the path from the square to the nearest bank branches. Then, the route continued from the bank branches to the courts of the city of Alicante. After that, the path continued to the main supermarket in the area that receives the most influx of people. Finally, the route to the Office of the Director General of Police was followed.

After following the routes —as it was described in a previous work of the authors (Pérez-delHoyo et al., 2017a)— information was saved by the Urban Accessibility Information Service, which uses a web-based user interface from a third party application —Google Maps JavaScript API v3— that show the accessibility problems by means of

Key Accessibility Indicators —hereinafter KAI— from users-routes analysis and reported claims of users. Furthermore, the studied points were categorized as Claim, Inefficient with Claim, Inaccessible with claim or Inaccessible.

Figure 4 shows the KAI obtained and represented by the Urban Accessibility Information Service in the Case study of Benalúa neighbourhood.

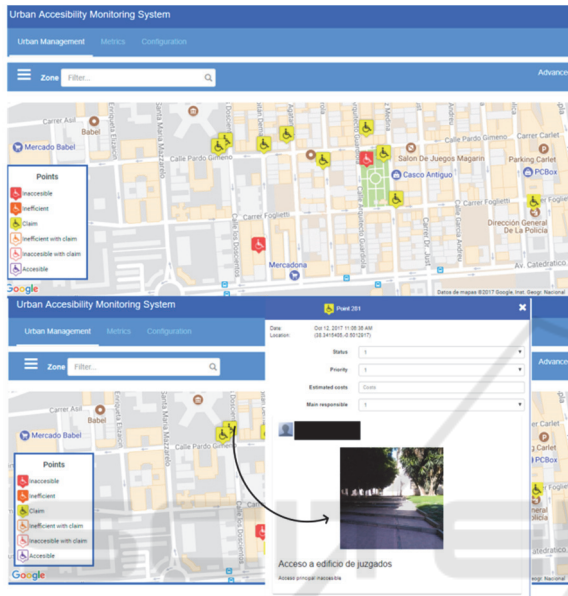


Figure 4: KAI obtained and represented in the Case study.

The first route studied included the path from the square to the nearest bank branches. Here, one inaccessible point and two claims were reported (Figure 4). Figure 5 shows one of the incidences reported, which refers to Point Number 275 categorized as Claim.

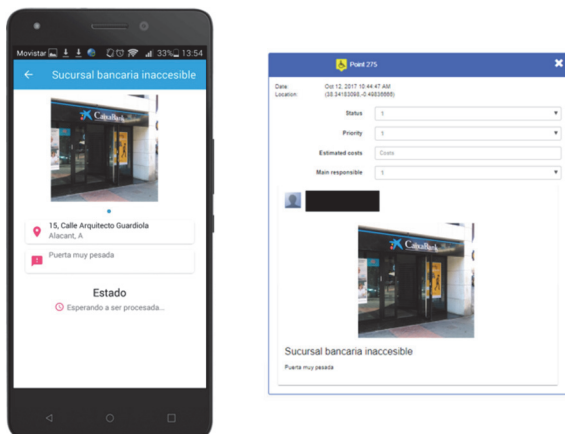


Figure 5: Point Number 275 categorized as Claim.

In second place, a second route was analysed, from the bank branches to the courts of the city of Alicante, specifically to the criminal court number 8 and the social court number 2. Five claims were identified in this path, as it is shown in Figure 4. Some points such as the entry to the criminal courts (Figure 6) categorized as Claim were not inaccessible but they require following longer and different routes for people with disabilities. It was also observed that as we move away from downtown, the accessibility level decreases. In addition, it was found as in the same street, opposing sidewalks that belong to different blocks have different levels of accessibility.

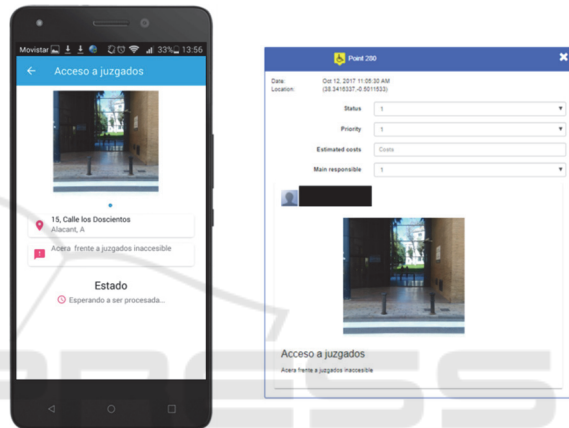


Figure 6: Point Number 280 categorized as Claim.

Finally, the last part of the study included the path to the main supermarket in the area that receives the most influx of people, where one inaccessible point and one claim were reported. Also, the route followed to the Office of the Director General of Police registered two claims (Figure 4).

6 CONCLUSIONS

Technology today is a great ally to promote citizen participation actions, but these actions also require returning to the community responses to their contributions and requests. This research takes a step forward in this direction proposing new efficient communication channels between citizens and Administration using the latest ITC. The proposed method will facilitate a greater interest of citizens in the issues of their city.

Citizens should be involved during all stages of the construction of the city, from planning and design to management and maintenance. To work in

this line has been the main objective of this work, which has considered citizens as the core of the project. The method of citizen participation to evaluate the urban accessibility that has been described involves all citizens, with or without disabilities, as well as the Administration. This will contribute to improving not only the quality of life but also social cohesion.

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