HCI and the Older Population

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INTRODUCTION

The proportion of older people in the population of the developed world is rapidly increasing and it is imperative to consider how technology design can meet the needs and wants of this important user group.

Older people currently control a large proportion of the wealth in the UK, and many have a substantial disposable income. There is also no evidence that they are particularly averse to using new technologies, if those technologies are appropriately designed and introduced. The older population therefore presents a sizeable market opportunity for the IT industry together with a challenge to discover how new technologies can be effectively designed for this group.

In addition, the increasing proportion of older people will lead to a significant increase in the numbers needing support for daily activities and in those needing long term care. Technology presents one important avenue for providing such support but only if it meets actual needs in appropriate ways and can be used effectively.

Both of these reasons provide strong imperatives for investigating human-computer interaction as it relates to the older population. The workshop on HCI and the Older Population at HCI 2004 provided a forum for academics and practitioners to discuss the issues in this area, looking both at current work and key challenges. These proceedings contain the papers accepted to this workshop, and illustrate the wide range of research being done in this area.

The workshop followed on from a previous workshop at HCI 2002, entitled "A New Research Agenda for Older Adults". More information can be found at http://www.dcs.gla.ac.uk/utopia/workshop.

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LEARNING TO USE COMPUTERS AT A LATER AGE

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ABSTRACT

10 older adults were interviewed about their experiences with computers, as well as their motivations behind learning to use computers at a later age. In addition to the interviews, the elderly were observed as they were using web for information search. The motivations for learning to use computers varied, some were motivated by the possible benefits, some thought they had to learn it, and some had personal reasons for learning. Usually, computer usage felt difficult at first, but when support was available, the elderly were enthusiastic and fearless learners. The main problems in the interaction with web search engines were related to editing the text in the queries, understanding the terminology, and understanding the structure of the web.

1. INTRODUCTION

Several studies present older adults as a major challenge for human-computer interaction: elderly are told to have several cognitive and physiological deficits, their motivation for computer usage is low (especially among females and people who have a lower education), and they fear or feel anxious of computers [*e.g.*, 2, 3, 4, 5].

The pessimistic view presented above is not the whole truth and it is dangerous to think of being old as a synonym of being disabled. The danger lies in a risk of forming stereotypes that can easily affect the designers (seniors can be seen as a group that is too difficult to take into account in the design) and more dangerously, making elderly think of themselves as not being able to learn to use computers any more. This position paper presents a study [1] of elderly who do not have noticeable problems in cognitive functioning and who are enthusiastic and willing to learn computer use at a later age. However, the study emphasizes that elderly novice users need support and training.

This paper focuses on the motivations behind older adults' learning of computer use and the difficulties and positive aspects related to this learning. Additionally, we were interested in the older adults' interaction with web search engines and in the possible problems related to it.

2. STUDY – PARTICIPANTS AND PROCEDURE

10 elderly users (3 females and 7 males, the average age 67.3 years) participated. The participants had all taken computer courses at Mukanetti association [6] which teaches computer usage specifically to seniors. Three participants were more experienced with computers, while the remaining seven were computer novices and had just taken a couple of basic courses offered by Mukanetti. As web searchers, the participants were inexperienced: six had heard about search engines only during a computer course and most of them had never used search engines.

First, the participants were interviewed about background information and about their computer and Internet use. Following this, the participants who did not have experience with search engines were briefly introduced to the Finnish version of Google (http://www.google.fi).

The participants were then given a list of possible search tasks they should try to complete by using the web. The tasks were selected so that they would address a variety of interests, for example, culture, politics, gardening, health, and computers. The participants used the computer independently for the tasks, but they could ask questions and they were assisted if needed. On average, the sessions lasted a little more than an hour.

3. RESULTS FROM THE INTERVIEWS

Three participants had used computers already earlier, when they were still working. These experiences were not considered to help with the current computer use as the early systems were so different from the current ones. In addition, the early experiences were mostly negative as the systems were still unstable and difficult to use.

We got computers at work in the 90's. Although I did not have a computer at that time, they told me at the office that I must not touch the computers because I could break them. This left me a feeling of fear towards computers that only ceased when I took the first course last year.

The motivations for learning to use computers varied, some were motivated by the possible benefits of the usage (*e.g.*, easy to correspond with distant friends), some thought learning was necessary (banks will have their services only through web), and some had personal reasons for learning (*e.g.*, showing others that they can do it).

Most of the participants got a computer from relatives who just brought the computer to the senior and gave very little advice about the possible uses:

My brother brought me his old computer. I asked him what I can do with it. "Play solitaire", he answered. Well, I played solitaire until I was completely fed up with it.

Commonly, the seniors began to really use the computer only after taking a course: learning to use it by themselves was simply too difficult. Furthermore, as the benefits of computer use were not clear, the trouble of learning was just too big to feel worthwhile.

Two participants had participated in a computer course provided by a local adult institute. Although this course was intended for beginners, the teaching was experienced as being far too hasty and confusing. This highlights the importance of the quality of the training: a course designed specifically for the elderly was seen as the best possible way to learn to use computers at a later age.

The participants told that sometimes computer use is confusing, frustrating, and feels chaotic. However, the courses they had taken had helped them to overcome the anxiousness and fear towards computers:

I think that the most important achievement during this two week course was that I do not fear computers any more. The fear of breaking the computer, which I think all elderly people have, has vanished somewhat.

For many seniors, the computer had already become an inseparable part of their daily routines. For these seniors, the computer was mainly a tool for communication through e-mail, an easy way of taking care of banking, a storage place for their own work (*e.g.*, some were writing autobiographies), and a source of information through web.

4. RESULTS FROM THE OBSERVATIONS

Although six participants were complete novices in information search from the web, they all could successfully complete at least a couple of search tasks. This suggests that also novices can use web effectively for information access.

The most serious problems the seniors faced had to do with editing the text in the queries. They had difficulties in noticing when the focus was in the text box, they commonly made typos, and had serious problems in getting the cursor to the right position in a word when correcting the typos. These problems are most likely due to the age-related declines in psychomotor functioning and vision.

The terminology used in dialogs (*e.g.*, warnings about opening certain documents) was not understandable for the seniors. Although the dialogs were written in the participants' native language, their message was not revealed. This result calls for more thorough (albeit simple language) explanations in the dialogs, as well as training users for these special situations.

The problems with understanding the structure of the web were revealed by the difficulties in getting back to the search engine after navigating away from it, difficulties in understanding the scope of the searches provided in some web sites, and problems in understanding the relationship between the links to a certain page and that page's URL (in search engine's result listing).

5. DISCUSSION

The study presented a group of seniors who were enthusiastic about learning to use computers, although some of them had had negative experiences with computers earlier. However, learning was experienced as challenging and the need for support became evident both in the interviews and during the elderly were observed in using web for information search. The elderly were able to use a search engine successfully after only a couple of minutes of training. However, there were several problems during the search that might have made the seniors quit the task if left alone – and certainly these problems would have made less motivated seniors give up (with possibly a heightened negative attitude towards computers). Younger people typically learn to use computers in close co-operation with other people and we should not expect elderly to learn this demanding skill themselves. Some age-related challenges were also found, for example, difficulties in using the mouse for pointing. However, these difficulties can easily be alleviated by careful design.

6. ACKNOWLEDGMENTS

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DESIGN CONSIDERATIONS FOR ELDERLY USERS IN DOMESTIC PERVASIVE ENVIRONMENTS

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ABSTRACT

This short paper examines some of the issues within the design of domestic pervasive systems for the elderly and offers an insight into some of the considerations that need to be examined when installing/developing domestic pervasive systems for this client group. This paper arises from research currently being carried out at Loughborough University. The research is aimed at providing services for elderly users in pervasive domestic settings.

Keywords

Pervasive Computing, Design, Elderly Users, Interface.

1. INTRODUCTION

Pervasive technologies offer new and exciting interactive possibilities within the domestic (home) environment. As this new interaction takes place within the domestic arenas of our lives, we need to recognize that there will be much user diversity. These new technologies bring with them a variety of new ways to interact, that have yet to be fully explored. The way these systems are designed needs careful consideration, so as to accommodate the different users within domestic environments. One set of users that have been targeted by the designers and developers of pervasive systems have been the elderly. With an ever increasing aging population there is a necessity, both economically and socially, for elderly users to remain in their own homes. One possible way of doing this, may be to embed pervasive systems into elderly users' homes [1]. These systems could be aimed directly at the users' needs, and as such may be as simple as an automated grocery ordering system, through to a complex system monitoring the users' health, movement and power/water consumption [3].

An important consideration is the design of interfaces and interaction strategies for older users within pervasive domestic environments. Many existing interaction strategies rely upon the desktop interaction paradigm of the mouse and keyboard, but for a pervasive domestic setting this is not practical as the tasks we do may not require a keyboard and mouse, the user may be mobile and the feedback and input may be in many different rooms of the house.

1.1 Consultation

The first step in any systems design is to initially find out and understand the user's needs. This is especially important when developing pervasive systems to monitor different illnesses, as there may be different monitoring requirements and different users that use the system other than the 'patient', such as nurses, doctors, neighbours and relatives. The sort of system needed must be discussed. What can be provided needs to be established: what the system is required to accomplish and the limits of the technology involved need to be explained to the user [2]. This initial consultation will affect the implementation of the system and also allows the designer to assess if the system will facilitate the users' desired activities.

1.2 Impairment

Many elderly users have some degree of impairment, this can drastically effect the input and output modalities used. Graphical user interfaces may not be appropriate to visually impaired users, and auditory based interfaces will be of little use to users with hearing impairments, so careful consideration will be needed to appropriately design efficient and effective means of input and output for individual users. We must also consider the limited mobility of many elderly users, which means that access to any services must be provided in multiple locations that are most commonly used by the elderly occupant. This may be done by initial consultation and monitoring [3].

The manual dexterity of many elderly users is impaired, so any input devices must require only a low level of accuracy to work safely and satisfactorily. If an alternative input system is to be used, such as speech, it must be remembered that vocal degeneration can occur in the older population [5][2], so the amount of spoken commands must be limited and easily remembered. Mental health issues also need to be considered, the support of users who have a degree of dementia need to be appropriately addressed [4]. A way of supporting these users may be through the implementation of systems that are intuitive, feel 'natural' and are easy to learn. By installing such a system issues of computer non-literacy may also be addressed. Generic illness, such as diabetes also plays a part in what services and systems are put in place. The degree and type of illness can indicate the

type and level of system needed, especially if health indicators are to be monitored.

In cases where mobile or wearable computing devices are to be worn, there are special ergonomic considerations that have to be appropriately addressed. These relate to the device placement, load and stresses that exist when this type of technology is worn by an elderly user. Many mobile devices also have small screen sizes, which may prove difficult to see [6] and there is also further research that needs to be done into the use of wearable input devices while the user is mobile [7] . It may be the case that elderly users find the wearing of such technology socially intrusive, so this may be integrated into their clothing to make it less obvious and much more discrete [8].

1.3 Multi-Occupancy

One little addressed issue, is that of multi-occupancy within domestic pervasive environments. There may be a variety of users within the home all using the same and different services. This could make any system highly complex and could cause conflict at a technical and social level. Any pervasive system needs to be able to cope with a variety of users from children to the elderly. They may all have different needs, in terms of the tasks that they do and their chosen input and output modalities. Within a shared pervasive environment we must also be aware of security and privacy issues, which users are allowed to see what information, who can use what services and is user monitoring ethical?

1.4 Psycho-Social Factors

So far we have briefly looked at some of the physical issues that can affect the design of domestic pervasive environments for elderly users. In this last section we look at the psycho-social factors concerning elderly users. One of the key features of an enabling and supportive pervasive system is that it can give its users a higher level of independence, and in so doing they obtain an improved quality of life. Existing community networks amongst elderly users may also prove to be a valuable source of individuals who may be trained to offer specific support or monitoring as appropriate. By using this community network it is hoped that a greater level of acceptance of pervasive technology might be gained.

2. CONCLUSION

In conclusion, this paper has shown some of the issues associated with the development and design of pervasive environments for the elderly. Although this is not a complete overview it raises important questions and offers a general insight into the way that some of these problems may be tackled. After examining the literature it becomes clear that there is a need for further investigation into the development of domestic pervasive environments for the elderly, in terms of the process of gathering user requirements, consultation, the physical characteristics of the user and the psycho-social impacts of the implementation of such technologies.

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INFORMATION SEEKING STRATEGIES USED BY OLDER PEOPLE

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ABSTRACT

This paper concerns a pilot study [2] which considers the increasing levels of public information that is provided on the web and reflects on some of the implications this has for our ageing population. The issue is particularly pertinent as governments are increasingly adopting technology for such use. The study investigates the attitudes of older people towards on line information searching and their personal strategies for information seeking.

Keywords

Search strategies, elderly, public information, cognition.

1. INTRODUCTION

It is increasingly important for the general population to access information from the web. Government is being encouraged to use the web as a central information source with millions of pages being available online. However these sources are little used. Pinder[5] argues that this is due to the poor usability and poor accessiblility of the information.

We start from the premise that improvements in information and communication technologies have the potential to give extra-added benefit to an increasingly aging western world population. In order to facilitate this we are exploring a Pro-active design philosophy which stresses the need for ensuring the broadest possible end-user population is incorporated from the outset[1]. This pilot study has been exploring the potential benefit for the elderly in developing systems that work with their consolidated strategies for problem solving. We are also aiming to secure a rather positive view of ageing which recognizes that many elderly people retain, enjoy and continue to use their cognitive abilities deep into old age rather than pursue a line of enquiry which assumes a rapidly increasing passivity in the older population.

Rabbit[6] stresses that at well-practiced skills, whilst competence does drop with age, people can still perform at levels much higher than unpracticed young individuals. His model of the decline in cognitive ability is that the incidence of major cognitive impairment increases with age, but it does not affect everyone equally.

Furthermore some cognitive skills are effected less severely than others. These "Crystallized" mental abilities relate to skills that have been practiced or gradually acquired over a lifetime. This contrasts with "fluid" mental abilities that depend on information processing speed or on the learning of new problem solving skills which are more likely to degrade thus reducing the capacity to solve novel problems. However, Rabbitt also suggests that crystallized skills that depend on fluid skills are not severely affected by degradation. Our stance here is that we should try and investigate the use of these skills in relation to information searching in order to further consider how such skills can be utilized in web based searching because some people may be extremely effective at finding information in more traditional ways but face difficulties accessing information on web sites – in particular e-Government information.

2. METHODOLOGY

A qualitative research methodology was followed with a scenario-based approach being adopted [3]. Participants were asked to think-aloud performing a web-based e-government information-seeking task. They were asked to find information and an application form for a housing benefit claim. Thereafter they could look for other information of interest. The observer took written notes of the major actions performed and statements made. No tape recording was done to maintain the relaxed nature of the observations. Follow-up questions explored how people would normally find information, their feelings about using a computer to do this, their criteria for choosing a strategy and their feelings about participating in the study. Participants were aged between 62-82. Where possible the observations were carried out in the person's own home using their computer, or in other cases at the home of someone they knew well (possibly the researcher). Lave [4] highlights the importance of natural settings to investigate cognitive phenomena. The setting affects the cognitive processes involved. Indeed, one participant left the computer to find other personal resources.

3. BRIEF SUMMARY OF FINDINGS

Subjects had strong strategies for information seeking and favoured their use. Strategies included using the telephone to ask someone to send a housing benefit form, and physically going and collecting a form from the council offices. Anecdotes concerning previous searches for information, for instance for family tree records and planning application forms also revealed a preference for physically going and getting hold of records and forms.

> *"The difference is I actually went there. I rang up and arranged to go and sit there and I went to [...] library. I went to the actual records office. I rang that office [looking at details online]. You book a seat. I'd do the same again as I actually got hold of the records. They're probably on here [the website]. I wouldn't know. I go to the cabinets and find the records myself."*

If proactive design is an aim then ways need to be found to support the use of existing search strategies and skills. This may mean supporting use of combinations of traditional information seeking approaches with web based ones, rather than seeing the latter as a replacement for the former. Novel interface design based on traditional search strategies may help. More research is needed in this area. The use of the telephone directory to locate a contact point for the appropriate council offices was far quicker for all but one of the participants and whilst this may have led to a long period before the form was actually located, it suggests that a look-up facility for web-addresses based on a telephone directory structure may be beneficial.

Whilst all the participants were keen to learn about the computer they saw little advantage in using the internet for their searches, although one person noted that if they were physically incapacitated the internet would be useful.

The obvious measure of information seeking effectiveness is the time taken to achieve the task and this was generally perceived as slow. However, speed was not necessarily the most important measure of perceived advantage. The participant's strategies for effective information searching were based on various criteria for positive satisfaction. Speed of access was often surpassed by other concepts of value as getting out, socialising, and actually talking to humans. One subject favoured using the library to look up information. They would wait several days before visiting town. However, the option of using computers in public places was treated with some ambivalence due to a concern for making fools of themselves.

It was notable that all subjects had a vague understanding that you could search on some criteria. However those lacking any computer experience, were not aware of the existence of search engines, how to locate them and the importance of at least an alias for a URL. Beyond these conceptual entities are serious problems with navigation. Scrolling and mouse movements in general carry physical barriers. Such difficulties required assistance from the researchers. Overall, if we are to provide information to elderly, novice computer users we would need to deal with the physical components and streamline the whole navigational process. The whole area of touch screen and clear navigational components requires serious research.

4. CONCLUSIONS

Suggestions that these problems are only with the current generation seem misguided. Several of the subjects had used computers as part of their jobs (eg BBC micros), including one who taught their use. The technologies had moved on, however, so that information searching was still problematic. The current generation of workers may be proficient with Google, but that may be of little use after retirement when completely new information technologies and interfaces have replaced it. Future work should consider the incorporation of well used search strategies into interface design in order to reduce the burden on fluid mental resources that may be heavily overburdened in a spiral of technological advancement.

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CATS: ASSISTING OLDER PEOPLE OBTAIN APPROPRIATE TECHNOLOGY SUPPORT

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ABSTRACT

In this paper, we describe the development of a checklist that is in development that can be used to assist older people determine the efficacy of different types of technology support systems. The importance of this is clear when considered in terms of the rising older population and the speed of technological acceleration making it impossible to keep abreast of latest developments that might be useful to supporting older people at home.

Keywords

Assistive Technology, Older People, Dependability, Design.

1. INTRODUCTION

There is a proportionate rise in the number of older people and as a consequence it is clear that new ways of supporting and assisting them are required. With the increase in population of older people, the UK is faced with a challenge of how to cost-effectively ensure that older people's health and social needs are met. Current trends favour technological responses to enable older people to maintain a quality of life, through telecare, EAT (Electronic Assistive Technology) systems as well as other home modifications and adaptations. Within the work under the DIRC (www.dirc.org.uk) Interdisciplinary Research Collaboration in Dependability we have begun to address the true potential for the appropriate use of technology in supporting older people in their own homes [3]. Our extensive fieldwork throughout England and Scotland allowed the voice of older people to be responded to through our adaptation of cultural probes [2]. The cultural probes highlighted the concerns of older people in relation to everyday mundane technology as well as their relationship with supportive technologies such as social care alarms [1]. In this paper we address a possible solution that we have been developing called CATS. The CATS tool has been designed to assist professionals and non-professionals determine whether a potential technology solution is most acceptable and appropriate for a person.

2. METHOD

Our fieldwork was conducted primarily at three locations, two in the North West of England and one in Central Scotland. Older people were asked to use "cultural probes" to provide us with glimpses into their lives. These probes consisted of Polaroid and disposable cameras, diaries, Dictaphones, photo-albums, postcards, maps of the area, pens and so on. We use them as a way of uncovering information from a group that is difficult to research by other means and as a way of prompting responses to users' emotional, aesthetic, and social values and habits. The data provided by the probes was enhanced by extensive qualitative interviews with the residents and technology tours around each person's home. The research team also complemented this by observation and photography.

3. TECHNOLOGY AND SUPPORT

It soon became clear to us that older people's relationship to technology was not straight forward [4]. Older people are a heterogeneous group and therefore have a wider range of views and methods of using and accommodating to the technology in their homes. Simple devices such as televisions, for example, were not just providing entertainment but were acting as a 'comforting friend' which was always on in the background. We also found that the dependability of the technology was at times critical to the way that it was used or not used by the older person [5]. For example, cords from care alarms were not used and were tied "out of the way" so that false alerts were minimised. On closer investigation, it became evident that the people who had specified the technology in the first place had not considered the relationship between the technology and the person.

4. THE DEVELOPMENT OF CATS

As a result of our work with older people we have developed and are validating a checklist called "*A **C**hecklist to assist the assessment of the dependability in **A**ssistive **T**echnology **S**ystems* (CATS)". The CATS checklist is

designed to assist in the appropriate choice of assistive technology system to meet the needs of an older person in their home. CATS provides a number of key questions which can be asked about the user's relationship to the overall technology system as well as specific technology related (system derived) questions. The intention and purpose of CATS is to allow users to assess their existing systems and determine appropriate additions (if required), for carers to determine if a person's system is not working well and needing replaced or updated. Finally, and foremost, CATS is designed for social care professionals (Occupational Therapists, Social Workers, Support Workers etc) who would normally be assisting in or having input into specifying or commissioning this form of technology. By using the CATS checklist appropriately, the user should be provided with a set of clear questions that can be used in determining the appropriateness and dependability of any particular AT system they design or are considering using.

CATS contains three main checklists. The first checklist is a "Location Space Form" which allows the different elements of the home and interactions in the home to be plotted. The form is split into four sections (Fitness for Purpose, Trustworthiness, Acceptability, Adaptability) and each section is split into subsections (Transparency, Requirements, Availability and Reliability, Safety, Confidentiality and integrity, Maintainability, Survivability, Usability, Learnability, Cost, Compatibility, Efficiency, Responsiveness, Aesthetics, Configurability, Openness, Visibility, User Repairability) which allows different facets of interaction to be considered [5].

The second checklist entitled "Main Technology Assessment Questions" is designed to probe whether the proposed technology is the correct decision, or whether an alternative method of assisting the person is recommended.

The third checklist entitled "Assessing a System: What to look for and what to avoid" is made up of highly detail questions about the system both in relation to the technology (and its properties and configuration) and the person (their activity patterns, use and understanding of the proposed system). The questions follow the order preset in the first "Location Space Form".

5. CONCLUSION

This paper has briefly outlined the theoretical development of CATS, a tool to assist technology specification. The development and theoretical underpinnings to the tool have been discussed and the tool is currently being evaluated. Although it is still too early to provide definite conclusions, the CATS checklist does appear to be a useful tool that could augment current assessment procedures. There is a possibility that it might need to be re-evaluated and updated to ensure that it is both reliable and valid with future working practices and legislative practices. There is little doubt that a tool of this type is required and could be a means of ensuring people receive technological responses that do actually meet need.

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ADDRESSING USER NEEDS: ADAPTING INFORMATION ACCESS FOR THE ELDERLY

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ABSTRACT

This paper offers one possible means of addressing the issue of poor web accessibility affecting elderly people. The approach presented is to adapt the order in which web pages are presented to the user according to specific web page elements that affect accessibility and the user's experience. This technique could reduce the time taken to filter out inaccessible pages and would be particularly beneficial to novice users and those with impairments.

Keywords
Elderly users, web accessibility, inclusion, disability

1. INTRODUCTION

1.1 Including the elderly

Current reports indicate that there is a definite need to 'bridge the gap' between elderly users and the Internet [2,10] and with almost a fifth of the UK population aged over 65, it is a significant market to exclude [6]. The concern at the growing 'digital divide' in the UK has led to a number of initiatives being employed to encourage web usage for the older generations and to ensure they are not excluded from the digital world [1]. In spite of these concerns, reports indicate that the UK has one of the highest percentages of Internet users over the age of 55 in Europe [2]. Many of these people make use of the Internet in controlling their finances, keeping up to date with current affairs and staying in contact with family and friends. The Internet can then be said to be a valuable tool in reducing the risk of social exclusion, a concern that many of the elderly face. In considering that the elderly are very likely to develop age related impairments such as visual and/or mobility related disabilities [12], web accessibility then becomes an important consideration. The initiatives may be in place to encourage the elderly to get online but poor web accessibility is likely to affect not only the user's ability to access information but also create a favourable web experience.

1.2 Individualised Support

The goal of universal accessibility has been the driving force behind new techniques of information adaptation to cater for elderly people's diverse needs. This concept of selecting information according to user needs was initially employed within Intelligent Tutoring Systems (ITS) because it was purported that individualised teaching provided the best learning [3,11]. Specific information about the user is stored within the user model of an adaptive system and enables individualised support. Information is presented to the user based upon the requirements specified within this user model. This process was later utilised in the subsequent development of Hypermedia Systems (HMS) and Adaptive Information Navigational Systems, which were designed to improve accessibility. One example is 'Hyperbooks' [5], which uses adaptive navigational support techniques to enable a wider source of information to be available to the user. Another example is the Avanti Project [7], a distributed system that provides adaptability to the more specific needs of the disabled and elderly users by adapting both presentation and layout of web based information. This process of adapting the order in which information is *presented* rather than the content is the approach that will now be reviewed..

2. ADDRESSING USER NEEDS

The Computer Aided Internet Navigation (CAIN) system [8] is an investigative tool that aims to increase the effectiveness of the web by using a process that selects then presents information according to individual needs. These needs are stored as heuristics within the user model. Earlier developments of CAIN have focused upon selecting information according to user's expertise and goal. CAIN *reacts* as opposed to altering content and hence offers possibilities in the selection of information according to the more specific needs of elderly persons. Age related disabilities, such as impaired vision and mobility could be grouped with those of the disabled. However, it is also important to recognize that even within user groups such as the visually impaired, some variation of needs should be supported and that each user has individual requirements.

These needs may also extend to user preferences where an individual preference supports the user's web experience.

3. SELECTING INFORMATION

Work is currently underway investigating user-defined ratings of elements that affect the accessibility of web pages according to categories of impairments such as visual, mobility and cognitive/language [4]. This will be particularly useful in determining the specific selection of web pages for elderly persons with age related disabilities. There are however two approaches.

3.1 Selection based upon user categorisation

The first approach involves placing users within a specific category and basing the selection of web pages according to pre-determined constraints. For example, a visually impaired person can use CAIN to provide an assisted search to filter web pages that affect accessibility due to its reduced font size and poor colour contrast between background and font. A person with restricted mobility such as chronic arthritis may wish to filter out web pages with elements that are known to affect accessibility for that particular group, for example small input boxes and navigational buttons that require precise mouse movements.

3.2 Individualised Selection

The second approach recognises the user as an individual and provides a more customisable search. This search enables the user to identify individual elements that might affect not only accessibility but also affect the user's experience is necessary. These can be elements relating to layout and colour as well as more complex ones such as tables and advertisements. This would be particularly useful where a user has a combination of impairments such as visual and restricted mobility and wishes to make an individual choice as to which affecting elements should be given precedence. For example, an elderly person with impaired vision and arthritis in their fingers may find that precise mouse movements are more problematic than the issue of a grey font upon a black background. This user can then assign a rating of significance to individual elements that CAIN will adhere to within a search. This process can also be applied for users with a particular preference or disregard for certain elements. A user may for example be put off by web pages with patterned backgrounds or a lack of pictures. Web pages can then be selected according to users' individual preference, which would enhance the user's web experience.

4. SUMMARY

CAIN offers possibilities in improving web accessibility for the elderly by adapting the order in which web pages are presented to the user according to user needs and preferences. This in turn should also improve the user's experience of using the web.

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OLDER PEOPLE, MOBILE DEVICES AND NAVIGATION

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ABSTRACT

As people age, they need a greater degree of support in a wide variety of situations, mobile as well as stationary. This paper considers how mobile devices, such as handheld computers, can provide support in these situations. We examine a particular example, navigation, showing that older people can benefit from the use of mobile devices and highlighting the need to learn more about how to design them for this user population.

Keywords

Older people, mobile devices, navigation.

1. INTRODUCTION

As people age, they experience declines in a wide variety of abilities that impact on various aspects of their everyday lives. As a result, they often need a greater degree of support in carrying out tasks and activities. What is more, as the proportion of older people increases, the possibility of relying on human carers to provide this support decreases. There is a growing need to support older people in new and innovative ways, such as through the development and use of technology.

Although there is an increasing awareness of this, much of the work in this area has focused on indoor and stationary applications [4]. Older people, however, need support not just inside their homes but also in mobile situations, because mobility is a key part of maintaining one's independence. Older people often struggle with mobility, partly because of physical frailties but also due to decreasing abilities to cope with the demands of outside and mobile environments.

In addition, a variety of everyday tasks are commonly performed while on the move, such as shopping, socialising and searching for phone numbers and addresses. If support for such tasks is only available in the home, then its usefulness will be limited.

In this paper, we discuss how mobile devices, such as handheld computers, can help to provide this type of support. We consider the main barriers to this support and how they can be overcome. In Section 3, we then present a case study in developing and evaluating a mobile device for older people and consider what we can learn from it more generally.

2. MOBILE DEVICES

The usefulness of increasingly common mobile devices, such as mobile telephones, handheld computers and digital cameras, stems largely from their portability and constant accessibility, allowing users to access facilities while on the move and in locations where no other access to technology is possible.

Furthermore, recent advances in processing power, connectivity and positioning technology increase the scope and potential of these devices. They can provide information tailored to the user's location and access information more efficiently and in locations that were not possible in the past.

This makes them ideal for providing support in a variety of mobile activities, helping with navigation, providing information about public transport, prompting memory in appropriate places and at appropriate times and enhancing communication and security. Some such facilities are already available and others can be developed using current technology.

2.1 Barriers

However, there are various barriers restricting the potential of mobile technology to provide support to older people.

Firstly, in general, these devices have not been designed with older people in mind and are often difficult for them to use. In order to be mobile, most are small and have small buttons and screens that are hard to see and operate. They often use deep menu structures that place heavy demands on memory. They also often rely on knowledge of metaphors and interaction techniques taken from desktop computers – techniques that are unfamiliar to, and confusing for, computer novices, such as much of the older population. While there has been some recent work on

interface design for older people on desktop computers, there has been little looking at mobile interfaces.

Other barriers arise from social issues. Older people often have a greater resistance to new methods of doing things. The benefits of new technology must be clear if it is going to be adopted by the older population as a whole. Too often a new device is perceived as a "gimmick" or a "toy" rather than a practical tool.

3. A CASE STUDY - NAVIGATION

To help to overcome these barriers and investigate whether mobile devices can really help older people on the move, we carried out a case study – the design and evaluation of a pedestrian navigation aid for active older adults. More information on this case study can be found in [1].

Navigation, or way-finding, is a key component of mobility. However, many older people experience increasing difficulties with navigation due to declines in their perceptual, cognitive and motor abilities [3].

3.1 The Device

We therefore designed and evaluated a navigation aid that uses a sequence of displayed intermediate landmarks to guide the user to his or her destination. A sample screen from the aid is shown in Figure 1.

Figure 1. An example screen from the navigation aid.

The interface was designed with guidelines for desktop interface design for older adults in mind (e.g., [2]), but it was sometimes necessary to modify these to take account of the limited screen space and different interaction methods available on a handheld computer.

3.2 Evaluation

The navigation aid was evaluated against a paper map using a set of field experiments with 32 able-bodied users; 16 aged between 63 and 77 and 16 between 19 and 34.

Among other results, we found that the older group took significantly less time when using the device ($p<0.001$, t-test). This was not true for the younger user group, as shown in Figure 2.

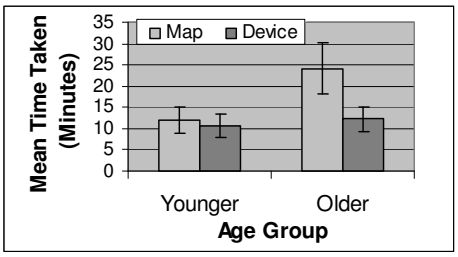

Figure 2. Mean time taken to navigate test routes (error bars show standard deviation).

4. CONCLUSIONS

The results from the case study demonstrate that a mobile device, if carefully designed, can be used effectively by older people. More importantly, the system provided an advantage for older users that was not enjoyed by younger ones. This suggests at the very least that design choices that are appropriate for a younger population may prove unacceptable for older users.

The more general finding of our case study is that generally available design guidelines, often based on studies of younger users, may well not transfer to applications intended for older people. Similarly, those guidelines that are designed for older users tend to focus on the desktop domain and do not always transfer well to mobile applications.

In the context of mobile systems in particular, we feel that further work is needed to (i) design guidelines that apply to older users and (ii) investigate how to overcome social barriers to system use.

5. ACKNOWLEDGEMENTS

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SMART HOMES AND EXTENDED FAMILIES

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ABSTRACT

Mobile and Ubiquitous technologies have the potential to strengthen and enrich geographically dispersed multi-generational family relationships and networks in ways that go well beyond existing telecommunications technologies. Smart home technologies could be developed specifically to facilitate a rich range of interactions between geographically dispersed members of multi-generational and extended families by focusing on ways in which *networks* of two or more smart homes could promote such interactions. The aim is find ways to strengthen geographically remote multi-generational family relationships and reduce the isolation of older family members. We outline the new interaction principles that can be used to simplify such interactions, and the biographical and ethnographic techniques needed to identify the factors likely to affect the acceptability and perceived value of such new facilities within family networks.

Keywords

Mobile, ubiqutious, older people, extended family, smart houses.

1. INTRODUCTION

Extended family relationships and networks have played important roles in many societies throughout human history, and continue to do so for many people. Where families of three or more generations live closely together, there are diverse opportunities for rich ways in which family members can interact and help each other.

Historically, factors such as industrialisation, the mobility of labour, and, in the UK, waves of housing policy, have led to wider geographical dispersal and smaller household sizes. In many post-industrial societies, patterns of multiple generations of blood relatives living together or close by have therefore been largely superseded by more complex and distributed living/networking arrangements

There have been some unfortunate consequences of these trends. In particular, these trends have led to increased social isolation, particularly for many older people, and arguably the dilution and inhibition of potentially enriching relationships between generations within families. A parallel increase in the value placed on personal independence has been particularly influential in gerontology, some aspects of social policy, and the provision of services to older people.

One effect of these trends has been to motivate the development of smart home applications to assist older people and people with disabilities to live independently, for longer, in their own homes[1]. Personal independence is more likely to become compromised in later life for many reasons; financial, social, and physical. Although some older people experience no serious problems, most experience some degree of physiological or psychological impairment ranging from mild to serious and limiting conditions. In many cases the effects of these conditions can be ameliorated through social and technological support.

2. IMPORTANCE OF RICH SOCIAL INTERACTION

Nevertheless, we assert that when designing domestically focused technological frameworks to support the well being of older people, it is not enough to focus solely independence and related issues. In particular, the complex webs of attachment that can be fundamental to a life of quality include frequent diverse social interactions, especially interactions with loved ones. Thus, future domestically focused technological frameworks aimed at supporting the well-being of older people should not be limited to promoting independence but should also explicitly focus on facilitating rich social interaction with remote extended family and loved ones.

When blood relatives live close by, rich social interactions can be afforded in numerous ways that are not easily afforded remotely via existing forms of telecommunication such as telephone calls, emails, SMS messages, alarms etc. However, we believe that much

richer interactions could be afforded between multi generational remote family members and loved ones by making use of the rich possibilities for inter-operation made possible between people split across two or more smart homes.

Whatever technology were to made available, rich interactions between family members in geographically remote smart homes would be workable in practice only to the extent that a) simple means could be found for people to be in control of them, b) to the extent that such interactions were felt to be valuable and c) to the extent that such systems were accepted by potential users.

In order to design candidate complex interactions between smart homes that are relatively simple to afford, control, and monitor, we propose to make use of the user interaction principle known as Direct Combination (DC)[2]. This interaction principle is well suited to reducing the mental load required by users in setting up interactions between two or more complex systems, of which a pair of smart houses are a good example. The principle does not commit to particular any specific interaction techniques or technologies, and the principle offers conventional interaction patterns as special cases, so affording a high degree of flexibility in design and use.

Using this simplifying principle we will work with multigenerational and extended families to develop scenarios, and to prototype examples of rich social interaction that can be usefully afforded by two or more smart houses.

3. METHODS

A central concern of the research will be to use, modify and develop appropriate biographical and broadly ethnological techniques to uncover factors within complex networks of family interaction that affect perceived value and acceptability of proposed new kinds of interaction. In this way, we aim to develop and validate scenarios and prototypes of interaction with high perceived value and acceptability afforded by two or more smart houses.

While the older population is extremely diverse, with succeeding generations, ever higher proportions of older people have access to developing technologies and want to use them to remain in contact. For example while the current take-up of computers and web access is relatively low among the oldest old, it is much higher among those currently moving towards retirement and they constitute a significant market for relevant developments.

However, despite this steady positive generational shift in attitudes to new technologies, it is still the case that proposed technological innovations aimed at parts of the highly diverse older population are often, in general, not well accepted, It can be hard to marry up the capabilities of future technologies and the needs and aspirations of different segments of different generations.

In order to uncover the factors that affect acceptability in different contexts of present and developing technologies, many new broadly ethnographic and biographical techniques have been, and are being, developed. Good examples of such techniques include technical biographies[1], cultural probes[3], technology probes[4] and others [5, 6]. Rather more effectively than evaluative instruments that focus on isolated applications or technologies, biographical approaches and related methods allow researchers to look at a very wide range of factors, some not at all obvious, that may affect the development of comfort levels in potential technology users.

Participative and evaluative approaches offering this degree of breadth and sophistication are particularly useful in the case in studies that involve measuring or explaining complex networks and behaviour. One example is the description [7] of the dynamic processes by which older people actively select environmental supports via a process of option recognition. To maintain a viable level of comfort and independence as they age, people continually optimise their personal positioning within what is actually available to them. This includes both social networks and technologies.

As already noted above, a rich range of possibilities could be opened up by interaction between members of genetic and or elective families using mobile and ubiquitous technologies, as for example by the linking of two or more smart houses, and/or remote units.

The factors that affect acceptability in distributed multigenerational scenarios will be crucial to any such developments. We suggest that their effectiveness will rest not on looking just at the parameters of acceptability for individuals or those living in a single location, but at attitudes within networks of relationships and places. Knowledge of the strategies that the users employ should allow designers to develop more suitable and person-focused systems[8].

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DESIGNING FOR AGED PEOPLE COMMUNICATION NEEDS

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ABSTRACT

This paper describes interest to developing digital services and application to the active elderly people. People, that have retired or are about to retire and do not have daily obligations to their children. These people have more free time than in earlier stage of life. They are often in good health to be able to choose their lifestyle. The user group is very heterogeneous and for some reason has not received much attention. They live active life, and are likely to have various communication needs, yet they seem to be fairly satisfied with existing communication tools. For starting to use new tools, they need clear motivation.

We are studying on communication and lifestyles of retired people to understand better their needs and shed light more on the motivational issues that may be one so far neglected key point in creating pleasurable products and services to these user groups.

Keywords

Aged people, senior citizen, communication needs, design

1. INTRODUCTION

The western societies are aging. The life expectancies increase and more of the typical old age illnesses can be treated better than before. Consequently, governments are now feverishly thinking of ways support independent living in the late phase of life and ways to answer the nursing needs. The positive effect that this may provide to society is sometimes forgotten: there will be more of those capable and reasonably healthy aged people. They are the people who were born after the 2nd world war (baby boomers) and are in many ways different from their parents. They are more experienced in taking new technology into use, consuming services and having demands. More importantly, they have wide experience and views that that they are likely to be able to share with younger generations and continue to make an impact to the society.

In order to provide services and products that would support their lifestyle and activities, we need more information about this age group. The general aspects of physical aging that affect to the design, such as changes in sensory functions and cognitive issues, are being researched and results are available to the industry, although the application of this information and the practical experience may still be among restricted group of professionals. Furthermore, we feel that motivational issues are even less researched and less applied. The situation is not alleviated by the fact that a lot of research with older generations may not apply to the aged people in the future.

2. 3RD AGE AND THE MEANING OF AGE

Peter Laslett [1] has defined the concepts of third and fourth ages for the old age. The third age is the part of life, when chronological age allows person to retire from work life and family related obligations have changed, as person is not anymore responsible of his/her children. In third age people can be active, as they are independent from others. They typically have free time and do not feel the weakness of old age. In short, this is the time of life that many people are dreaming of while still at work. The 4th age follows then possibly later in life when the abilities are weakening so that everyday life is dependent on others.

Although the third age is not defined by the chronological age, we can roughly say that in the western societies people around 60–80 years old are typically in 3rd age. The time and length of 3rd age varies greatly among persons, depending on personal differences, socio-economical background, living area and sex. For example in Finland, 75 years seems to be a statistical age when serious illnesses and deterioration starts to become obvious. At the age 75-84 years, at least 50% can do daily routines such as shopping, walking over half kilometer, dressing up, etc.. but the percentages are much higher for ten years younger people [2].

We are defining the age on physical and mental abilities more than on the chronological age, since it is the key issue that enables people to choose their lifestyle also in old age.

3. HETEROGENIOUS LIFE STYLES

Aging people have been often treated as homogenous group, but people in 3rd age are as heterogeneous as any other customer segment. In fact, the age is likely to bring more differentiation in some needs due to increased variation in physical condition and life experiences.

The diversity seems to be further growing when post-war baby-boomers grow older as they have more differences in several aspects: there are big differences in education level, living places (rural or urban), experience of different cultures, work history, family background (single, married, divorced, re-married, living with different or same sex partner).

There will be senior citizens that are physically in better condition than earlier generations - the ones that keep on jogging, going to gym and doing other physical activities they have always been doing. But there are also those who are weaker than earlier generations since they have never been exercising or done physical work.

A study [3] of people over 75 years old divided their lifestyles in 5 groups:

- Family oriented
- Work oriented
- Hobby club oriented
- Quiet life living
- Illness-centered lifestyle

The people in their 3rd age seem to be able to choose their lifestyle. The fifth category seems to imply 4th age where illnesses are making it difficult to live other type of life. The study showed that good health gives possibility to choose own lifestyle and several roles in life. For most of the people in the study, the social contacts and social support network have formed before the retirement and old age. The main social contacts were ones established through marriage and/or divorce, children, friendships and hobbies. The possibility to move around was one of the main factors in ways to keep in touch with others. If person was not able to visit others, the number of contacts seemed to be smaller and the contacts were mostly taken care in phone.

4. OUR ASSUMPTIONS AND STUDY

It seems that senior citizens have been later adopters than younger generations for the current general-purpose communication technology such as mobile phone or PC with Internet [e.g., 4, 5]. We assume this is partly due to the fact that people receive information of new technology, e.g. Internet, from their colleagues, friends and acquaintances [4, 6]. When people retire, some of these interactions and daily routines change. We are studying how retirement, a major milestone in life, causes changes in the lifestyle communication patterns. For example, people may join to different kinds of hobby clubs or informal groups spending time on some common activities during daytime. Or they may choose not to form new acquaintances.

The adoption of new technology and prevention of digital divide will be a major issue also for the future seniors. They are familiar in the current technology already but no doubt the development will continue and there is going to be always something new.

We hope that by looking more carefully of the lifestyles of aged people we can support the peoples' lifestyles better and increase their quality of life. We would like to find digital services that would be perceived instantly valuable and truly useful for people in their 3rd age. Possibly, these applications would in fact be first adopted by seniors and spread to wider population from there. Also, the applications adopted already in the 3rd age could be easy to use also later in life, in the 4th age. We would like to also note that our aim is to find ways for supporting quality relationships and interaction between people with technology, not to replace it by technology.

The study has just started and we will be able to share some information about the study in the HCI and Older population workshop. The study aims to receive deeper understanding by continuing with person-to-person interviews and diary-keeping .

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ONLINE FORM DESIGN: OLDER ADULTS' ACCESS TO HOUSING AND WELFARE SERVICES

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ABSTRACT

Access to local authority housing and welfare services is commonly achieved through the completion of paper forms. As the aging population increases, so too will the demand for such services. However, current paper forms may disadvantage older adults through current means of form access, completion and submission. Here, the position is offered that online forms may benefit the older adult by overcoming many difficulties associated with paper forms. These benefits may be further extended to service providers outside of the local authority domain. This paper summarises an exploratory investigation into online form design for older adults, detailing summary observations recorded during user requirement and user evaluation design phases.

Keywords

1. INTRODUCTION

A rapid increase in the aging population [1] is likely to create greater demands on housing and welfare services. For many older adults, access to these services is critical for their continued well-being. The older adult's first point of access to these services is commonly through the completion of forms, issued by service providers, to determine the older adult's eligibility. However, due to cognitive, manual dexterity and motor impairments, often presented as a product of the natural aging process, traditional paper-based forms may disadvantage the older adult's successful application for these services. With the observed growth in the aging population, rapid uptake of internet technologies by older adults is predicted [see 2]. Thus, although highlighted briefly by form designers in the past [see 3] consideration of online form design for older adults' is a timely topic for investigation. This paper promotes the use of online forms to assist older adults when requesting housing and welfare services. In this investigation, the example of a housing and council tax benefit form issued by a local authority is used to determine a) the difficulties experienced by older adults when completing a paper form to directly inform the design of an online prototype, b) the key design features for an online version of this form and c) user evaluation of an online prototype. In conclusion, this paper offers design recommendations that will support older adults' online form access, completion and submission activities.

2. IDENTIFYING FORM DESIGN CHALLENGES

To establish difficulties experienced when completing paper forms and to determine the key design features for an online version of a local authority housing benefit and council tax benefit claim form eight older adults (aged 60+), all possessing internet experience, were consulted via semi-structured interviews. During the interview they were requested to complete the form, with explicit instructions to communicate their thoughts while conducting the task. Following this activity, the older adults were presented with a number of topics for discussion, detailing computer use, internet activities and experiences of online forms. By doing so, it was hoped that the strengths and weaknesses of paper form design and current online form design would be elicited to directly inform the design of the prototype online housing benefit and council tax benefit claim form.

2.1 Summary observations:

Key comments made about the paper forms related to form length and question complexity. This led to questions being avoided or incorrectly answered (both actions ultimately leading to the form being returned by the service provider). The interviewees suggested that more information relevant to each question should be provided next to the question, rather than returning to a previous page. Establishing which answer box was associated with each question often created confusion. One interviewee noted that pension and banking details were required to complete the form and suggested that this information could have been presented at an early stage to avoid disruption while they found the additional documentation. Another interviewee wanted to know why she was providing details regarding her deceased husband. Clearly the form had not expressed adequately that, in this case, such details were unnecessary. In addition, many of the interviewees were assisted by carers and relatives when completing and submitting forms. Online forms were responded to positively although it was acknowledged that more could be done to assist the older user.

3. KEY DESIGN FEATURES

From the user requirement capture, 5 key design features (general and online specific) were identified and are summarised below:

Form layout and question structure: Extra spacing between questions and between answer boxes is suggested to overcome identified difficulties. Simplification of question structure is also suggested to avoid creating excessive demands on the older adults cognitive load.

Completing questions: Pop-up messages and hyperlinks appearing next to the appropriate question are suggested to serve as a help function to further clarify or simplify a question and its completion. In addition, information sources required to complete the form, for example, pension details, should be presented at the beginning of the form to avoid delay

Data entry: By using keyboard and mouse devices handwriting legibility difficulties due to declines in manual dexterity are overcome. This is likely to reduce the need for the issuing organisation to return the documents for correction. In addition, by employing a data entry validation system, any obvious data entry errors of omissions can be identified prior to form submission, again reducing the need for the form to be returned and corrected.

Form personalisation: To avoid answering unnecessary questions, the online form should be 'personalised' based on the data entered by the user. For example, when marital status is entered and the user is a widow, no questions relating to the user's deceased spouse should be presented.

Online form submission: Submitting the form online will avoid the difficulties associated with posting/delivering the form and/or arranging for a carer to post/deliver the form. Online form submission will be of great benefit to those presenting mobility deficits. In addition, online submission of the form may lead to a quicker processing time achieved by the issuing organisation.

4. PROTOTYPE DESIGN & EVALUATION

Driven by the key design features identified and existing internet usability guidelines, a prototype online housing and council tax benefit form was produced using Macromedia Dreamweaver™. To evaluate this prototype, the eight older adults involved during the user requirement capture were employed. An interview technique was employed that allowed the interviewee to explore the prototype, followed by questions to elicit the strengths and weaknesses of the prototype design. The interviewees were informed that an honest opinion was required and not one that may flatter the researcher.

4.1 Summary observations

It was observed that all interviewees found the online form easy to complete. Information relating to the alternative sources of information that the interviewee would need (e.g. pension details) was welcomed and considered 'time-saving'. The layout of the online form was also positively evaluated and supported by comments such as "…it's easy to know which box goes with which question". Simplifying the question structure also assisted with the form completion process as did the use of hyperlinks to provide clarification or simplification of the question. The interviewee who had previously offered details regarding her deceased husband was happy to find that her marital status as a 'widow' yielded no further questions relating to her husband. Thus by personalising the form this eliminated previously experienced confusion.

Observed weaknesses related directly to the use of input devices and navigational techniques. Difficulties using a mouse may be due to limited experience, overcome by increased use or an assistive input device. Scrolling difficulties may be overcome through the use of the page down button (as witnessed here) or through the implementation of more pages. However, the latter may cause user frustration and/or fatigue due to increased form length.

5. DESIGN RECOMMENDATIONS & FUTURE RESEARCH

Although this study focussed on the design and development of a local authority form, few comments were made regarding form specific topics. Therefore, the design techniques used here, such as pop-up messages and hyperlinks and form personalisation, may be directly translated to alternative online forms, such as banking and purchase forms. Future research should further consider and extend the design considerations presented here to validate the design techniques for alternative welfare, housing, social and financial service domains.

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OBTAINING FEEDBACK ON ADVANCED PRODUCT CONCEPTS FOR ELDERS

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1. INTRODUCTION

The Proactive Health group at Intel Corporation has been conducting research on elders in an attempt to develop computing solutions to allow people to "age in place" and to remain healthy and active for as long as possible. Our focus thus far has been on cognitive decline. Diseases of cognitive decline, such as Alzheimer Disease, affects ten percent of adults over 65 and 50 percent of adults over 85 [1]. Our process for conducting research and developing technology concepts is described in figure 1 below.

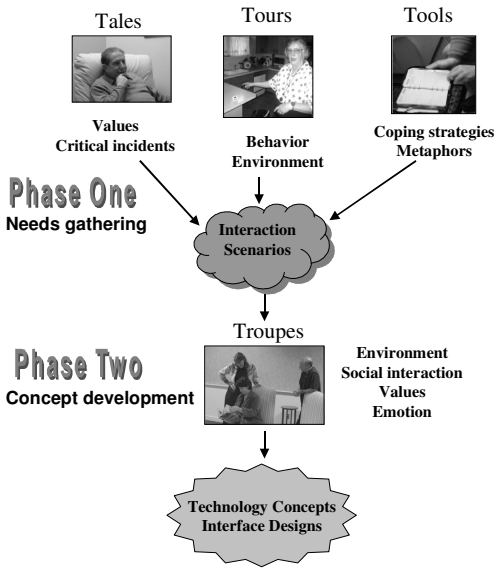

Figure 1. The Research Approach

In the *needs gathering* phase, we conducted interviews that elicited elders' stories (tales), "day in the life" tours of the house (tours), and key artefacts that they use in their day-to-day activities (tools). These data types revealed elders' values, critical incidents in their lives, key aspects of their behavior and environment, and coping strategies. From this data, we developed interaction scenarios in which technology is used to help elders cope with the problems and challenges we discovered. In the *concept development* phase, we conducted focus troupes to elicit feedback from our target audience. A focus troupe (aka Informance) is a method of depicting a technology concept via dramatic scenarios [2, 5, 6]. In this method, actors show a concept by dramatizing its use in a staged context. The audience consists of target users, and a facilitator leads a discussion after each scenario about the concept and how it might be used (or not used) by the audience. Like a focus group, this method is qualitative – data is collected on people's reactions and comments.

I believe that this approach has produced insights into the development of solutions that might not have been obtained otherwise. By closely examining the lives of elders, their environment, their social networks, and daily routines, we develop insights into problems and opportunities in keeping elders healthy and active. By using the focus troupe method of obtaining concept feedback, we obtain actionable feedback from elders before investing expensive engineering resources in system development.

2. DESIGN ISSUES FOR ELDER TECHNOLOGIES

The specifics of our cognitive decline project are reported elsewhere [3,4]. Here I report on the focus troupe findings that address design principles for elder technology.

We contracted a local dramatic troupe to hire actors, develop a script, and facilitate the group. The script consisted of four scenarios, and 2-4 concepts were depicted in each scenario.

3. METHOD

We recruited three types of participants: healthy elders, those with mild cognitive impairment, and leading segment boomers (those born between 1946 and 1957). The healthy elder group consisted of elders 65 and over who had no diagnosed dementia or cognitive impairment, and were in generally healthy condition. The mild cognitive impairment group consisted of patients (and their spouses) who have been diagnosed with cognitive decline that is significant but does not meet criteria for dementia. Finally, the leading segment boomers group consisted of people between 46 and 57 who have had some experience in caring for an elder family member.

Group	# Participants	# Male	# Female	Avg. Age
Healthy Elders	35	21	16	73.1
MCI	16	9	7	71.6
Boomers	28	13	15	51.1

Figure 2. Participants

In all there were seven sessions – three healthy elder sessions, and two each of MCI and boomers. Each session lasted about 2-1/2 hours. In each session, the moderator introduced the topic area, described the informance group process, and had each participant do a short introduction. Then the actors were introduced, and they acted out scenario one. Participants then wrote down their initial impressions about the concepts that were dramatized on a notebook, and the moderator then engaged them in discussion. This occurred for all four scenarios, and was followed by a general discussion of all of the concepts. All sessions were videotaped.

4. RESULTS

In all, there were thirteen concepts dramatized. The concepts ranged from technologies to support healthy elders, such as an "exercise enabler" and a pervasive electronic calendar, to concepts that help caregivers look after elders who were in moderate to advanced stages of dementia. Participants reacted to all of the concepts in each session. In the content of the responses, there were consistent themes and concerns that emerged across the participant comments and across the different concepts. We've begun thinking of these themes as persistent criteria for any technology that supports elders and their caregivers. These themes seemed to serve as criteria by which the participants evaluated the concepts.

4.1 Impact on everday life

Participants were clearly judging the technology according to their perceptions of how it might change their lives, both positively and negatively. Participants were often eager to think creatively about how the technology might be used to suit their needs. For example, boomers pointed out that detection of wandering behavior would be great to keep track of their kids as well as elders. A prominent sub-theme was how the technology would impact **social interactions**. For example, an electronic calendar was perceived as possibly facilitating the sharing of experiences between relatives living apart. One person noted that a shared calendar would allow a grandfather to see his grandchild's sports practice schedule, and thus would facilitate conversation the next time they talked on the phone.

4.2 Flexibility

Participants reacted negatively when the technology did not demonstrate sufficient flexibility in accommodating an individual's lifestyle or functional needs. For example, people often commented that an interface modality would not fit all people. When a scenario demonstrated that a blinking light would signal the user about a situation, people would respond with comments such as "if the elder had poor eyesight, a light would not work." Participants made it very clear that technology needed to be adaptable for it to be acceptable as a solution in people's homes.

4.3 Device intrusiveness

Participants also reacted negatively to possible intrusion of technology, making life more difficult instead of easier. Related to this issue is **control –** people want to be able to control the technology, not have the technology control them. A typical reaction was, "I don't want beepers going off all the time – I have enough intrusion as it is." Technologies need to show value that clearly outweighs any actual or perceived inconvenience. A related concern was that the technology would foster premature or unnecessary reliance on assistive devices. It was clear that assistive devices should only help when needed.

4.4 Privacy concerns

There were several concerns around the privacy of information and who would have access to it. Most participants want control over what information is shared, and many felt that they only wanted to share information that was vital to their health or safety. Many expressed reservations about sharing even with a spouse or close relative. Any home monitoring technology needs to satisfy users that the information is secure and under their control. Furthermore, a reciprocal relationship would be preferred in which elder and caregiver share data with each other about their activities. If caregivers monitor elders, elders in turn should be able to track the caregiver. In a few cases, however, the absence of concern about privacy was surprising – this was usually when a caregiver was desperate for help monitoring an ill parent.

4.5 Failure modes/opportunities

Participants were quick to identify failure modes of the technology. For example, one participant noted that wearing the "smart" tennis shoes just to go out gardening would incorrectly notify an exercise partner that you were ready for a walk. The technology needs to be tailored appropriately for the elder's situation and environment. People --especially elders -- will abandon the use of a technology if there are even a few situations where it fails to work properly.

4.6 Maintenance

A final dimension of evaluation was the maintenance of the technology. Participants were very concerned about setting

up the technology and keeping it functional. For example, a participant expressed concerns about the number of voice prompts that would have to be entered to enable the sequential prompting of daily activities. Maintenance and setup must be minimal for these aids to be accepted.

5. CONCLUSION

Although many of the specific concepts tested were directed at solving issues with cognitive decline, I believe many of the design issues above relate to a broad range of advanced concepts for elders. It should be noted that elders and boomers were very positive overall about the concepts. Some of the most enthusiastic responses were in the following areas:

- Elders and boomers alike want state-of-the art interaction paradigms such as voice recognition and pervasive access to personal information.
- Technologies that ensure basic safety are highly valued, as was technology to support calendaring and reminding. Aids to help in name-face recall were also highly valued, even among the boomer groups.
- Many respondents wanted the concepts to be portable, and to offer outside the home assistance. Elders were not reluctant to push the technology envelope, such as requesting credit-card-sized displays or face recognition combined with in-ear name prompts for social situations.

Participants showed a surprising amount of sophistication and thoughtfulness about advanced technology and how it might impact their lives. I attribute this partly to the effectiveness of the focus troupe method. This method, because it depicts technology use in a more relevant social and environmental context, allows people to focus more on real world usage and less on the confusing specifics of computer technology.

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UNIVERSAL REQUIREMENTS FOR HOME TECHNOLOGIES

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1. ARE THEY DIFFERENT FROM US?

One approach to HCI and the older population is to ask how they are different from us. One can then measure their reduced capability, compared with us, and devise special adaptations to the technology to accommodate them. The inclusive design approach tempers this approach with the assumption that, with ingenuity, it should be possible to design technologies that both older and younger people can use. Power tools designed for people with arthritis can be equally attractive to people with no such problems.

It is important that parts of the population are not excluded from the benefits of new technologies because of poor ergonomic design. There is a degree of self interest here. We all will eventually be old (we hope). However, this paper is to argue for a different take on older people and HCI; this is to ask how older people are the same as us. As Alan Newell has argued [3], designing for an extreme population can highlight requirements that are of value to everyone. This paper briefly describes how research at York involving older people has helped us to think more clearly about the things we all want from home technologies. These will be discussed under the headings: dependability, sociability and enjoyment.

2. DEPENDABILITY

Some of our recent research has been concerned with technology to support independent living. This electronic assistive technology takes two general forms. The first are systems that support activities of daily living, for example a door opener could allow someone in a wheel chair to get out of a room, or let someone else into their house. The second type of electronic assistive technology uses sensor systems to detect emergencies such as a flood or a fall and get help via a call centre. These systems are critical systems in the sense that if they go wrong the consequences could be serious. There is thus a need to ensure that they are dependable. To this end we have been looking at existing standards that might apply to these systems [1]. We have also devised a risk management framework that includes social and psychological harms (e.g., dependency, loneliness and fear) as well as the usual concerns of injury and medical emergencies.

This technology, designed specifically for frail older people, foregrounds the need for dependability arguments in the design of home technologies, but dependability will be an issue for many of the applications of ubiquitous computing that are being suggested, for all of us. It is not hard to envisage a smart home that locks its owner out, or worse, locks them in at the same time as cutting all links to the outside world. A robotic system could easily cause injury or damage to property. Social and psychological harms from technology seem less likely for younger age groups, perhaps because they have more choices. Nevertheless, a court case where a teenager sues Microsoft because their use of the internet has damaged their ability to socialise normally is not beyond the realms of possibility. This takes us on to the next universal requirement, sociability.

3. SOCIABILITY

Net Neighbours is a shopping service we have designed in conjunction with Age Concern York. It uses existing technologies: the telephone, online shopping and a secure database. Volunteer office workers take orders from older people who are unable to shop themselves, and then use a supermarket online shopping site to order the goods for them. The idea came from an ethnographic study of the hazards faced by older people by Mark Blythe. The problems that had to be solved by frail older people needing shopping were apparent in several interviews. What was also noticeable was that shopping is not just about obtaining food. For many it is an important opportunity for social contact. Net Neighbours takes account of this. The volunteer looks after only one or two older people and rings up for a social chat, not just to get the shopping order. The secure database supports them in this.

Loneliness and isolation are a particular problem for some older people because of reduced mobility and a reducing social circle [2], but we all want social contact. It is perhaps not an accident that the most successful recent recreational technology, the mobile phone, is a communication technology. It is quite possible that the near future will see similarly dramatic changes in social communication from home, once a critical mass of DSL connections is made.

4. ENJOYMENT

Much of the technology we buy for our homes is there to provide an experience. It may do something for us but that is not the point, it must also give us enjoyment, anticipation and pleasure. Because enjoyment is an ephemeral, present

tense, experience, it is particularly difficult to measure. Interrupting the experience to ask for self report will almost certainly destroy it. Asking about it after the event is also less than satisfactory. Darren Reed [4] has been developing an approach that looks directly at user behaviour to detect instances of group flow, i.e., those occasions in group socialising when the group are all fully involved in a transparently pleasurable way. His initial chosen area of study was some telephone conferences run by Hackney Borough Council [5]. Their Friendship Link connected together groups of 4 to 8 frail older using a telephone conferencing switch. Perhaps because these conversations were quite limited these incidents of group flow were particularly noticeable. Since these initial studies, we have observed similar behaviour in the conversations of young graduates in recreational telephone conferences with younger people and in the co-present group conversations of people sharing photos.

5. CONCLUSIONS

The message of this paper is a simple one. All HCI researchers with an interest in domestic technologies could benefit from contact with older people. Understanding their needs and wishes will generally point to universal requirements for home technologies. In the unlikely event that it does not - what the heck - you may still be able to invent something useful for a very deserving user population.

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HCI AND OLDER PEOPLE

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ABSTRACT

The inclusion of older people within the design cycle for information technology is discussed, and the successful development of a prototype email and web browser described. This is followed by a discussion of the use of theatrical techniques to educate designers in the requirements of older people for technology.

Keywords

Older and Disabled People, Requirements Gathering, Guidelines for Developers.

1. INTRODUCTION

The HCI requirements of older people differ in a number of important ways from those of other groups, but their needs and wants have received little attention from the HCI community. Demographic changers are leading to a growing population of older people many of whom have significant wealth and disposable income. Other less fortunate older people require access to many government services which are planned to be offered digitally. The switch-off of analogue television will affect those many older people who have shown no interest at all in digital technology. Legislation is also providing guarantees for older people with disabilities – approximately 50% of those over 65.

The HCI community thus has a moral, legal, and economic imperative to consider more carefully the particular challenges offered by this group of potential and actual users of computer systems.

2. RESEARCH AT DUNDEE

Applied Computing at Dundee has been developing computer systems for older and disabled people for over thirty years, and has recently announced the Queen Mother Centre for Information Technology to support Older People [1]. Projects include the UTOPIA (Usable Technology for Older People: Inclusive and Appropriate) project, a Scottish Higher Education Funded project in collaboration with the Universities of Glasgow, Napier and Abertay Dundee.

This project is focussed on helping industry tackle the challenges of an increasingly elderly user population, and has investigated methods for user requirements, developed specific applications for older people, and investigated ways of educating designers in industry on the needs and wants of older users.

3. REQUIREMENTS GATHERING

We firmly believe in including users within the design team of new technology and have been investigating how this can be done effectively with older people. We assembled a cohort of over 200 older people who have a range of physical, sensory and cognitive characteristics as well as including people with a wide range of experience of using computers, and attitudes to new technology ranging from being petrified of them to using them regularly. We have investigated ways in which we can interact with groups of old people to ascertain their needs and wants [2]. This has included novel ways of organising focus groups which are particularly suited to this field. For example, it is not easy for novices to speculate about technology about which they are ignorant – to this end we have used theatrical techniques, where script writers have produced realistic scenarios of what might happen when technology was installed in the home [3]. These videos were very successful in facilitating the discussions and led to many useful insights by the engineers involved in the project. Other techniques we have developed include workshops where older people have been able to try using technology in a very supportive environment. We have also found home visits can provide a wealth of information about older users' attitudes to technology [4].

4. A EMAIL SYSTEM AND WEB BROWSER FOR OLDER PEOPLE

In collaboration with an industrial consultancy company we developed a "proof of concept" email system and web search and navigation system aimed at older people for whom the internet was an "alien territory". We involved older users in the design and early evaluation of the prototypes, which offered a radically simple user interface which was designed to be intuitive to use, with minimum functionality, no jargon, and with font and contrast ratio, and button size appropriate for older people.

Evaluation trials were conducted which compared the proof of concept prototype with popular "out of the box"

commercial systems. The older people's performance was significantly better with the proof of concept system, in terms of tasks completed, fewer errors and hesitations, and fewer interventions by the experimenter, The older people found the commercial systems threatening, confusing, overpowering, and cluttered. In contrast, the proof of concept systems were found to be attractive and easy to use and they were prepared to use such a system in the future. This development thus showed that software could be designed which was more acceptable to older people than popular commercial systems, and produced quantitative improvements in performance.

It should be noted, however, that this process required significant transfer of knowledge of the characteristics of older people and how they behaved to the design team. Particularly in the early stages of the process, it was not easy to convince the design team of the level of older people's lack of understanding of information technology – not only jargon, but also metaphors, and the underlying assumptions were alien to many of these older people.

5. EDUCATING DESIGNERS.

One important output from the Proof of Concept development was a realisation of the need for a focus on educating design teams on the characteristics, needs and wants of older people and the ineffectiveness of standard guidelines and text books in getting this message across. We believe that it is vitally important to change the mind set of the designers, and this should precede information about guidelines and lists of recommended procedures.

In order to provide maximum impact we investigated the use of theatrical techniques to provide a hard hitting message in an accessible, and hopefully humorous form. We thus worked with a Theatre Company with professional actors, writers, directors and a video team. On the basis of evidence and anecdotes which our research team had gathered from older people we produced three short videos which illustrated the problems older people faced in using technology. We are making these videos widely available, and are asking a range of designers to fill in before and after questionnaires so that we can measure the effectiveness of this technique.

6. CONCLUSIONS

We have shown that it is possible to design information technology systems which, in contrast to many commercially available systems, older people find easy to use and which encourage them to use computers and the internet. We concluded that the major issue is changing the mind set of designers and are investigating ways in which theatrical techniques can be used to do this efficiently and effectively.

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LEARNING FROM PEOPLE WITH DEMENTIA TO DEVELOP RESEARCH METHODS FOR OLDER PEOPLE

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ABSTRACT

Much of the research into HCI and the older population has concentrated on physical problems associated with older age, such as visual and motor problems. Cognitive decline is associated with older age, and in many older people cognitive impairment develops into dementia.

This paper describes how people with dementia are too often an overlooked minority and how the HCI design community might learn from them to develop research methods and computer interfaces which are of benefit to older people in general.

Keywords

Older people, dementia, participatory design, person centred research, inclusive design

1. WHAT IS DEMENTIA?

Dementia is predominantly a disorder of later life, with its prevalence and incidence rising sharply with advancing age [12]. About 750,000 people in the UK have dementia; only around 18,000 are under the age of 65. One in five people over the age of 80 has dementia [3].

Dementia is a progressive neurodegenerative disorder caused by many different diseases, the most common being Alzheimer's disease. People with dementia typically have problems with language, memory and visuospatial processing [17]. Many of the impairments caused by dementia are also associated with old age. The distinction between severe dementia and normal ageing is obvious but establishing the difference between early, mild Alzheimer's disease and age-related cognitive loss is more difficult [13].

2. PEOPLE WITH DEMENTIA AND COMPUTERS

Historically, people with dementia, in common with the majority of older people, have been seen as passive consumers of computer applications, rather than being involved in their development.

Computers have been used as tools in diagnosis and assessment [4]. There are various projects developing computer applications to aid independent living, eg sensors, detectors and tracking devices [5]. Some work has been carried out on memory aid applications [9] and the use computers for rehabilitation [11] and reminiscence [2].

However, people with dementia can enjoy using computers, profit from a sense of achievement and be involved in evaluation of web-based systems [11, 3 and see also poster at this conference].

3. PERSON-CENTRED APPROACH

Tom Kitwood pioneered the idea of person-centred dementia care and urges researchers to take into account the uniqueness of each individual and use an array of methods to build up a total picture of their experience [15]. Researchers are increasingly recognising the importance of the person with dementia and their experience, rights and perceptive [7].

The views, preferences and choices of people with dementia have often been disregarded or treated as irrational or unreliable [14], but people with dementia can be included in the design and evaluation of the services they use [1].

4. FINDING A SUITABLE DESIGN METHODOLOGY

A 'holistic' approach, where the user is involved from the start of the design process, has been identified as important when designing for older users. This is because the designer can examine the context of the application in the user's life: how the user learns to use the technology, what support might be needed and how the user experiences and perceives it [6].

Lines and Hone have described their experience of using focus groups with older people and the difficulty of retaining the attention of the whole group [16]. Attention is a problem in dementia, however, lessons from person centred care have shown that there are many ways in which people with dementia can communicate and that time and patience are very important [1].

Participatory design techniques, have been used successfully with older people. Participatory design focuses on collaborating with the users throughout the design and development process. Ellis and Kuriawan have described the importance of building a relationship based on trust with the participants in the design project and the advantage of using a flexible and easily modified HTML based system for cooperative prototyping [8].

Researchers as the University of Dundee have put forward a new methodology that they called user sensitive inclusive

design, which addresses the great variety of user characteristics shown by people with dementia and promotes the development of tailored, personalisable and adaptive interfaces [10].

5. PROPOSED RESEARCH

We plan to investigate the possibility of developing a unified methodology that combines the participatory and sensitive inclusion design approaches from HCI with person-centred support from dementia research to develop and validate design techniques with and for people with dementia.

The project aims to work with people with dementia themselves to identify what aspects of computer interface design may act as a barrier to access, and to establish new ways of working with people with dementia to design computer interfaces

The limited work carried out so far has shown that people with dementia will need support both to use computers and to express their views. In order for the research to be truly 'person-centred' the participants will need to see the benefits for them in the work being carried out.

Ethnographic studies of groups of people with dementia using computers are the first stage in identifying their needs, capabilities, limitations and views; and in developing an appropriate methodology for involving people with dementia and older people in general.

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INCREASING AUTONOMY OF OLDER ADULTS THROUGH THE USE OF COMPUTERS AND THE INTERNET

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ABSTRACT

This paper describes a research project that addresses the potential beneficial effects of newly acquired computer and Internet skills on the cognitive ability and quality of life in older individuals. This project is a randomized controlled study with healthy older participants between 65 and 75 years of age. In this paper, the design of this study, as well as some preliminary results on an everyday competence measure, the Technological Transfer Test (TTT), will be discussed. This test was designed to measure problem solving with respect to everyday technological devices, such as a cash machine. The ability to use such devices is very important for autonomy in later life, as society becomes more and more technology driven.

Keywords

Cognitive aging, intervention study, Internet, technology.

1. INTRODUCTION

Individual differences in the rate of age-related cognitive decline appear to be mediated by age-extrinsic factors, such as socio-demographic factors. A possible mechanism through which these factors moderate the development of cognitive aging is the concept of 'Reserve Capacity', for example, the model of 'Cognitive Reserve' (CR) [2]. Proxies of CR usually are measures like education, occupational activity, or participation in cognitively challenging activities (e.g. reading, playing games) [4].

This is in accordance with the 'Use-it-or-lose-it hypothesis' [3], which states from a neurobiological perspective that stimulation of brain cells prevents these cells from decay. With 'Use-it-or-lose-it' in mind, the present study aims to stimulate older adults to use their cognitive abilities to prevent these abilities from decline. Here, the use of Internet facilities is used as a cognitively challenging intervention. 'Surfing' the Internet involves many cognitive skills (e.g. executive functions, visual search, attention). Therefore, we argue that stimulating older adults to use the Internet may be a suitable method to promote the usage and development of cognitive skills and thereby increase CR.

2. DESIGN

The randomized controlled intervention study introduced in short here, called the 'Internet for the Elderly Project' (in Dutch: PIVO), is the first study of this kind to test the possibility to increase CR in later life. The intervention in this study is the use of a computer and the Internet at home for 12 months. At this moment, the intervention study is still in progress. Data collection will be completed in October 2004.

Participants of this study are 240 healthy individuals, aged 65 to 75 years, with no prior computer or Internet experience. These participants were randomly assigned to one of four conditions: training/intervention, training/no-intervention, no-training/no-intervention and a group with people who are not interested in the intervention. The individuals in both the training/intervention group as in the training/no-intervention group received a brief training in the use of computer and Internet facilities (e.g. Web-surfing and e-mail). After this training, participants in the intervention group were provided with a computer and a fast Internet connection at their homes for a period of 12 months.

It is hypothesized that participants in the intervention group will benefit from using the computer and Internet facilities by showing a relative improvement in several

domains of function. Main outcome measures include general cognitive functioning (e.g. memory, attention, executive functions), functional status and independence, social network and transfer to everyday performance.

3. EVERYDAY TECHNOLOGICAL PERFORMANCE

One of the nested questions in PIVO is whether newly acquired computer skills transfer to the use of everyday technological devices. The ability to use these modern devices is very important for autonomy of older adults. Today's society is relying more and more on technology and many activities of daily living are only possible by using technology (e.g. withdrawing money from a bank account). Moreover, many technological devices are designed to increase autonomous living (e.g. microwave ovens to prepare ready-made meals). To measure this transfer of skills, we designed the Technological Transfer Test (TTT).

3.1 Methods

The TTT is administered twice during the study, once at baseline and once after the intervention at 12 months. At each administration, four technological problems are presented. In this paper, we present some preliminary data of the baseline administration of 123 PIVO-participants.

3.1.1 Baseline devices

At the baseline administration, the four technological devices of the TTT were a telephone and a portable CD player (both real-time devices), as well as a cash machine and a train ticket vending machine (both simulated and operated through a touch screen).

3.1.2 Procedure

Participants received an instruction leaflet with the problem that had to be solved (e.g. "Play song four of this CD"). Also, for the real-time devices, short instructions were provided. Participants were instructed to act as quickly and correctly as possible. The instructor was not allowed to assist the participants.

3.1.3 Analyses

We conducted linear regression analyses to determine which demographical (age, sex and education) and cognitive (memory, measured with a word learning test, and general cognitive speed, measured with a letter digit substitution test) variables could predict technological performance time of the four TTT-devices as well as a total-score (sum of Z-scores).

3.2 Results

It was found that level of education as well as general cognitive speed significantly predicted technological performance (with one exception: cognitive speed did not predict performance on the cash machine) . Age predicted the two simulated devices and sex predicted performance on the CD player.

4. DISCUSSION

Level of education and general cognitive speed were the most important predictors of technological performance. Education is found to be a significant predictor of many cognitive tasks, so it's role in technological tasks was expected. Also, the role of general cognitive speed was anticipated, because a reduction in basic processing speed provides the basis for cognitive change in a host of cognitive domains. Furthermore, the dependent variable was a speed measure as well. This does indicate, however, that technological performance draws on cognitive skills. Age only predicted performance on the two simulated technological devices. This is in accordance with the literature on the use of modern computer-based devices by elderly people. The older people get, the less likely they are to adopt or use new, unfamiliar technology [1].

The results of this study provide preliminary evidence of a relation between cognitive skills and the use of daily technological devices. When developing technological devices, designers should consider age-related cognitive limitations. This is especially important for older adults because autonomy in daily functioning is increasingly dependent on the ability to use technological applications.

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HOW REPRESENTATIVE IS YOUR OLDER ADULT SAMPLE?

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ABSTRACT

Older adults are a diverse population. This creates a challenge for developers of technology when defining a representative sample for user involvement in the development process. This paper discusses the challenges of sampling with such a diverse group. It describes how an alternative sampling method was applied to an exploratory study evaluating the usability and usefulness of PDAs for older adults.

Keywords

Older adults, sampling, usability

1. INTRODUCTION

Involving older adults in the development process, whilst essential for the development of usable and relevant technologies, can bring numerous challenges at each stage of the process [1]. One major challenge which is essential for ensuring the validity of requirements and usability findings is the involvement of a representative sample of users.

However, research has indicated that the diversity between and within older adults increases in physical, sensory, and cognitive areas. Also, there is wide variability in other areas such as levels of education, literacy levels as well as in psychosocial factors such as self-efficacy and well-being. Working with such a diverse population, therefore, presents a problem in defining a "typical" user.

There are however various methods available for selecting representative samples based on either random or purposive sampling. These methods can involve a predominant statistical focus, such as using a stratified sample or a more grounded theory focus as well as participatory design sampling, involving creative sampling methods, such as the use of personas [2].

Furthermore, in developing technologies particularly for older adults, there has been a tendency to focus on selecting users which represent particular functional impairments, such as including users with vision impairment, hearing impairment, dexterity impairment, cognitive impairment and so on. However, this type of purposive selection focused on impairments may be impracticable. That is, usability evaluations using experimental designs, which require the matching of participants, or independent designs that require large numbers of participants to provide real statistical meaning, are confounded by the difficulties in either matching extremely diverse participants, or accessing a large number of participants. It may be more appropriate therefore to consider other relevant factors in sampling such as experience and acceptance of technologies when recruiting users.

The current study, as part of the UTOPIA project, describes such a sampling method applied to an exploratory study investigating the usability and usefulness of Personal Digital Assistants (PDAs) for older adults.

2. SAMPLING METHOD

The sampling method adopted in the current study was used by Maguire [3] in an evaluation of new digital TV services.

The premise underlying this method is that feedback from individuals who are not target users as well as the "early adopters" of technology will provide valuable data on usability. It also deals with the event of a particular group taking up the technology at a later time. For example, take the personal computer, which until recently was not widely used by older adults. There is now, however, an explosion of interest in computers by older adults. However, it is now apparent that computer software/interfaces are not usable by this population group. Therefore, it would seem usability evaluations would benefit from feedback from a wide range of the population.

Maguire suggests that categorising users into four categories based on experience and acceptance of technology can provide useful and relevant usability data as shown in Table 1 below.

	Experienced users	Inexperienced users
Technology-accepting users	Will provide informed and constructive responses. Should result in useful ideas for improving service based on user's previous experience	Will provide idea of how inexperienced consumers will react when they first acquire a product
Technology-resistant users	Will highlight concerns from a technical perspective and which features are of value, even to technology resistant users	Will identify concerns of the wider consumer population. Useful if aim is to launch a simple service of interest to mass market.

Table 1 – Four categories of users

As well as providing diverse views of usability problems this type of categorising will also allow the comparison of those with negative attitudes towards technology with those with positive attitudes towards technology.

3. PDA STUDY

Unlike Maguire's evaluations of a mainstream service, the current study's purpose was to evaluate a non-mainstream device (PDA) within a particular subpopulation – older adults.

In order to ascertain experience and acceptance of technology, potential users were screened through interview and questionnaire. This resulted in four users being selected for each of the four categories.

An informal one-stop evaluation of the PDA was carried out during a focus group, in the form of demonstrating the uses of the PDA and allowing the users to carry out particular tasks. In order that long-term usability problems could be identified however, the users were given the PDA over a six week period. They were assigned weekly tasks over this period and were required to complete an events diary, recording usage, including extent of use, problems experienced and usefulness of the activity.

4. FINDINGS

Diverse types of information were obtained from each user both in initial and long-term usability evaluations, as shown in Table 2. The characteristics of information obtained supported the categorisations given by Maguire.

Interesting, it was found that the lack of experience and resistance to technology was more predictive of use than functional impairment. For example, user 4 found it almost impossible to use the input device (stylus), due to dexterity problems, however, his initial comment on seeing the device, before using it was negative "Too big – can't carry that in my pocket". This resistance did not dissipate throughout the evaluations.

	Experienced users	Inexperienced users
Technology-accepting users	User 1 Suggested improvements based on her previous use of mobile phone This user requested use of the PDA for additional 6 months	User 2 Observed great enthusiasm at initial session tackling tasks effectively. "I'm going to have great fun with this," Long-term evaluation observed a more apathetic attitude towards using the device
Technology-resistant users	User 3 Highlighted difficulties related to set-up and ongoing technical support	User 4 Provided information on hardware, such as inappropriate size, input device. "Too big – can't carry that in my pocket".

Table 2 – Findings based on categories of users

The 4 categories of users were useful in obtaining views on acceptance of the technologies, for example a novice user who was accepting of technology showed the PDA as highly usable and useful, however this was not maintained long-term.

5. CONCLUSION

This study has shown that sampling methods applied to the wider population can be applied effectively to the older adult population. It would therefore seem advantageous for developers of technology for older adults to consider the methods of experience and acceptance of technology in their sampling criteria.

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HELPING OLDER PEOPLE HELP THEMSELVES

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ABSTRACT

Despite having attended computer classes and learning how to use a computer, the older computer user is not adequately equipped with the knowledge to help themselves solve their own computer problems. Help facilities in computer applications are not designed for the older computer user in mind and the teaching process doesn't teach older learners how to fix their computer problems. In this paper we discuss our research in the area of help and the older computer user and share our findings on older computer users trends on using help. Based on our research, we offer a possible alternative for the older computer user looking for help, in the form of an online collaborative help environment.

Keywords

Older people, Learning, Computers, Help

1. INTRODUCTION

The world's population is predicted to age faster in the next 50 years than it has during the past half-century and Europe has been highlighted to be one of the areas where population ageing will be most advanced [9]. This issue has prompted research into ways technology can support and include older people (for example EQUAL Research Network [7] and the UTOPIA Project [8]).

The main area of focus for most of this research has been on adapting interfaces for older computer users (for example [2] and [10]). There are, however other issues older users face when using a computer, one of which is not adequately being able to help themselves when they encounter a problem with the computer.

2. THE OLDER COMPUTER USER NEEDS HELP

Older people are being encouraged to learn how to use computers to enrich their lives [1] and the increase of older computer users is evident with the presence of a Silver Surfers Day [5].

A survey by Goodman et al reports that 48% of computer users over 50 live alone [3]. If older computer users are not equipped to fix their computer problems themselves, they have to turn to external sources of help. Increasingly dispersed family structures mean that support from family members may not be readily available and, even when it is, such dependence on external help reduces the autonomy of the older user [6].

2.1 The application doesn't really Help

Most applications today are equipped with Help documentation to aid users but are only accessible by users who know what they are looking for. How would an older computer user know what to look for if they could not phrase their problem in a way the computer would comprehend? A study by Syme et al shows that experienced older computer users are aware of the Help facility but choose not to use them because of their perceived irrelevance and difficulty, one of which is the use of jargon [6].

2.2 The learning process doesn't cover Help

Older computer users have probably learnt how to use the computer from a local learning centre, college or university. Most of the lessons prescribed cover "proactive" areas of computer us, i.e. "How to do A" or "How to perform B". It is only when problems are encountered in a class that "reactive" areas such as "How to fix A" or "How to correct B" are covered. Most "reactive" knowledge is acquired through time and with experience. As such, this does not equip older computer users with sufficient knowledge to fix the myriad of problems that may arise when using a computer at home in the long term.

3. OLDER USERS : COMMUNICATION & HELP

We conducted an interactive focus group with older computer users, requesting information on their communication, technology and help patterns. We were keen on exploring whom older users wanted to turn to for help but did not and asked participants to complete an activity chart.

3.1 General Results

We invited older computer users from our database of users to attend our workshop. 13 people attended, 11 were females and 2 were males and their ages ranged between 60-80 years. Data was captured using a general questionnaire, activity charts and video-recording focus groups. Salient results are summarised below:

1. Participants were keen to obtain help from someone they knew in the first instance. This would most likely be family and friends and someone they would not mind asking for help from. Users would only turn to Help Lines if their first line of help had failed.

2. Participants wished to be able to solve problems with technology themselves. Participants were disillusioned with customer service help lines due to the high cost, difficulty of explaining their problems in non-technical terms and difficulty of understanding what the customer service advisor was saying.
3. Participants did not consider user manuals to be helpful either and found them complicated and difficult to understand.

4. A HELP & LEARNING INFRASTRUCTURE

Based on the above findings, we conducted further studies into the possibility of combining chat, help and learning functions into a single application. This has lead to the creation of a prototype, HelpSuite: A Help & Learning Infrastructure for Older Adults.

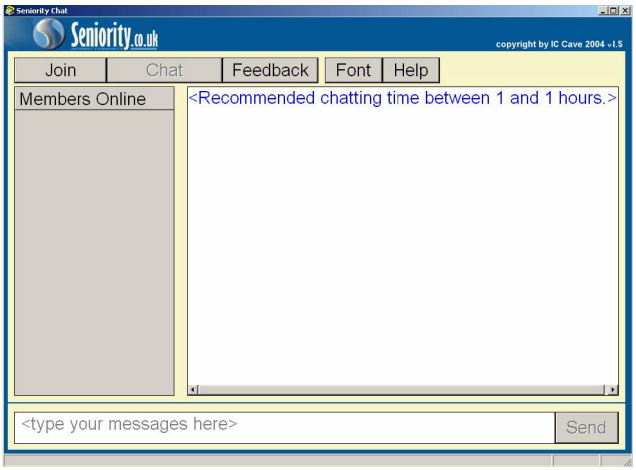

Figure 1. HelpSuite version tested at Seniority website.

This is an online collaborative environment, which has been adapted using Microsoft Netmeeting SDK. This system allows older users to meet online to chat, discuss, share and help solve each other's computer problems. The system's technology also allows users to "share" their computer programs to "show" their helpers what the problem is. Helpers can then choose to talk about the solution or "correct" it for the user.

Initial usability tests with beginner older computer users indicated that buttons and their text were simple to understand once users were aware of the function of the application. The system was also tested at www.seniority.co.uk, a popular web forum for the over 50s. Seniority user feedback indicated that most users on the forum were intermediate or advanced computer users and were satisfied with the interface but were keen on additional functionality and the ability to customise the interfaces.

5. ACKNOWLEDGEMENTS

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CONSIDERATIONS IN DESIGNING GAMES[1] FOR OLDER PEOPLE

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ABSTRACT

Games have been around for the last 30 years. However, a majority of older people aged 50 and above are not drawn to playing games. We investigate whether older people would be interested in playing games and if not, what changes are needed to accommodate the older player.

Keywords

Games, Older people, Design

1. INTRODUCTION

Changes in the world population indicate that there will be a greater number of older people in the next 50 years than there have been in the last 50 years. Europe has been highlighted to be one of the areas where population ageing will be most significant [5]. In the UK, although a considerable proportion of older people are in the low income groups, many have high disposable incomes [1] with people aged 50-64 on average earning £60 (gross) more a week than the average individual [2].

These figures point towards a potential gap in the leisure market for older adults. If a better consumer offer targeted older people, in the form of goods and services that could enhance their quality of life and offer increased opportunities for enjoying the considerable free time at their disposal, then older people might be encouraged to spend more [1]. To investigate the requirements of such an offer, research into older adults and gaming is being investigated at the University of Abertay, as part of the UTOPIA Project [6]. These requirements could offer games publishers information to expand their consumer base.

Currently, older people take up leisure activities such as watching television, physical activities, needlework, reading books or participate in community activities [2]. The motivation behind these activities is either to keep themselves busy, to be socially included, to keep themselves mentally alert or just to have some fun. Games can fulfil these functions, but will older people be keen to play existing games or would game developers have to adapt games to suit them? This paper investigates this question and reports our findings on a games workshop, discussing possible considerations in designing games for older people and further areas to investigate.

2. GAMES WORKSHOP

A games workshop was carried out by the UTOPIA Project to ascertain older people's preferences for interfaces in general. We chose to test this by asking older users to play computer and console games. We invited older computer users from our database of users to attend our workshop. 11 people attended, 8 were females and 3 were males and their ages ranged between 50-84 years. Data was captured using a general questionnaire and audio and video recording. 3 console games and 5 computer games were available to play with. The console games, which were available, are Super Monkey Ball, Crazy Taxi and The Weakest Link. The computer games that were available are

- Neverhood™ (a clay adventure game) [4],
- SimTunes™ (a paint program which is also a musical composition program),
- Jill of the Jungle (a 2D action game) and
- Loop (a looping game from Shockwave) [3]

Before playing commenced, most users were shown how to use certain functions or given a demonstration. Although we expected results in the area of interfaces, we also found salient results for games research. Below is a summary of our findings.

2.1 Navigation

Participants encountered problems attempting to navigate and did not understand where they had to go in the game or if they were going the right way. In these instances, some participants preferred human help with few willing to learn via trial and error.

Virtual world games assume that players will figure out where to go and what to do by trial and error. This assumption may not hold true for older people whom may just want to move on in a game to yield successful results.

[1] Games in this paper refer to computer, console and video games.

2.2 Feedback

Whilst playing the games, participants did not expect to receive aural feedback to their actions. This led participants to claim there wasn't enough feedback to the games. At times, even when they recognised feedback, participants did not know what to do thereafter. In one game, participants tended to repeat the same movements without seeing the connection between their actions and results.

Alternative forms of feedback should be offered for older players, so they can see and hear the feedback of their actions. In addition, tips should be offered on screen as to what players should do next.

2.3 Interfaces

Many interface issues were raised. Participants encountered difficulty in keying two buttons at the same time for a complicated manoeuvre. Participants also had problems using thumbsticks on joypads for console games. Some of the observation results point to the fact that the keyboard was not the most suitable input interface for the users.

Numerous alternative interfaces are available for different games, such as steering wheels, dance mats and EyeToy™ featuring a camera interface. Given the option, older players may prefer them to standard interfaces. This is an area that warrants further investigation as it is possible that, like using a mouse, once older users are given time to familiarise themselves with an interface, they may not have any problems using it.

2.4 Game Design

Many participants failed to understand the concept/objective of the game, having to collect items, points, having another life, different levels, etc. For example, one participant avoided a knife because she thought it could be used to hurt the character in the game, rather than help it. A different sense of logic and perception exists in the game world, one which older players are not familiar with. Until older players grasp this concept, older players may prefer to play games that mirror activities in their life such as a sport or driving game.

2.5 Perception of Games

Most participants came with negative perceptions of games. One participant assumed that games were played by teenage boys who had nothing better to do. Others thought it was expensive and a waste of time. Despite these perceptions, participants' attendance and interest in playing games at the workshop suggested an openness and interest in exploring games further.

Some participants showed inconsistency in their answers and behaviour. In one instance when 3 participants were asked individually whether they enjoyed playing console games, they denied any enjoyment, despite the fact that they were captured on video laughing and smiling whilst playing.

3. CONCLUSION

The games that were chosen for this workshop limited itself to reality and quasi-reality games with realistic tasks and outcomes. This was to ensure that older players could relate to content in the games.

Once most participants learned the basics, they began to enjoy playing the games offered. Some participants commented that playing a game would be good practice in learning how to use a mouse.

We have identified issues that are relevant for the older player. Further studies needs to be conducted into older people's perceptions of games and game playing and what may motivate them to play games. By doing so, we may be equipped to change negative perceptions and include older people into the existing gaming population.

4. ACKNOWLEDGEMENTS

This work is funded by the SHEFC UTOPIA project. We are grateful to all older users who attended the games workshop. We would like to thank Dr Rosine Eisma for organising the workshop, choosing the computer games & compiling the observation report for Neverhood. We would also like to thank Katerina Binova-Barbour (Jill of the Jungle) & Mark Anderson (SimTunes) for their observation reports.

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A PERSON ISSUE BEFORE A TECHNOLOGY ISSUE – PART 2

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ABSTRACT

This paper describes recent experiences of using IT with those older people who are usually considered more frail or vulnerable. It comes to the conclusion that IT does make a life enhancing difference to their lives and that simple ready to use hardware and software is adaptable to meet the needs of most users!

Keywords

Invigoration Therapy, accessibility options, Netscape Navigator.

1. INTRODUCTION

For the HCI conference in 2002 my contribution was called "It's a person issue before a technology issue". The fundamental point made was that to get significant numbers of older people using computers a personal approach is an essential element. This paper reports upon work done since 2002 and how these experiences have only reinforced our earlier view. Four points will be made:

- Using computers is not a fair descriptive term for this work which actually enhances people's lives;
- Older people have self images which influence their choices of working and learning;
- Modern software already allows the needs of most older people to be met but many traditional IT users are not aware of what is possible;
- Using appropriate but simple accessibility options enables more frail older people to use IT.

2. BACKGROUND

Since 2001 Age Concern Oxfordshire, in partnership with Age Concern England, developed Age Resource Desks. These are centres with one or two computers and appropriately trained volunteers or staff who can help older people learn to use IT initially on a one-to-one basis. They are called Resource desks because they are not training bases; the computer is looked on as a source of fun, communication and information. There is no set course at an Age Resource Desk and so the volunteer helpers respond to the needs and capabilities of the clients to make learning fun. Eventually some clients have the confidence to go on to more formal training and/or buy their own equipment. However, many remain with the service because it is the only provision that meets their needs. A personal approach is needed because many older people do not see the benefits of IT or they believe that they can not cope. Some have great physical limitations and so we have widened the scope of using IT to include making decisions about its use. In this way more frail clients can choose colours, fonts or illustrations and so create their own cards, menus or programmes even if they can not strike a key. This is very labour intensive but the rewards are quite staggering as the next section will try to show.

3. IT AS INVIGORATION THERAPY

Older people are hard to generalise about because, as Alan Newell said at HCI 2002, their needs and abilities are more diverse than any other group of people. Many are perfectly able to use and learn IT for themselves and the new types of flexible learning "courses" where credits can be cashed in at any time during a certain period really helps this group. As a charity we have to use our resources appropriately and so we try not to compete with mainstream training even though that is the route to much funding. Therefore, we are most interested in helping the older people who have more restricted options due to their abilities or locations within Day Centres or Residential Homes. These older people can feel that their chances to learn new skills are greatly diminished and that their quality of life is worsened by ill health and their circumstances. However, it can be seen that using IT with this group of older people means much more than using computers. The chance to communicate with the rest of the world or distant relatives is a revelation to older users; it is like learning to communicate as a young child again. The opportunity to be "taught" by grandchildren is life enhancing and the fact that the older person has learned new up-to-the minute skills, at a time when they thought they may be unable to do this, is truly invigorating. There is no other large group of people for whom IT can enable so much personal growth through Invigoration Therapy. Marlene Hicken coined this term when writing for **www.theclockhouse.info** about her work as a volunteer for us at Shotover Day Centre.

4. OLDER PEOPLE LIKE TO BE LIKE OTHERS

This point is an extension of the first. By using IT older people feel a part of what is going on in society and they have access to e-shopping, e-banking and e-government. Equally all media contacts have references to websites and so older people will feel excluded if they are not able to use IT. New opportunities are created too, for example one of our first clients, who needed IT support at home, now has a "job" as a moderator on **www.idf50.com** – this has completely changed the outlook on life for someone who was largely housebound. The chance to share and record reminiscences is also a powerful invigorator. Recently the BBC has given this opportunity to many older people through its on-line archive of stories "The People's War". Many older people have made their own contributions which can be read at www.bbc.co.uk/ww2 However, our volunteers have worked with those who cannot use IT so that they are not excluded. All of these contributions can be read by searching for Clockhouse within the People's War webpage. The writers have often been quite disabled or frail but they have shown enormous interest in the archive and have taken great pleasure in telling friends and relatives how to access their stories.

Wanting to be like others applies to hardware too and so we find that some older people insist on trying the laptop touch pad mouse even when we think that an external trackerball may be much better. Laptops are now more popular due to their lower prices and the need for many older people to conserve space. We have also introduced particularly frail clients to their use via our laptop based outreach service. However, laptop keyboards are also harder to see and use. We encourage clients to look and try before they buy to determine the suitability of equipment to their needs. The size and colour contrast of the keys is very important as we found when we accompanied one wheelchair user to a well-known computer retailer which displayed all it products at heights too high for him to see! We also remind clients that plug-in keyboards are cheap to add to their package and "big key" keyboards are liked by many once they have overcome some of the limitations of "wanting to be like others".

5. ACCESSIBILITY VIA SOFTWARE

Many people are still unaware of the accessibility options within windows. We use large text, large scroll bars, large pointers and large icons all the time and we also regularly adjust mouse click speeds. So it is a real shock to move to computers in other centres which have not been set up in this way. Large icons on tool bars are especially useful to many users! This re-emphasises another point made at HCI 2002 that good aids for "critical users" such as older people, are likely to be of benefit to most members of society. Making use of the accessibility options is helped by websites such as www.abilitynet.org.uk/myway and www.microsoft.com/enable Using in-built settings is totally acceptable to our clients and does not compete with the principle of "being like everyone else". Likewise using an alternative web-browser to Internet Explorer is also acceptable. We have found that Netscape Navigator is much to be preferred because of its "view menu" which allows text to be enlarged to 300% or more. The enlargement is very high quality and characters are not pixelated. This is a much more user friendly option than the "magnifier" in windows which needs a steady hand to operate it and yet steady hands are not common among our older clients.. Email is one of the top requirements for older people and this is where the enlarge text facility of Navigator really scores. Many other centres are still surprised when we demonstrate dual control of the computer often via a mouse and a trackerball working together. This is an inbuilt facility but one that is not widely used. It makes a statement for left-handed users and allows the helper to point on the desktop without invading the client's personal space or hijacking their mouse.

6. THE FUTURE

Much of our work in the future will be as a second tier service training staff and volunteers in using accessibility options so that many more older people can benefit from Invigoration Therapy. We also seek the funding needed to continue to operate and, in particular, expand the outreach service and take IT to the many individuals, clubs and centres where older people have never had the chance to experiment and be involved with IT. A particular target should be older people from black and ethnic minority communities who may feel isolated. We have one volunteer from this community and it has proved particularly hard to introduce the clients to IT even though we can demonstrate a wide variety of newspapers, pictures and music that is available from around the world. Electronic Diwali cards have been tried but we have no recipe for success in this area of work yet.

7. WEB REFERENCES

www.theclockhouse.info	our work and the concept of Invigoration Therapy
www.idf50.com	a site for older people
www.bbc.co.uk/ww2	reminiscence work
www.abilitynet.org.uk/myway	accessibility options
www.microsoft.com/enable	general advice

SPOKEN SUPPORT FOR EVERYDAY LIFE

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ABSTRACT

Speech output invoked at the appropriate time when older people are completing a task can be very powerful. It provides the equivalent of a friendly helper at your elbow telling you what to do next, guiding you through a procedure or warning of possible dangers.

This paper introduces speech support in the domains of web browsing and car driving two very different applications where speech has shown to be useful, explores its potential and looks at the special issues involved.

Keywords

Older people, speech output, web browsing, car driving, memory loss, interface support

1. INTRODUCTION

Speech output can play an important part in helping older people to execute every day tasks or to help them execute them more efficiently. It can also provide useful information about the environment and things happening around them, which older people may not readily absorb for themselves, or act as a reminder concerning previous interaction for those with poor memories.

Although this paper focuses on interaction with older people, as a user group they also fulfil a useful role as extreme users who pick up interface design problems that other groups work around and are less aware of. Help and support made available to older people can also prove useful for other users in more extreme contexts. For example a young person executing a task in distracting circumstances faces similar problems to on older person with memory loss and low confidence.

This paper demonstrates how helpful speech output can support older people in day-to-day tasks by providing vital information that younger people might absorb for themselves unconsciously.

Older people can also be viewed as extreme users of systems who push the boundaries of good design, reacting to design problems that younger more flexible users simply work around. Thus they usefully detect important failings. Finally, interface design features that are useful for older people frequently prove to be useful for everyone.

2. OLDER PEOPLE AS EXTREME USERS

It is well known that ageing affects short term memory and the ability to absorb general background contextual information together with the ability to multi-task.

Loss of memory and general awareness causes loss of confidence in ones actions. Here confidence boosting and affirmative speech output has proved to be very useful (Zajicek and Hall, 2000).

The ability to absorb information is also age related. Older people were found to be less able to absorb long instructions than younger people (Zajicek and Morrissey, 2001). Speech support that appears at the point it is needed removes the need for long instructions at the beginning of a task.

The aim of speech support is to:

- compensate for memory loss suggesting actions that have not been remembered
- help with strategising by making contextually relevant suggestions i.e. what to do next in computer interaction
- enable instructions to be passed in smaller messages
- provide contextually relevant advice i.e. advice about road conditions
- provide warnings in safety critical situations

Perception of the speech support system is in many cases as important as the functionality. An important factor for acceptance and thus usage of speech support is that the system is well liked and trusted by the target group.

3. SPEECH SUPPORT IN COMPUTER INTERACTION

Age related memory loss means that older people experience difficulty building strategies at the interface..

Speech output which talks a user through their computer interaction, letting them know where they are and what they can do next, have been used successfully within the domain of Web browsing. It was found (Zajicek and Hall, 2000) that older adults who had not been able to use a voice Web browser without speech output were able to use it when Voice Help was installed. What's more longer trials

showed that once older people had listened to instructions concerning where they were in their interaction and what they can do next, for some time they reached a point where they started to 'know' what to do next. The instruction message appeared to become resident in long term memory rather than the user having to rely on short term memory to remember what they did last time.

4. SPEECH SUPPORT WHEN DRIVING A CAR

Older people are less aware of their surroundings and less able to multi-task with poorer judgement.

Speech support for in-car systems is under test at Toyota and Stanford University (Jonsson et al, 2004). In particular the nature of the output for advice about dangerous driving is under investigation. The aim of researchers is to find the most acceptable form of speech output that helps drivers retain relevant information and provide timely warnings about hazards on the road. Advice is not always easy to accept which makes the social implications of the speech output very important. Previous studies show that linguistic, such as language style and structure, and para-linguistic cues such as emotional colouring, recorded or synthesised voices and age, gender of voices, in speech play a large part in user perception of speech support and of the system as a whole.

5. SPEECH SUPPORT IN THE FUTURE?

We envisage intelligent speech support systems that can help and advise older people while completing a range of day-to-day tasks. As in our web browsing example they will hopefully enable older people to complete tasks that had previously been thought to be too difficult, introduce them to the workings of Information Technology and while driving a car provide background information which they are no longer able to retain. This will also pave the way for better design and useful support for the whole population.

Speech support has also been used to direct older people in matters of personal hygiene in the bathroom (Assests 2002).

Many situations where a care provider or instructor supplies useful comments and directions are potential candidates for speech support. Sensors are easily positioned to measure physical actions within the house or further a field thus enabling relevant speech output to be targeted at many aspects of day-to-day living.

6. CONCLUSION

Speech output can act in the same way as spoken advice and we have shown that it enables tasks to be completed that might have been impossible before.

It can also contribute significantly to safety and the possibility of living independently.

Having established that these systems are useful. We find that when looking for acceptance and responsiveness to the message, the work at Toyota has demonstrated that the nature of the support is very important. In addition to properties of the voice systsem, cultural differences also play an important part. The Toyota trials were carried out in West Coast America. Spoken output that works for user groups in that area may well not work for those in the UK.

The authors plan to investigate differences between the Toyota group and clients at Age Concern Oxfordshire and explore further how these systems can be integrated seamlessly into the lives of older people and thus enable them to live independently for longer.

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Timetable

9:30 - 9:40	**Introduction** Joy Goodman and Stephen Brewster
9:40 - 10:10	**Keynote 1** *Universal Requirements for Home Technologies* Andrew Monk
10:10-10:30	**Getting to know each other session**
10:30 – 11:00	**Papers 1** *Learning to Use Computers at a Later Age* Anne Aula *Information Seeking Strategies Used by Older People* Paul Curzon, Suzette Keith, Judy Wilson, Gill Whitney
11:00 - 11:15	*Coffee*
11:00-12:00	**Demos and Posters** *Design Considerations for Elderly Users in Domestic Pervasive Environments* Alan Chamberlain and Roy S. Kalawsky *Addressing User Needs: Adapting Information Access for the Elderly* Alice Good *Older People, Mobile Devices and Navigation* Joy Goodman, Stephen Brewster and Phil Gray *Smart Homes and Extended Families* Simon Holland and Caroline Holland *Designing for Aged People Communication Needs* Mia Lähteenmäki and Anne Kaikkonen *HCI and Older People* Alan Newell *Learning from People with Dementia to Develop Research Methods for Older People* Nada Savitch and Panayoitis Zaphiris *How Representative is Your Older Adult Sample?* Audrey Syme and Roos Eisma *Considerations in Designing Games for Older People* Lachimi Tiwari, Portia File and Peter Astheimer
12:00-12:15	**Keynote 2** Isobel Lindsay
12:15 – 13:00	**Papers 2** *CATS: Assisting Older People Obtain Appropriate Technology Support* Guy Dewsbury and Ian Sommerville *Online Form Design: Older Adults' Access to Housing and Welfare Services* Lorna Lines, Yogesh Patel and Kate S Hone *Obtaining Feedback on Advanced Product Concepts for Elders* Jay Lundell *Increasing Autonomy of Older Adults Through the Use of Computers and the Internet* Karin Slegers, Martin van Boxtel and Jelle Jolles
13:00 - 14:00	*Lunch*

14:00 - 14:20	**Keynote 3** Wilf Lakie
14:20-14:45	**Papers 3** *Helping Older People Help Themselves* Lachimi Tiwari, Portia File and Peter Astheimer *Spoken Support for Everyday Life* Mary Zajicek and Oxford-Brookes
14:45-15:15	**Videos – the UTOPIA Trilogy** Alan Newell
15:15-16:15	**Discussion Posters**
15:30 - 15:45	*Coffee*
16:15-17:00	**Discussion Groups**
17:00-17:30	**Report Back**
17:30 – 17:45	**Wrap Up**
17:45 - …	*Social activity*