Using Mobile Devices to Enhance Public Engagement: Collecting Ideas for Future Development and Experiencing the Suggested Future Scenarios

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Abstract

This paper aims to present results of the use of mobile devices to support public engagement during the decision-making process with the case study, *Edward Street Park*, a new urban park in Sheffield, England. This study is part of the EU project VALUE+ (2012-2015). The project seeks ways to enhance public engagement by using visualization tools during the planning and decision making process. In line with this, people were asked to sketch their ideas on 3D models displayed on a mobile device rather than a traditional way, that is expressing them in words. Suggestions were visualized and residents experienced the scenarios through the mobile device. The project objective was to help the local community to put their ideas on the table with the help of a mobile device and to give the public a chance to see suggested future scenarios for the site presented on a mobile device as well. The results illustrate that the use of mobile devices contributes to the enhancement of public engagement with face-to-face interaction and better understanding of future scenarios with proposed changes, suggested by different groups from the public.

1 Introduction

Public engagement aims to protect, conserve and wisely manage resources in environmental planning by collecting ideas, thoughts and perspectives from all affected parties, local people, stakeholders and developers, at the early stages (HANSEN & MÄENPÄÄ 2008). So far, there has been little discussion regarding the role of augmented reality via mobile devices and its use during the collaborative engagement process. For the engagement process, it is evidenced that 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 improve the quality of decision-making outcome (ORLAND et al. 2001). However, current users tend to focus on nature, the public and visualization, but future users care more about the visual clarity and more clearly defined imagery (PETTIT et al. 2011).

Visualization techniques have long contributed to the enhancement of public engagement and the decision-making processes. It is now possible to engage the public through more sophisticated computerized animations through 3D sequences which serve to enhance image visualization and online visualizations. The tools for 3D visualization will definitely make big progress in the following years; however, mobile device supporting 3D visualizations can go further as public engagement advances with face-to-face interaction (SCHROTH 2010).

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In today's digital world, tools for visualization are mostly computer-based, which help the improvement of interactivity and communication, such that there will be no need for additional intervention (SCHROTH 2010). Participatory planning requires some time before the meeting (workshop or charrette) for preparation of the venue and the technical infrastructure (SCHROTH 2010). As technology advances, the use of computer-based visualization is increasing in the planning process (WALZ et al. 2008) New visualization tools, techniques and media enhance the interaction between the public, professionals and experts (AL-KODMANY 2001). For successful participatory planning, however, people need to have more frequent face-to-face dialogue (SCHROTH 2010). Mobile devices can be utilized to facilitate interaction after transferring sketches into real-time 3D visualizations (SCHROTH 2010). Even though mobile application devices have the possibility to view project proposals on-site, there could still be some workshops and meetings to share the ideas after each participant individually navigates the area.

Visualization tools aim to make project proposals easily understandable for general public (SHEPPARD and CIZEK 2009). There is strong evidence to suggest that these tools can indeed improve the dialogue between all participants, including experts and professionals, by enabling people to access information more easily in a transparent, open and fair manner (AL-KODMANY, 1999; BISHOP and LANGE 2005). Regardless of size or scale, tools allow participants to view past conditions or future proposals, experience the area and thus understand the concept behind any suggested changes (SCHROTH 2010, BISHOP & LANGE 2005).

Most studies in the field of landscape visualization have focused on traditional visualization techniques, such as sketches or photorealistic images (SCHROTH 2010); and computer-based visualization techniques, such as 3D-GIS models, animated sequences, virtual reality (LOVETT et al. 2009). There are still, however, some technological barriers that need to be managed in terms of improving sensory experiments in in-lab conditions (LANGE 2011). Instead of handling the obstacles in the laboratory, mobile devices can be adopted for visualization on-site with the support of the multisensory environment; its ubiquity may give a chance to people who own a 3D-enabled mobile device to view and evaluate the environment and share the ideas and thoughts related to both visualizations and the real environment (LANGE 2011).

In the field of landscape architecture, virtual reality and internet-based landscape visualization technologies (LANGE 2001) as well as public engagement during the decision-making and design process (SALEH & NASSAR 2011) have gained rising recognition over the last decade. Development in 3D landscape visualization, now allows using mobile devices to be used as a valuable tool in landscape design, planning and management (LANGE 2011). PIEKARSKI & THOMAS (2001), SCHALL et al. (2009) found that augmented reality can be used to help enhancing the urban planning process. ZHOU et al. (2008) and ALLEN et al. (2011) suggested that there are still gaps for the use of mobile augmented reality for urban planning especially for lay people's participation and user effort, however more research have been done on technological improvement of augmented reality and applications (ZHOU et al. 2008). This paper therefore discusses how the use of mobile devices can be used to support face-to-face interaction for public involvement during the planning process. The main aim of this study is to enhance public engagement with vis-à-vis communication, by allowing residents to share their ideas first and experience the visualized ideas with the mobile visualization tool later during the planning process.

2 Material and Methods

2.1 Case Study Area

Edward Street Park provides a good example of an underused urban space with old industrial properties, retailing areas, residential and public amenities. The area accommodates socioeconomically, ethnically and culturally diverse communities with students (student accommodation), professionals (high-middle income) and immigrants (low-income). Immigrants live in Edward Street flats, students in Huntsman House, Solly House, Omnia and professionals in Atlantic1 and Impact (see figure 1). Students prefer the area because of its proximity to the university. As they tend to stay for short periods of time, there is limited communication and collaboration among the users. Therefore, as part of one of the projects being conducted by Sheffield City Council, "City Centre Breathing Spaces Strategy", aims to redevelop the economic, social and cultural characteristics of the urban area and the open space by allowing people to gather, connect, interact and relax in a developed social environment (Sheffield City Council 2011a).

Fig. 1: Design of Edward Street Park and surroundings (Sheffield City Council 2011b)

The reason why Edward Street Park is chosen as a case study area for the VALUE+ Project is to encourage public engagement concerning sustainable planning and to enhance this culturally and ethnically diverse community's sense of identity, ownership and engagement and to design "multifunctional inner city breathing space" (INTERREG IVB 2010) in Sheffield. Other reasons for the selection of the area include the poor layout of the previous open space, its close proximity to the university campus and the area being home to "hard-to-reach groups", as well as the construction of new residential developments around the site.

The VALUE+ project was started in July 2012 and will be completed in July 2015 (INTERREG IVB 2010). At the open day in September 2013, 70 percent of the Edward Street Park was completed. The remaining 30 percent of the project can still be shaped according to community's expressed preferences.

2.2 Research Setup and Preparation

One of the aims of the VALUE+ project is creating inclusive designs by using 3D visualization tools to enhance public engagement (INTERREG IVB 2010). 3D visualizations help lay people understand future alternatives and communicate (WISSEN et al. 2008), thus participate meaningfully (SHEPPARD & SALTER 2004).

Trimble SketchUp was chosen to create a 3D model of the site due to software's being easily accessible and its interface's being easy to use. A SketchUp expert created the 3D model by using the data – terrain features, buildings, vegetation and other design details – provided by Sheffield City Council. Walkabout3D (Deliverance Software) was used to prepare a walkthrough video of the 3D model due to its improved rendering speed and ease of use with Trimble SketchUp and navigation.

As it is mentioned above, the project has completed and officially opened to public use in September 2013. With the additional funding, however, it is possible to make an additional 30 percent change within the project area. As there is a limited amount of funding, this paper only focuses on the areas where the public find problematic or require attention.

The first phase of the study is designed to gather information about what residents want to change in the area by letting them sketch their ideas on an iPad. The study took place at the café terrace in front of Tesco, which people actively use compare to other parts of the site. People who were passing by on site were approached without discrimination and asked to participate in a short study related to the area. People who were interested were informed about the project by being shown a one minute long walkthrough video of the 3D model of the area. They were, then, expected to answer a series of demographic questions regarding gender, age, occupation and where they live and to sketch their ideas on digital screenshots according to which part they wanted to make changes to. Upon agreeing to take part, people watched the video and were given a consent form in addition to demographic questions. After choosing the part where they wanted to make changes, ZoomNotes (a mobile note-taking application for iPads by Deliverance Software) were acknowledged to people with the digital screenshot of their choice. The participants were allowed to use the application with an iPad stylus pen and draw what they want to see in the project area rather than using verbal descriptions (see figure 2). After the completion of sketching they were asked if they were familiar with the mobile note-taking applications and ZoomNotes specifically.

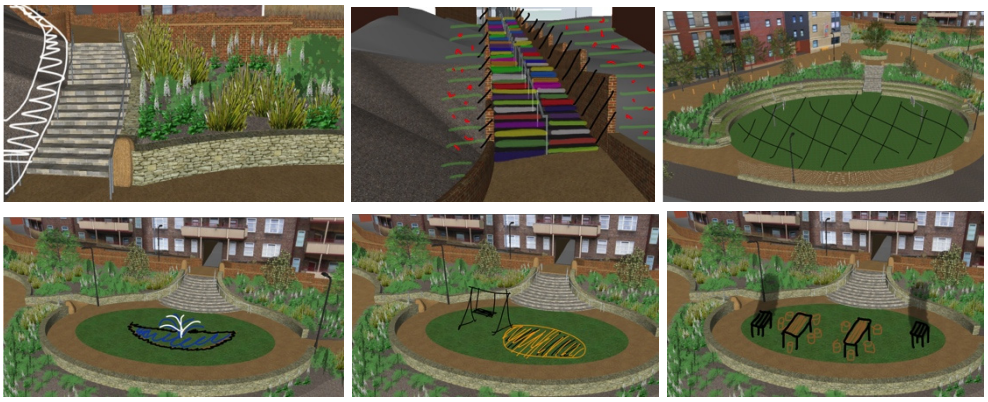

Fig. 2: Examples of sketches made by the public by using ZoomNotes on an iPad

The second phase of the study was designed to analyze public preferences three weeks after the first phase. The sketches were taken into consideration and suggested changes were visualized as different future scenarios in order to be shown to residents on-site. This phase also took place at the same spot, at the café terrace to be able to communicate to as many people as possible. As none of the previous participants were available to take part in the second phase, the same way of sampling as the first phase was used; asking passers-by if they have time to take part in a short study. They were shown ten different sets of three images, prepared according to public preferences after gathering data via ZoomNotes (see figure 3). Each set of photos illustrating the same part of the site showed the current condition, 3D model and future scenario on an iPad.

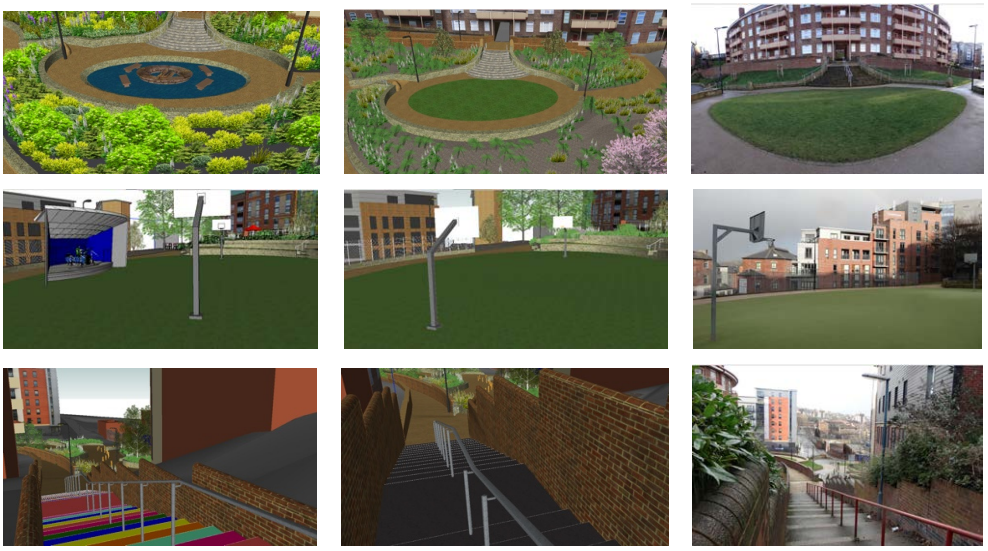

Fig. 3: Example view towards upper garden (top); view towards event space (middle); view towards the site from Solly Street stairs (bottom). Future scenario – left, 3D model – middle, current condition – right

First, participants were shown future design scenario and asked whether they liked the visualized potential future design images (not at all, not much, somewhat, a little, very much). They were also asked to guess to which part of the site the image belongs to. Finally, they were asked to rate the sets of images of the specific areas (poor, unsatisfactory, satisfactory, good, very good).

3 Results

34 residents participated in the first phase of the study to sketch their ideas on an iPad. 59 % of them were male and 41 % female while 68 % of them were students and 32 % of them were non-student. The most popular parts they wanted to change were Solly Street stairs with 41 % and the event space with 38 % (20 % festivals, concerts, movies; 18 % basketball ground and sports events). The remaining 21 % referred to a mix of the upper garden playground, adding bins and wooden benches, improving the café terrace and opening a café around the site.

Some people withdrew after they were informed that they would need to sketch their ideas on an iPad. Most of the participants were hesitant to make sketches and mentioned that they were not good at drawing. People who were in groups tended to spend more time exploring ZoomNotes by using different types of pens, thickness and colors while individuals were more likely to make basic sketches and explain what they wanted to change. Following analysis regarding familiarity responses, it is indicated that 20 % of the participants were familiar with computer note-taking software, 5 % were familiar with using ZoomNotes, 44 % were familiar with mobile note-taking applications and 31 % were not familiar with the note-taking application or software at all.

Regarding the second phase, 47 residents participated in the study. The mean scores for the future design scenarios ratings ranged from 3.78 to 4.65 on a 5-point Likert scale (5 being the highest). According to responses, participants were able to understand the suggested design scenarios and correctly guess the parts of the site. The tendency for ratings of the future design scenarios and 3D model images were similar. Future scenarios rating means ranged from 4.10 to 4.78 and 3D model rating means ranged from 4.04 to 4.40. The current situation photos were underrated with means ranged from 2.17 to 4.74. Participants tended to rate future design scenarios higher as the scenarios brought a solution for common identified problems around the area. Another reason for design scenario images being rated higher than current condition photos could be the season, such as areas looking unattractive without vegetation compared to well-vegetated 3D model images.

It is noted that it would have been beneficial to know how many people own a computer or laptop and a mobile device (smart phone or tablet) and how often they use it. It would be important to know why people did not want to participate and why they decided to withdraw after being informed. Furthermore, it could have been useful to look into responses separately for participants who were willing to participate and who were convinced to participate.

4 Conclusion, Outlook and Future Work

The responses and feedback indicated that mobile devices had considerable potential for enhancing public engagement with face-to-face communication on-site and contributing to understanding of the different design scenarios for the public including students, professionals and socially vulnerable groups.

As people seemed more comfortable and interested while they were in groups, it would have been more useful to arrange a public meeting – similar to a charrette – with multiple iPads to allow them to communicate and to collaborate. It is assumed that those who were not willing to participate and who decided to withdraw after being informed were not experienced or familiar with such a device and application. Events or workshops could be arranged as part of community development to solve above-mentioned problem, to prevent the limitations regarding the use of mobile visualization tools and to enhance the engagement of all the different age and cultural groups.

Further work that follows will include exploring the potential of this technique if people were made to feel more comfortable. In addition to that people will be allowed to use mobile devices with augmented reality features to view different future design scenarios with position tracking system on-site and in-lab settings. There are increasing numbers of studies regarding 3D mobile device visualization tools, their usability and effectiveness as part of design and planning processes (LANGE 2011), however further research on best applications, in human-computer interaction, usability and perception is required.

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References

AL-KODMANY, K. (1999), Using visualization techniques for enhancing public participation in planning and design: process, implementation, and evaluation. Landscape and urban planning, 45(1), 37-45.

AL-KODMANY, K. (2001), Visualization tools and methods for participatory planning and design. Journal of Urban Technology, 8(2), 1-37.

ALLEN, M., REGENBRECHT, H. & ABBOTT, M. (2011), Smart-phone augmented reality for public participation in urban planning. In Proceedings of the 23rd Australian Computer-Human Interaction Conference, 11-20. ACM.

BISHOP, I. D. & LANGE, E. (Eds.) (2005), Visualization in Landscape and Environmental Planning − Technology and Applications. Taylor & Francis.

HANSEN, H. S. & MÄENPÄÄ, M. (2008), An overview of the challenges for public participation in river basin management and planning. Management of Environmental Quality: An International Journal, 19 (1), 67-84.

INTERREG IVB (2010), INTERREG North West Europe Application Form. VALUE+ Project.

LANGE, E. (2001), The limits of realism: perceptions of virtual landscapes. Landscape and urban planning, 54 (1), 163-182.

LANGE, E. (2011), 99 volumes later: We can visualise. Now what? Landscape and Urban Planning, 100 (4), 403-406.

LOVETT, A. A., APPLETON, K., PAAR, P. & ROSS, L. (2009), Evaluating real-time landscape visualisation techniques for public communication of energy crop planting scenarios. Virtual geographic environments, 103-116.

ORLAND, B., BUDTHIMEDHEE, K. & UUSITALO, J. (2001), Considering virtual worlds as representations of landscape realities and as tools for landscape planning. Landscape and urban planning, 54 (1), 139-148.

PETTIT, C. J., RAYMOND, C. M., BRYAN, B. A. & LEWIS, H. (2011), Identifying strengths and weaknesses of landscape visualisation for effective communication of future alternatives. Landscape and Urban Planning, 100 (3), 231-241.

PIEKARSKI, W. & THOMAS, B. H. (2001), Tinmith-metro: New outdoor techniques for creating city models with an augmented reality wearable computer. In Wearable Computers, 2001. Proceedings. Fifth International Symposium, 31-38. IEEE.

SALEH, A. & NASSAR, U. (2011), 4th Urbenviron International Congress on Evironmental Planning and Management, Green Cities: a Path to Sustainability. The use of new visualization Tools to Enhance Public Participation in Riverfronts' Landscape regeneration. Cairo, 10-13 December 2011.

SCHALL, G., MENDEZ, E., KRUIJFF, E., VEAS, E., JUNGHANNS, S., REITINGER, B. & SCHMALSTIEG, D. (2009), Handheld augmented reality for underground infrastructure visualization. Personal and ubiquitous computing, 13 (4), 281-291.

SCHROTH, O. (2010), From Information to Participation: Interactive Landscape Visualization as a Tool for Collaborative Planning (Vol. 6). vdf Hochschulverlag AG.

SHEFFIELD CITY COUNCIL (2011a). Sheffield City Centre Breathing Spaces Strategy. https://www.sheffield.gov.uk/planning-and-city-development/planning-documents/background-reports/city-centre-masterplans-and-reports/breathing-spaces-strategy (09.01.2015).

SHEFFIELD CITY COUNCIL (2011b), Edward Street Park Design [Site Signboard]. Sheffield, UK.

SHEPPARD, S. R. & SALTER, J. (2004). The role of visualization in forest planning. Encyclopedia of Forest Sciences, 486-498.

SHEPPARD, S. R. & CIZEK, P. (2009), The ethics of Google Earth: Crossing thresholds from spatial data to landscape visualisation. Journal of environmental management, 90 (6), 2102-2117.

WALZ, A., GLOOR, C., BEBI, P., FISCHLIN, A., LANGE, E., NAGEL, K. & ALLGÖWER, B. (2008), Virtual Worlds-Real Decisions: Model-and Visualization-based Tools for Landscape Planning in Switzerland. Mountain Research and Development, 28 (2), 122-127.

WISSEN, U., SCHROTH, O., LANGE, E. & SCHMID, W. A. (2008). Approaches to integrating indicators into 3D landscape visualisations and their benefits for participative planning situations. Journal of Environmental Management, 89 (3), 184-196.

ZHOU, F., DUH, H. B. L. & BILLINGHURST, M. (2008), Trends in augmented reality tracking, interaction and display: A review of ten years of ISMAR. In Proceedings of the 7th IEEE/ACM International Symposium on Mixed and Augmented Reality, 193-202. IEEE Computer Society.