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COMPUTER GAME TECHNOLOGY, COLLABORATIVE SOFTWARE ENVIRONMENTS AND PARTICIPATORY DESIGN

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ABSTRACT

This paper presents a project that explores the possibilities for the use of computer game technologies in the participatory design process. Interactive 3D environments designed with the Virtools development environment were used in a Home Zone consultation process, which allowed participants to navigate, explore and contribute to proposed developments to their residential environment. These technologies were observed to benefit the participatory design process in some areas, namely the visualization and contextualizing of the developments, but also presented traditional technological barriers in others. While these barriers did not completely remove the participants from the process, they reduced the apparent level of engagement of these participants with the process. This paper concludes that the technology overall, is a positive addition to the participatory design process, and while there is still much research to be undertaken, it has many more potential applications in related areas.

KEYWORDS

Computer game technology, participatory design, online collaboration frameworks

1. INTRODUCTION

Computer games are complex software artefacts, which can provide immersive, interactive entertainment experiences. The technologies which underpin these experiences are collectively termed an ‘engine’. This engine is responsible for processing the vast amounts of data, which is generated by a computer game, and rendering it to the computer screen in a two or three-dimensional form. The three-dimensional game engine has been in existence for well over a decade and the computer games industry itself is now well established and highly successful at producing immersive, entertaining and compelling game experiences. While the industry is often praised for its successes in developing many innovative and groundbreaking game-play experiences, computer games on occasion, have been portrayed in a negative light as a form of entertainment that glorifies violence and encourages anti-social behaviour. Contemporary computer games offer a level of detail and realism that leaves little to the imagination. Photorealistic environments along with increasingly sophisticated characterisation can give the player the impression that they are actually taking part in the on-screen events. More recently, developments in pervasive gaming have attracted attention due to the way they appear to transcend the barrier between computer and the player and offer an alternate gaming experience. Computer games however on occasions, have provoked public outrage and condemnation over their violent content. Violence is not exclusive to computer games though, it can equally be found in other forms of entertainment, such as children’s cartoons and major motion pictures. It is the interactivity within the virtual world of the game that sets it apart from film and television, and has made the industry a particular focus of attention. Computer games have the ability to engage the player as active participants in the narrative rather than as passive observers. A growing opinion is the notion that computer games can make an important contribution to other processes outside the gaming field by using these powerful interaction mechanisms. In

this sense, computer game technology can encourage focus, empathy and imagination in the user or participant (Schell, 2004). All of these parameters have an important role to play in alternate uses of the technology.

People outside the games industry are beginning now to see how this technology might be applied in fields with more obvious social benefits. Education is one area where businesses have sought to exploit the potential of computer games. For example, MediaStage (Immersive Education, 2004) is a learning tool with a game engine at its core. Students can bring classic texts and historical narratives to life by using the software to create role-plays, performances and scenarios in a real-time, virtual environment. Game engines are also being used to train medical practitioners in surgical procedures. Errors are less of a problem when virtual models are used instead of live patients (Sakas, 2002). The growing interest in digital media and real-time visualization within the heritage industry has given rise to a whole new field of activity known as 'virtual heritage'. Here, game engines are being used to reconstruct archaeological sites, ancient settlements and cities. This also extends to the live reconstruction of historical sites with augmented reality technologies (Schnädelbach. H. et al, 2002) – a close relation of game engine technology.

This paper describes a University of Lincoln research project to explore the application of computer game technology to the community consultation phase of a participatory design project in an urban landscaping project. The project used the Virtools game engine and development environment (Virtools, 2004). This development environment allows for the online distribution of an interactive three dimensional visualisation. The application of this technology was within a design proposal for a 'Home Zone' neighbourhood development in Hull, UK. A Home Zone is a residential street where the living environment clearly predominates over any provision for traffic. The design provides space for motor vehicles, but fully accommodates the wider needs of residents. This is achieved by adopting approaches to street design, landscaping and highway engineering that control how vehicles move without restricting the number of vehicular movements. (Biddulph, 2001). The application of computer game technologies in such a project was to enable and encourage community members to participate in the design of their home zone and to visualise the planned developments.

2. TECHNOLOGY IN PLANNING AND DESIGN

Participatory design is well established in the architecture and planning professions. The application of technology along with public involvement in the process is a recent development however. The distributive and visually enabling aspects of computer game technologies is one area, which is positive in this aspect (O'Coill and Doughty, 2004). Further establishment of the synergies between computer software and participatory design is made with the evolution of collaborative software environments. These systems still pose difficulties; mainly concerning usability issues for non-computing specialists (Rank et al., 2004). Existing research into digital media in participatory design is still limited, however. There are very few practical studies looking at applications of real-time visualization to user participation in architecture, urban design or landscape architecture. In fact, established theory and practice regarding participatory design in architecture still does not address everyday digital media, such as digital video, internet polls and web-based discussion forums.

The use of technology in the participatory design process has to be employed with careful consideration. It should, in all cases, be an enabling and empowering inclusion to the process rather than becoming a barrier to participation. These barriers have been classified as socio-economic, technical and skill-based in nature (Heap, Kelly, 2004). While Heap focuses on the challenges of implementing online collaborative tools in an academic institution, the principles of the research can be generalised to online collaboration within a much wider community. In this sense, the development of a rich, navigable and compelling on-line three-dimensional environment could prove to have a negative effect on a participatory design process rather than the planned empowering effects due to the potential inability for participants to overcome these socio-cultural barriers. On the other hand, the development of on-line, computer game technology-driven participatory design could enhance the participation of users with non-threatening environments and the lack of social constrictions (Hoppmann, 2004).

Three-dimensional interactive environments in environmental design have been used to explore and support collaboration between professionals and city inhabitants concerned with the revitalisation of Japanese city districts and also between academic researchers and environmental designers involved in the redevelopment of parkland sports facilities in Taiwan (Lou, et al., 2003; Fukuda, et al., 2003). While many other projects have consisted of simple passive, walk-through simulations, these developments produced systems that allowed users to compare multiple design options and to make design changes interactively. While this research provided little information about how users responded to the system, it focused instead on describing the interactive features of the system, and the different steps involved in producing the software. The work of Lou and Fukuda does answer some practical questions, however, about how real-time environments can be constructed and configured to engage non-professionals more directly in design decisions. It does not, though, address how the technology could be employed within the more broad-based, structured process of participatory design.

3. APPLYING COMPUTER GAME TECHNOLOGY TO A PARTICIPATORY DESIGN PROCESS – THE ALBANY STREET HOME ZONE PROJECT

In 2001, the Lincoln School of Architecture was commissioned to undertake the community consultation and design for a Home Zone project centred on Albany Street in Hull, UK. A Home Zone project is concerned with the urban landscaping and traffic management of a targeted residential street with funding provided by the UK government. The outcome of such a project is anticipated to be an improved residential environment, which is safer and offers an improved quality of life for the residents.

Community involvement in the design of the Home Zone is a key requisite. In order to enable participants to visualise and experience the proposed designs for the street and its environment the Virtools game development environment was used. This development system was chosen for its facilitation of the rapid development of interactive virtual environments which can then be distributed easily with the internet and viewed with common browsers with the aid of a simple plug-in.

The street was modelled and deployed as an interactive environment with the proposed improvements implemented in the design. Residents were encouraged to navigate the street and to explore the proposed environment. Online discussion groups and forums were used to facilitate discussions of the proposed developments and to disseminate information about the project. Within the scope of this project, the residents attended a central location to view and explore the interactive, virtual street. The immediate advantages of the interactive system were apparent at this stage. Residents reported great difficulty interpreting the architectural and technical drawings of the proposed street improvements. The interactive environment allowed them some degree of visualisation and judgement of relative scale within the development (Figure 1). However, it also became clear that those residents who were not familiar with using a computer or navigating a virtual environment engaged in the process to a reduced extent, and relied on others to demonstrate the system to them.

Figure 1. Screenshot of the visualization

4. CONCLUSION

The use of computer games technology in the participatory design process overall is considered to be positive. There are some caveats to this however. The technology should be as accessible to participants as possible. Careful design of the interface and interaction mechanisms should encourage inclusiveness and not present a barrier to participation. The purpose of the virtual environment itself should be clear. Participants should have a clear idea of why they are interacting with a virtual environment, and what is expected from them as a result. In the light of this, the technology should form an active role in the participatory design process rather than being a passive observational exercise. There is still a good deal of research to be undertaken in this area, particularly related to software usability issues in online collaborative environments.

This has proved to be a very useful exercise and has given us further ideas for developments of these types of application of computer game technologies. For example, there are possibilities for house builders to distribute their dwellings as 3D interactive environments to give more information to potential buyers, and for interactive 3D exhibition spaces to be distributed by similar methods. The increased deployment of broadband internet throughout the UK would allow more effective distribution of these interactive environments, and would allow participants to interact and explore in their own time and on demand. In the wider sense, this technology could be applied to many other public participation or visualisation projects for information dissemination and gathering.

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