Forum Theatre as a Requirements Gathering Methodology in the Design of a Home Telecommunication System for Older Adults

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Abstract

The ability to elicit requirements in the design of new technology has proven to be particularly problematic with older generations of users who have not grown up with the same level of familiarity and understanding of present day user interfaces as younger generations have. It is also widely acknowledged that older people are poorly represented in the development process of mainstream technology. In this paper, we critically examine how 'Forum Theatre' can be used as a requirements gathering methodology in the development of a novel digital television (DTV) based communication system. We demonstrate how live theatre established a 'common ground' between audience participants and actors in the facilitation of new ideas, and discuss how live theatre can be used to stimulate interest and understanding from designers and relevant professionals in the development of an unfamiliar and largely undefined technology for older adults.

Keywords: Forum theatre, digital television, older users, participatory design

1. The emergence of interactive TV

Since the advent of television broadcasting, producers have endeavoured not only to entertain their audience, but also to engage them as television viewers. In the 1950's the concept of 'interactive TV' was explored through a television series called "Winky Dink and You". This invited children to engage with on-screen characters (e.g. helping them escape from perilous situations) by drawing on to transparent plastic sheets placed over the television screen (Gawinski 2003).

More recent developments in digital transmission and receiver technologies have allowed extra information to be transmitted within the compressed television signal (Gawinski 2003). This has led to a significant number of enhanced and interactive services which offer audiences different ways to interact with content and media. Depending on the technical capability of the broadcasting platform provided, these include pay-per-view, Video-on-Demand (VOD), e-commerce and healthcare services. The emergence of high-speed (broadband) Internet and cable TV has provided new opportunities to generate highly lucrative, consumer-driven revenue from connecting millions of households worldwide. These aim to offer the next generation of 'triple-play' (video, telephony and data) and 'multi-play' (multimedia and data) services which will be supported by powerful and interoperable digital receivers and home entertainment systems.

Technological advances offer a greater variety of digital television services, but research indicates that designers have ignored many key aspects of 'user-centred design', with most human factors research focused

on and largely producing findings relating to the 'average' user (Carmichael 2002). Older and disabled people remain overlooked segments of the population (Carmichael *et al.* 2005b). Clarkson and Keates (2003), Freeman and Lessiter (2003) amongst others, for example, have identified that the perceived ease of use of digital television is much lower than for analogue systems. In addition to the complexity of new equipment, there is significant evidence of the poor design of on-screen displays and remote control handsets, lack of provision of, and access to, audio-description for visual impaired viewers, signing and subtitles for the deafened and hard of hearing, and support for compatible assistive technologies (Carmichael *et al*. 2005b).

Failure to account for the broader variations in cognitive, sensory and motor abilities in an increasing ageing population is likely to exacerbate many interaction problems for older people (Carmichael 1999, 2002). Present barriers to the uptake of digital television include perceived cost and complexity of equipment, a lack of interest, value and understanding of digital programmes and services (DTI/The Generics Group 2004). Yet, given that a planned switch-off of analogue broadcasting is expected within many countries during the next decade, user acceptance is vital to ensure that the benefits of this new technology are realised. Despite government and commercial factors encouraging a voluntary migration towards digital TV, preliminary studies found that some British television viewers, disappointed and confused by the inappropriate design and quality of services provided, were reluctant to adopt digital television (Pemberton *et al.* 2004). Given these issues, it is not surprising that the present adoption rates for digital television in the UK are significantly lower for older audience groups (51% for those aged 65-74, 36% for those aged over 75) than the national average of 62% (as reported in April 2006, Ofcom 2006). This mirrors the low take up of computer or Internet services by older people in the UK (Dickinson *et al*. 2005b).

It may, however, be possible to increase the adoption of DTV by older people if services could be developed which are particular attractive to this user group. The research reported here aims to explore the development of novel TV-based applications primarily for older people who are reluctant or resistant to using PC-based technologies. As the research is focused on the support of technology for people who are unfamiliar with concepts and terminology associated with computer-based systems, significant challenges arise in gathering appropriate information from older people in the design of applications, which crucially do not yet exist.

This paper examines issues relating to the elicitation of information in the development of new technologies for older adults. The main focus is the use of drama techniques as a methodology in the context of participatory research, and a detailed description of a 'Forum Theatre' study for novel interactive digital TV services is presented.

2. Designing for older users

Advocates of "inclusive design" have long argued for a change in the perceptions of mainstream technologists and for designers to pay proper attention to the way products work, look, feel and respond to people who use them (Newell 1995, Fisk *et al*. 2004, Zajicek 2004). In particular, they recommend that older people should be better represented in the development process of new technology, and that computing professionals should have a better understanding of older people's relationships with technology. The stereotypical misconceptions, and low expectations many designers have of older adults' use of technology, have increasingly been challenged by studies which have found that older people are willing to use and embrace new media, provided that they can see their potential benefit, and can properly understand how to use them (Eisma *et al*. 2004).

Appropriate methodologies to respond to the needs of older and other 'non-average' users have included participatory methods, where researchers have worked with 'expert' groups of older people using 'hands-on', reciprocal learning approaches, both to make the users aware of some of the possibilities of technology, and to inform and educate computing professionals of the problems older users face when using new and unfamiliar systems (Eisma *et al.* 2003). This has included a more sensitive approach to understanding the needs of dynamic diversity within heterogeneous populations (Gregor and Newell 2001). Key to this methodological approach has been the distinction between designing for 'average' users and those with a more diverse range of user characteristics.

The development of effective methods for representing research findings to designers is also a pressing issue within the context of designing for older people (Newell 1995). Traditional methods of user-centred design often fail to take account for the wide range of sensory, physical and cognitive characteristics of older users, and the complexities faced by many older people, who have not grown up with same degree of understanding and knowledge of present-day user interfaces and devices as younger generations. As a consequence, relatively few guidelines are available which actively demonstrate how to collaborate with the intended users throughout the design and development process (Eisma *et al*. 2003). Although many older adults are able to embrace new technology, researchers and practitioners have found significant challenges and constraints in eliciting requirements from older adults, particularly from those people who are unfamiliar with and reluctant to use technology. These issues include:

- Lack of confidence, producing apprehension and anxiety in using computer-based systems (Marquie *et al.* 2002)
- Lack of necessary knowledge in learning the conventions of software interfaces (Dickinson *et al.* 2005a)
- Difficulties in maintaining attention throughout in-depth requirements gathering activities (Barret and Kirk 2000)

While Eisma *et al.* (2003, 2004) noted:

- More uncertainty of the possibilities of new technologies, requiring more 'concrete' examples to understand the use of a system
- Greater difficulties in understanding technical terms, concepts and metaphors of new technologies
- More negative expectations in the amount of effort required to learn to use new applications
- More reluctance to complain and criticise products and design concepts

3. The use of Forum Theatre in design

The use of story telling through theatre and video can be a very powerful method of requirements analysis as part of a range of participatory practices promoting greater end user involvement in computer-based activities and products. The authors have found that collaborative use of live drama can increase designer empathy towards end users. A particular theatre genre, Forum Theatre, has been found to be particularly useful in establishing a 'common ground', allowing members of the audience to reflect upon and engage with actors and other member of the audience about the characters' thoughts and actions in regard to the system being developed (Newell *et al.* 2006).

Forum theatre was established in the 1970s by the contemporary playwright and director Augusto Boal within his 'Theatre of the Oppressed' movement in Brazil (see Boal 2000). As an applied form of interactive theatre,

a group of actors conventionally 'act out' an example of an issue in one or more short scenes. A discussion with the audience is then conducted through the use of a skilled facilitator, who assists in generating debate and encouraging group participation. During the performance, the actor, or the facilitator, may stop a scene to elicit information or ask for assistance from the audience. The audience can also question the actors who remain in role. Scenes may be improvised with the audience, who may request a replay of certain actions, or make alternative suggestions.

Studies by Brandt and Grunnet (2000) and Tiitta *et al*. (2005) have explored the use of these dramatic techniques. These have included the use of scenarios to focus on human aspects of fictional personalities and lifestyles in work situations, to the use of materials such as photo diaries to capture aspects of everyday activities. The use of stories, portrayed through video has also been used to investigate the applicability of an intelligent sensory system to monitor the well being of older people within their homes (McKenna *et al.* 2005). Short scenarios, written by a professional script writer and recorded with professional actors aimed to "promote the conflict between characters" (McKenna *et al*. p. 7, 2005), both to illustrate how the system might work, and the consequences of errors which could occur during its usage. The researchers reported that the familiar context and believable dramatic tension in the videos were very valuable in facilitating and stimulating discussions with groups of potential users. These discussions successfully engaged the audience, producing a wide range of rich anecdotal information in relation to individual experiences, and elicited a number of important unpredicted social and technical issues within the system.

Video has also been found to be a powerful technique in educating designers in the development of computer-based systems for older people. Dramatised stories were included in the UTOPIA (Usable Technology for Older People: Inclusive and Appropriate) project, the primary aim of which was to develop techniques to inform, and correct, the 'mind sets' of designers concerning the needs of older people (Carmichael *et al.* 2005a, Newell *et al.* 2006). A series of short videos aimed at addressing the issues older people have in using modern technology formed the 'UTOPIA Trilogy'. The researchers found that users empathised with the characters portrayed, which were based on real events and conversations, and formed an amalgamation of many people's experiences with technology (see Newell *et al.* 2006). The videos proved to be a very useful method in provoking discussion, and addressing sensitive issues with designers. Questionnaire results showed that viewing these videos produced a significant change in the 'attitudes' of both student and mature designers towards older users.

4. The digital television project

Following the success of these projects, a drama-based methodology inspired by Forum Theatre was used as a means to explore ideas for developing a home telecommunication system via digital television for older people. Live theatre was used to identify the acceptability of a number of social activities presented to participating audiences, with the information gathered during these sessions informing ideas and interests for early prototype development.

Following a period of information gathering, via one-on-one and small (fewer than five people) focus group discussions with older users (over 65 years of age with and without 'computer experience'), a series of short stories illustrating the use of interactive digital TV applications were developed by a script writer (the Leverhulme Artist in Residence at the School of Computing). Three of these were then iteratively developed to produce short playlets designed to provoke discussion on various types of social interaction via DTV. The scripts addressed the issues of: (i) using video-type facilities to support communication with family and

friends, (ii) capturing and sharing memories through the television, and (iii) operating a daily reminder system.

1. The TV chatting experience	Peggy, a widow has just bought a new digital television with an inbuilt video camera so that she can use the new 'chatting service' to her daughter and family who live in the other side of the country. A younger neighbour helps Peggy to operate the system.
2. A scrapbook of memories	A few years later. Peggy is moving from her family home into a sheltered flat. She has to give away many items, which remind her of the past. The sense of loss is managed so much by the use of the digital TV's camera to photograph the important items to make a 'scrapbook of memories', which she can take with her.
3. The TV reminder	Peggy always forgets her son-in-laws birthday and is frantically looking for a piece of paper with the date. When she sits down to watch the news on TV, a reminder message sent by her daughter appears on the screen.

Table.1 Listed description of scenarios

The process

Over a period of four weeks, the principal investigator consulted with a professional script writer to ensure an accurate and detailed portrayal of each scenario. Stories used fictional characters and embodied ways in which users might act in the context of the novel technology. These were written to identify interaction issues audiences may experience, while carefully avoiding any technical details or jargon that might confuse participants. In particular, they were designed to be short, concise and open-ended so as not to resolve any situation. No working prototypes were used to depict the applications. Instead, the performances relied on a series of props, such as a digital television, a web camera, various household objects and a video projector.

The playlets all included the standard characteristics of good theatre such as, tension between characters humour, and resolution. They lasted approximately seven minutes each. Once the scripts were complete, three days of stage and technical rehearsals were undertaken, with professional actors and a theatre director prior to the plays being performed to audiences of older people.

The audience of older people were recruited from the Dundee area, and selected by telephone interview, to identify if, and to what extent, differences in their responses would be predetermined by previous knowledge and familiarity of computer-based technologies. Forty-five people, all aged over sixty years old, were chosen and divided into two groups - those who had had some experience in using computers and those who had never used computers, see table 2. These two groups then attended separate theatre sessions. In total, of the forty-five participants, thirty-one people (69%) reported that they had digital television, of which sixteen (52%) were classified as computer users.

GROUP 1 (COMPUTER USERS)				GROUP 2 (NON-COMPUTER USERS)			
Male - 9		Female - 13		Male - 8		Female -15	
Mean age 71.7	S.D 4.26	Mean age 67.5	S.D 6.26	Mean age 75.5	S.D 4.44	Mean age 68.6	S.D 5.71

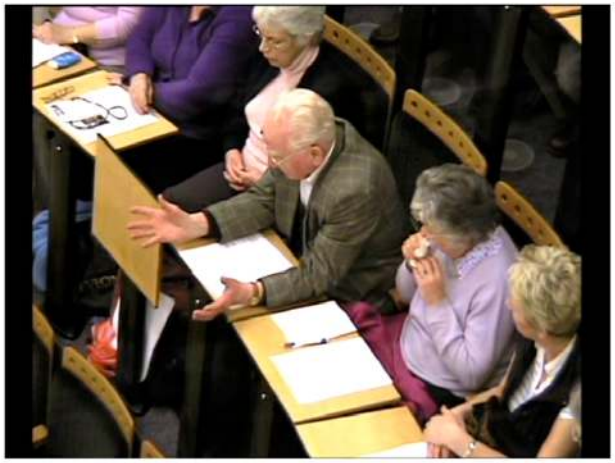
Table.2 Group details of participants

The live performances of each scenario were followed by discussion with the audience, conducted with a professional facilitator. These were recorded onto separate audio and video formats using four video cameras positioned around the theatre and one boom microphone.

Each session began with the facilitator posing some open questions concerning understanding and everyday use of technology. The playlets were then performed, and interspersed with discussions introduced by the facilitator, who raised discussion items focused on the activity presented in the playlet. Discussion of each playlet lasted approximately twenty minutes. During this time, audiences were encouraged to 'hot-seat' the actors who stayed in character; i.e. to pose questions in relation to what they had done, and the problems they may have encountered in using the technology. Discussion between audience participants was also encouraged, as were technical questions directed towards the research team. At the end of each session, all participants were asked to independently complete and return a short comments form summarising their feedback on the performances and activities undertaken during the day. Analysis of the results was undertaken using open-coding techniques from Grounded Theory (see Strauss and Corbin 1998), a methodology used to derive meaning from the systematic gathering and analysis of qualitative information. As part of the analytic process, patterns and categories in audience behaviour and response were identified from the field notes and transcripts complied from the digital recordings. This method of examining the data provided a useful means to generalise, and then discretely compare similarities and differences between responses from different group members.

(a) Actors interacting with the mock-up TV system

(b) Discussion between audience, actors, facilitator and researcher



(c) Individual comments made by audience members

(d) Example of the audience size in the specialised theatre

Figure.1 Still photographs of the Forum Theatre sessions

5. Summary of results and outcomes

The sessions raised a number of important issues. One of the most noticeable differences related to the responses given between participants of the 'computing' and 'non-computing' groups, particularly in terms of their expectations and understanding of the applications. This was much more obvious than differences between current adopters and non-adopters of digital television. Members of both the adopters and non-adopter groups demonstrated varying degrees of understanding of the digital switchover, of what digital actually meant, and what was required to receive digital television from the different options available. Some digital television subscribers were critical about the need to upgrade and pay more, to get additional programmes, and complained about 'broken down' and unstable picture quality from their digital reception.

The more experienced and competent computer users compared operating a new TV-based application to using a personal computer. Questions were raised as to whether a reminder service on digital television would work in a similar way to receiving an email message, or whether digital content could be stored and then copied onto a CD-ROM like on a computer. These direct mental model comparisons between PC and DTV technologies lead computer users to comment that some of the activities portrayed by the actors, such as chatting with friends, and sharing digital photographs could already be done on a home computer. Many of the less computer literate users in the audience, however, commented on the perceived advantages of such activities, not only for themselves, but for other friends and family.

Three activities had been presented: communication with others, capturing and sharing memories and a daily reminder system. Participants identified a range of pros and cons in all the activities, including new suggestions not considered by the research team. These included digital television as a home monitoring system to check on the well being of individuals by care professionals and doctors, in addition to home surveillance ideas for security and personal protection.

Participants from both computing and non-computing groups, however, favoured the first scenario, and the possibility of some kind of two-way, visually-orientated communication system, predominately for 'keeping in contact' with friends and family at a distance.

A selected summary from the two groups is given below to highlight some of the main issues raised from the discussions with older audiences.

Aspects of sociability

The communications application was seen to be a more intimate and personal form of mediated-communication than an email or a telephone conversation, particularly in being able to show 'expressions on people's faces' rather than just a 'disembodied voice'. However, participants were concerned over the intrusiveness of such a system, in which someone could appear on the screen without some form of prior agreement with the participating party. As a result, there was agreement from both groups that, for a two-way visual communication system to work, some form of preventative measures would be necessary to stop a caller from contacting a friend or family member while they were watching a television programme.

For example, it was suggested:

> I think it would be awful if that could actually happen, that your privacy could be invaded, just because somebody was going to push a button, somewhere else. There could be all sorts going on.

Protocol issues associated with social etiquette and privacy were identified. For example, it was stated that the mobile phone had resulted in the perception that individuals are contactable all the time. This led to recommendations which included a form of messaging service, similar to using a telephone answering machine where users could prevent, or even postpone, having to answer an unwanted call.

> ...and this seems to me that this is like the mobile phone technology, where people can access you at random, whether you want to be in contact or not, and your almost moving to something like the telephone preference system, or a screen system if you want to clear areas of your life that are not defined, or equally you don't want

> to intrude on somebody else's. And I get a little bit worried about the problem that this notion that everyone has to be accessible to everyone and everything all the time.

Participants raised a number of practical considerations which had not been recognised as significant issues by the research team. These included questions about what would happen if the television user was having a conversation while recording a programme - would the conversation also be recorded. Others wanted to know if both parties had to have the same equipment for the application to work, and whether it was the responsibility of the caller to accommodate for time zone differences when making an international 'video' call.

Security and protection

Anxiety was raised over the possible misuse of the technology from commercial companies. In particular, uncertainty as to how the digital system would operate raised concerns over if, and how, someone could effectively access and obtain personal information from their television set. Some participants recounted that they had experienced and, in some cases had been charged for, 'cold' or unwanted calls, despite, for example being ex-directory or registered on the Telephone Preference Service[1]. Many non-computer participants were therefore apprehensive about using an equivalent messaging service on DTV.

More experienced computer users, however, associated this form of unsolicited messaging as a type of 'internet spam', and asked about the feasibility of an equivalent spam filter mechanism as found in computer 'security' software. Others were more concerned with procedures to prevent 'bogus' and unwanted calls from commercial advertisers selling dubious products, and the related problems of having calls blocked, particularly in an emergency situation.

Language and terminology

Participants from both groups reported difficulties in understanding computer-based terminology. For example, terms such as "*buzz words*" and *"Hong-Kong English*", referring to obscure words and phrases with no clear meaning, were used by audience members to describe their frustration in trying to understand screen and paper-based instructions. Many felt there was an underlying and explicit assumption that they were simply expected to know what they meant, as one participant described:

> A lot of instruction feeds bits of information which are not clearly grouped and are not clearly sequenced, and they are not clear whether something belongs to this section or something else... and it's this messiness of the feed in of the learning that I think 'foxes' people all around, because they assume things that you don't know.

Participants told stories of how instructions were considered far too dense and complicated to understand on an individual basis, and in some cases, needed to be explained by somebody else who was far more familiar with the terminology. Based on their mixed experiences in using technology, they also raised a number of questions as to who had the responsibility to inform consumers of how to use and set-up the new digital television receivers.

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[1] Telephone Preference Service (TPS) allows individuals to freely opt out of receiving unsolicited sales and marketing calls. Originally introduced in the UK in 1999, this legislation is now part of the Privacy and Electronic (EC Directive) Regulations 2003.

Input control

The discussions also included criticism over the inability to select and input information from small and inappropriately labelled keys on the remote control handset, further hindered by a lack of appropriately timed feedback on the television display. Concern was raised as to how elderly and less mobile individuals would be able to operate some of the equipment illustrated, particularly the web camera and remote control.

The use of theatrical performances raised a number of novel design suggestions for many of the accessibility issues experienced and foreseen. Many participants were willing to touch-type (albeit very slowly), despite criticism with regards to SMS messaging on mobile phones. Ideas for a much simpler, and possibly larger hand control, limited to three or four buttons, cardboard sleeves placed over the controller to mark clearly defined keys, one select and scroll button option to control all the functionality on the display, as well as alternative keyboard and voice activated devices, such as the use of a microphone attached to the television set were suggested.

Back-up support

It was suggested that users be given the ability to back-up content, so that it could be transferred from television to television. An inbuilt video camera (attached to the digital receiver) was thought to be particularly useful to capture and store images of household objects of personal or financial value, in the event that these items were actually lost or stolen. In addition, the television screen was seen to have a particular advantage in displaying detailed photographs at a large size, while the ability to view different kinds of images on-screen was thought to be a good focal point for stimulating group conversations.

Degrees of learnability

Questions were raised over the plausibility of tailoring and adapting applications to accommodate for a variety of different user needs. In view of the perceived complexities of learning new technologies at an older age, it was suggested that there might be benefits in a system that started with the minimum, rather than the maximum level of functionality. Descriptions such as "*good old work horse piece of machinery*" to describe a reliable and sustainable system, and "*modular system*", which referred to the notion of a display where additional features, coined 'modules' could be included, were examples of language used by participants.

6. Discussion and conclusion

The results of these sessions illustrated the power of Forum Theatre as part of a requirements gathering methodology, which enabled technologically naive people to understand and address important issues in relation to novel design concepts. This method was successful in stimulating discussion on a range of acceptability issues for digital television, including issues in relation to usability, language and terminology, input control, and security and protection. The theatrical sessions enabled audiences to empathise with the problems experienced by the actors in the stories portrayed, and, in doing so, identify important issues in relation to their own situations. Participants commented particularly on their relief that others had experienced the same kinds of problems with technology as themselves.

The strengths of using Forum Theatre, within the context of a user-centred design practice, clearly relate to the creative abilities of theatre to visually convey ideas of how technologies and system may work, without confusing participants about the technical details necessary to achieve this. Forum Theatre was particularly helpful in the discussion of abstract ideas, which can be difficult for people with limited computing skills and knowledge to conceptualise**.** Also, age-related changes can cause problems in conducting focus group studies with older adults (Barrett and Kirk 2000), but drama, with its ability to present information beyond simple verbal representation, (Brandt and Grunnet 2000) has been found to be both emotionally and practically stimulating in the discussion of new design concepts.

Drama-based scenarios, which predominantly focused on the social activities of the technology presented, rather than specific details on how the system should work, allowed older people to identify more easily with the ideas presented. Participants found that they could generally relate to the interaction problems portrayed by actors, including their feelings of frustration and uncertainty, regardless of their understanding of technology *per se*. In addition, the emphasis was placed on the actors mimicking actions with imaginary applications. Thus working prototypes were not used to demonstrate the digital system's capability, and this reduced the danger of such prototypes constraining participants' mental models.

Our experience with Forum Theatre has been that script writers and actors possess some unique qualities as intermediaries in encouraging older people to become active participants in the development of new design concepts. Their skill in dramatising stories and contextualising issues in a recognisable manner of human behaviour and experience can provide some unique advantages. Newell *et al*. (2006) discuss these issues in greater detail, describing how script writers and actors are able to;

> know when to exaggerate for effect, and how to articulate feeling in such a way that it communicates effectively to the audience. In the words of the theatre they are expert in "suspending disbelief" (p.5)

We have found that the use of actors to respond to audience comments, to think aloud and question their own actions, to show emotional responses, and, within the context of everyday experiences, to present generic pictures of users to which audiences can relate, can offer new avenues to inform and inspire 'inclusive' and 'participatory' design practices. During this study the actors were approximately the same ages and levels of technological experience as the characters they represented, they were well briefed in their roles, and were experienced in Forum Theatre techniques.

At times, communication difficulties were experienced between the script writer and academic researchers in the process of describing scenes. Consequently, this collaborative process encouraged the researchers to think more carefully about the system and its usage context. Although many participants were keen to participate and engage with questions and ideas, some made a higher number of contributions, and a small number of participants were quieter and more hesitant to join group discussions. Similar problems of group dynamics are found in focus group research (Frey and Fontana 1993), and a skilled and effective facilitator is essential to be able to pause and manoeuvre conversations to encourage open contributions and shared experiences. Forum Theatre facilitation needs to be open, with a skilled facilitator able to clarify and pose open-ended questions to encourage audience-centred discussion.

Theatre also involves the costs required to script write, perform, facilitate and record a theatrical session. In this study, the costs were roughly equivalent to six weeks salary of a professional engineer. This is a very small fraction of the total cost of similar system development projects.

The potential of live performance to inform ideas in the pre-design stages of new technology for older people can be very advantageous for all parties concerned. Key to this approach has been working with support from a skilled script writer and an experienced facilitator. The researchers found when discussing undeveloped technology that the theatre 'story' can make future ideas more concrete by enabling people to relate to current experiences with technology. As an extension of this research, we are now exploring the possibility of presenting the performances and discussions on video in the manner of *The UTOPIA Trilogy*, both as a record of the study, but also as a means to demonstrate and share our results to commercial interests, in an easily and readily absorbable format.

While we found theatre particularly useful at the stage of the requirements gathering, it may not be equally well suited for very early requirements gathering, or later, more specific prototype evaluation. The use of Forum and other theatre techniques however, provides a power tool for designers at various stages of a user-centred design process.

Our experience with this project has led us to propose that theatrical performances could also be used to encapsulate the results of wider usability and ethnography studies, particularly in presenting the results of social and technical issues in the design of usable technology for older adults' to relevant computing professionals. This would expand on the work of Hutchinson *et al*. (2003), and Gaver and Dunne (1999) on the use of technological and cultural probes to explore and reflect upon the complex relationships people have with domestic technologies.

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References

BARRETT, J. and KIRK, S., 2000, Running focus groups with elderly and disabled elderly participants. *Applied Ergonomics*. **31**(6), pp. 621-629

BOAL, A., 2000, Theater of the oppressed. (London: Pluto Press)

BRANDT, E., and GRUNNET, C., 2000, Evoking the future: Drama and props in user centered design. In *Proceedings of PDC*, 28 November - 1 December 2000, New York, pp. 11-20

CARMICHAEL, A., 1999, Style Guide for the design of interactive television services for elderly viewers. Independent Television Commission, Kings Worthy Court, Winchester. Available online at http://www.computing.dundee.ac.uk/staff/acarmichael/Carmichael_DesignStyleGuide.pdf. (accessed May 2006)

CARMICHAEL, A., 2002, Older users of digital TV - challenges and opportunities. *Consumer Policy Review*, **12**(6)

CARMICHAEL, A., NEWELL, A.F., MORGAN, M. and DICKINSON, A., MIVAL, O., 2005a , Using theatre and film to represent user requirements In *Include 2005*, 5-8 April 2005, Royal College of Art, London. Available online at: http://www.hhrc.rca.ac.uk/events/include/2005/proceedings/pdf/carmichaelalex.pdf (accessed May 2006)

CARMICHAEL, A., RICE, M., SLOAN, S. and GREGOR, P., 2005b, Digital switchover or digital divide: A prognosis for usable and accessible interactive digital television in the UK. *Universal Access in the Information Society*, **4**(4), pp. 400-416

CLARKSON, J. and KEATES, K., 2003, Digital television for all: A report on usability and accessible design, Appendix E - Investigating the inclusivity of Digital Television Set-top-box Receivers. Available online at: http://www.digitaltelevision.gov.uk/pdf_documents/publications/Digital_TV_for_all_appendix_e.pdf. (accessed May 2006)

DICKINSON, A., EISMA, R., GREGOR, P., SYME, A., and MILNE, S., 2005a, Strategies for teaching older people to use the World Wide Web. *Universal Access in the Information Society,* **4**(1), pp. 3-15

DICKINSON, A., NEWELL, A.F., SMITH, M.J. and HILL, R.L., 2005b, Introducing the internet to the over-60's: Developing an email system for older novice computer users. Interacting with computers, **17**(6), pp. 621-642.

DTI/THE GENERICS GROUP., 2004, Attitudes to digital television. Preliminary findings on consumer adoption of digital television. Available online at http://www.digitaltelevision.gov.uk/pdf_documents/publications/Attitudes_to_Digital_Television.pdf (accessed September 2006)

EISMA, R., DICKINSON, A., GOODMAN, J., MIVAL, O., SYME, A. and TIWARI, L., 2003, Mutual inspiration in the development of new technology for older people. In *Include 2003*, 25-28 March 2003, Royal College of Art, London, pp. 252-259

EISMA, R., DICKINSON, A., GOODMAN, J., SYME, A., TIWARI, L. and NEWELL, A.F., 2004, Early user involvement in the development of information technology related products for older people. *Universal Access in the Information Society*, **3**(2), pp. 131-140

FISK, A.D., ROGERS, W.A., CHARNESS, N., CZAJA, S.J. and SHARIT, J., 2004, Designing for older adults. Principles and creative human factors approaches (London: CRC Press)

FREEMAN, J. and LESSITER, J., 2003, Using attitude based segmentation to better understand viewer's usability issues with digital and interactive TV. In *1st European Conference on Interactive Television*, 2-4 April 2003, Brighton, UK, pp. 19-28

FREY, J.H. and FONTANA, A., 2000, 1993, The group interview in social science. In, *Successful focus groups. Advancing the state of the art*, D.L. Morgan (ed). (London: Sage Publications)

GAWINSKI, M., 2003, Interactive television production. (London: Focal Press)

GAVER, W. and DUNNE, A., 1999, Projected Realities: Conceptual Design for Cultural Effect. In *CHI 1999*, 15-20 May 1999, Pittsburgh, Pennsylvania (ACM Press) pp. 600-607

GREGOR, P. and NEWELL, A., 2001, Designing for Dynamic Diversity - Making Accessible Interfaces for Older People. In *WUAUC '01 Workshop on Universal Accessibility of Ubiquitous Computing*: *Providing for the Elderly*, 22-25 May 2001 Sal, Portugal, pp. 90-92

HUTCHINSON, H., MACKAY, W., WESTERLUND, B., BEDERSON, B.B., DRUIN, A., PLAISANT, C., BEAUDOUIN-LAFON, M., CONVERSY, S., EVANS, H., HANSEN, H., ROUSSEL, N., EIDERBÄCK, B., LINDQUIST, S. and SUNDBLAD, Y., 2003, Technology Probes: Inspiring Design for and with Families. In *SIGCHI conference on Human factors in computing systems* 2003, pp. 17-24

MCKENNA , S.J., MARQUIS-FAULKES, F., NEWELL, A.F. and GREGOR, P., 2005, Requirements Gathering using Drama for Computer Vision- based Monitoring in Supportive Home Environments, *Technology and Disability*, **17**(4) pp. 227-236

MARQUIE, J.C., JOURDAN-BODDAERT, L. and, HUET, N., 2002, Do older adults underestimate their actual computer knowledge? Behaviour & Information Technology, **21**(4), pp. 273-280

NEWELL, A., 1995, Extra-ordinary human-computer interaction. In *Extra-ordinary human-computer interaction, interfaces for users with disabilities*, A. Edwards (Ed). (New York: Cambridge University Press)

NEWELL, A.F., MORGAN, M.E., GREGOR, P. and CARMICHAEL, A., 2006, Theatre as an intermediary between users and CHI designers. In *CHI 2006*, 22-27 April 2006, Montreal, Canada, pp. 111-117

OFCOM., 2006, Media Literacy Audit: Report on media literacy amongst older people. Available online at: http://www.ofcom.org.uk/advice/media_literacy/medlitpub/medlitpubrss/older/older.pdf (accessed April 2006)

PEMBERTON, L., RICE, M. and GRIFFITHS, R., 2004, Fear and loathing in the living room. Acceptability issues for interactive television services. In *Proceeding for the 18th British HCI conference*, Leeds, 6-10 September 2004

STRAUSS, A. and CORBIN, J., 1998, Basics of qualitative research. Techniques and procedures for developing grounded theory. (London: Sage Publications)

TIITTA, S., MEHTO, K., KANKAINEN, T. and KANTOLA, V., 2005, Drama and user-centered methods in design. In *Include 2005*, 5-8 April 2005, Royal College of Art, London, UK. Available online at: http://www.hhrc.rca.ac.uk/events/include/2005/proceedings/pdf/tiittasauli.pdf (accessed May 2006)

ZAJICEK, M., 2005, Older adults: Key factors in Design. In *Future interaction design*, A. Pirhonen, H. Isomäki, C. Roast and P. Saariluoma (Eds). (London: Springer-Verlag) pp. 151-176