Use of Mobile Devices in Public Participation for the Design of Open Spaces

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Abstract

Mobile devices are ubiquitous nowadays. Their use is expanding into a wide range of applications. The potential contribution of mobile devices for public participation during the decision-making process is yet unclear. This study uses the case study of a new urban park in Sheffield, UK. Using iPads, views of stakeholders including hard-to-reach groups, students and professionals are sought regarding the mobile device technology and regarding the park design. Participants were shown a short animated video of a three-dimensional model of the study site and were asked questions about the mobile device visualization. The study shows that visualization using mobile devices can contribute to enhancing the understanding of the general public, thus creating a broader base for decision-making.

1 Introduction

Value+ is a collaborative INTERREG IVB project supported by the European Union to enhance public participation during the planning and decision-making process in selected cities throughout North West Europe. In each case study city there is an actual real-world investment site. The case study in Sheffield is Edward Street Park. In the past, this dense urban area faced problems such as vandalism, drug abuse, prostitution, safety issues etc. (INTERREG IVB 2010). The project site was chosen to increase the level of public participation while creating a public space with some help of a range of resident groups. Three-dimensional (3D) visualizations are developed to display design scenarios interactively to the stakeholders in order to get them involved in the decision-making process.

Understanding of a planning or design proposal is essential for successful public participation and sustainable design. Visualization has long been used to determine people's preferences, reaction to environmental changes and to provide an opportunity for the public to explore current and future scenarios (KWARTLER 2005). To some degree research to date has focussed on how traditional and digital tools affect the public participation process (SALTER et al. 2009), rather than looking into the integration of common participation tools and new technological approaches. It is widely believed that non-technological tools are inadequate for more complex analysis and larger data sets (AL-KODMANY 2001). Enhanced display and visualization can allow people to deduce relationships and layouts in a more informed way. Digital tools can also be utilized to support public engagement interactively (LANGE & HEHL-LANGE 2005; SCHROTH 2010). This is challenging and requires computerized tools that are easily understandable and manageable in order to improve public participation. Additionally, it is important that a

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higher degree of realism (LANGE 2001) should be employed to illustrate images so that 'lay people' can understand them more easily (AL-KODMANY 2001). In the participation process landscape visualizations have the potential to engage people – current and future users – during planning and design (ORLAND et al. 2001; PETTIT et al. 2011) and help to improve the quality of decision-making outcome (ORLAND et al. 2001). Mobile devices now allow people to view future environments on-site and as 3D visualizations (LANGE 2011). However, it is not yet clear whether or to which degree mobile device visualization tools are valued by users as part of the decision-making process.

This study aims to present the preliminary results of an ongoing project on enhancement of public participation with mobile device 3D landscape visualization for Edward Street Park by testing mobile devices to create a base for the decision-making process.

2 Material and Methods

2.1 Case Study Area

Edward Street is home to different cultural backgrounds and income level groups. Student accommodation, low-income family housing (council housing) and high-middle income groups surround the park (see figure 1). Table 1 shows the categories of the user groups of the park. As the surrounding buildings are often used by temporary residents, there is little to non-existent communication between the permanent Edward Street Flats dwellers and short-term tenants. The revitalization project, part of "City Centre Breathing Spaces Strategy" of Sheffield City Council aims to improve the quality of the urban area and open space to create a social environment that allows people to gather, communicate and relax (CITY DEVELOPMENT DIVISION 2011). The Edward Street project is chosen as a case study area to meet the need for enhancement of public involvement for sustainable planning. As a main aim of the Value+ project is "strengthening communities and creation of a multifunctional inner city breathing-space in central Sheffield" (INTERREG IVB 2010), Edward Street with its ethnically diverse population, and "hard-to-reach" groups was chosen as a case study area. In addition, proximity to new surrounding residential developments and to university campus and a poor layout of the existing park are reasons for selection of the area (CITY DEVELOPMENT DIVISION 2011). The park was officially opened in September 2013. The main part of the park is completed, but approximately 30% can potentially be changed based on feedback gathered from residents.

Table 1: User group categories

User Groups			
Low-income	Students		Professionals
	Resident	Non-resident	

Fig. 1: Design of the park and surroundings (SHEFFIELD CITY COUNCIL 2013)

2.2 Research Setup and Preparation

Within the overall project a workflow is developed particularly considering ease of use for a range of partners participating in the Value+ project. Trimble SketchUp was used to produce a 3D model of the area owing to easy access to the software and easy-to use interface (see figure 2-3). The digital model consists of the terrain, surrounding buildings, vegetation and further design details provided by Sheffield City Council. A walkthrough video of this model was produced using Walkabout 3D (Deliverance Software), because of improved rendering speed and navigation compared to Trimble SketchUp.

Fig. 2: General view from Edward Street Park (current condition – left); Virtual model with planting (future condition – right)

Fig. 3: View towards Edward Street Park Event Space (current condition – left); Virtual model (future condition – right)

The opening day event on 28th September 2013 was announced through local newspapers and event magazines, handouts were prepared for the residents and local community. In order to gather the views of the nearby residents about potential improvements of the park, people attending the opening day event were provided with the opportunity to view a oneminute long animated walkthrough video of the 3D model of the site on an iPad, as shown in Figure 4. A survey was conducted after they watched the video and they were asked to answer questions related to level of realism in the 3D model, mobile device use for the visualization of the site and its enhancement on understanding of the space and the value of the 3D visualization on the mobile device to create a base for the decision-making process. 81 responses were gathered on that day. Participants, with different cultural backgrounds and income level groups including professionals (high-middle income groups), low-income groups and students, were also asked to give feedback regarding the current situation of the urban development area and future design suggestions.

Fig. 4: Presentation of walkthrough of the 3D model on an iPad to residents

3 Results

The participants reported that the level of realism on the mobile device is good (mean 4.25 on a 5-point Likert scale with standard deviation (SD) = 0.646), see Table 2. The 3D model as viewed on the iPad enhances the understanding of the space and proposed plan (mean 4.12 on a 5-point Likert scale with SD = 0.524). The 3D model on the mobile device is considered helpful as a base for the decision-making process (mean 4.32 on 5-point Likert scale with SD = 0.631). When participants were asked if they are willing to use mobile devices (iPhone, iPad, smart phone, tablet etc.) as part of planning and the decision-making process, 79% of them were in favour.

Table 2: Mean and standard deviation of the feedback

Method	Valid n (from 81)	Mean	Standard Deviation
Level of Realism of the 3D model	79	4.25	0.646
Enhancement of understanding	78	4.12	0.524
Usefulness of the 3D model on the mobile device for the decision-making	79	4.32	0.631

4 Conclusion and Outlook

The responses of the participants suggest that there is strong potential for 3D mobile device visualization to contribute to the enhancement of public participation and understanding of design scenarios of residents, including socially vulnerable groups, students and businesses. Following on from this survey further work will include interviews to explore any deep-rooted problems of residents regarding the park, such as reasons for why they want to change the area and how they want to change it. These interviews will also make use of mobile device visualizations.

3D mobile device visualization in planning and design is a rather new area, thus there are many unanswered questions regarding the 3D mobile device visualization tools and their effectiveness. Given the ubiquitous nature of mobile devices, there is strong potential for mobile device visualization to be integrated as a standard in planning and design processes in the future (LANGE 2011), however further research on the software side, in human-computer interaction, usability and perception is required.

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