
HCI for Older and Disabled People in the Queen Mother Research Centre at Dundee University, Scotland

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Abstract

This paper describes research carried out within the Queen Mother Research Centre for Information Technology to support older and disabled people and how this led to the development of an approach to research into accessibility and usability which is instantiated in the facilities of the new building.

Keywords

Older and disabled people, usability, accessibility.

ACM Classification Keywords

H5 Information interfaces and presentation.

Introduction

The research group comprising the Queen Mother Research Centre for information technology to support older and disabled people started in 1980 and, having grown to over thirty researchers, is the largest academic group in the world with this focus. It has always been highly interdisciplinary, including creative designers, therapists, nurses, linguists, school teachers as well as computer engineers and psychologists [2].

This research group were early advocates of design taking into account the needs of older and disabled people. In 1993 we presented the idea of "ordinary and extra-ordinary hci". This highlighted parallels

between "ordinary" (able-bodied) people in "extra-ordinary" (high work load/stress environments - e.g. pilots, soldiers) and "extra-ordinary" (disabled) people operating in "ordinary" environments, and the lessons which could be learnt by mainstream HCI practitioners by designing for older and disabled people [3] This was in contrast to the "design for all" approach which has a focus on modifying standard software and/or adding "accessibility" options for older and disabled people.

Provision of Cognitive Support

A major focus of our research is to provide cognitive support for older people and for those with cognitive impairment [4]. New approaches to human interface design are required in this field. A central barrier is the tremendous complexity of software applications. We found 250 possible operations and 5 panels in Microsoft's Outlook Express email system, and 50% of a group of older beginners failed to complete basic email tasks using this interface. In one case, a novice user spent over 50 minutes unsuccessfully trying to open and reply to an email message. A further complication is the use of metaphor in applications. Consider what a naïve person is asked to understand when presented with, for example, a web browser:

They seem to be using a *television* set; but are actually using a *computer*. This television display is showing a *desktop*; but on this *desktop* there are *windows*. They can *look through* these windows to see an *application* which is *running*. That *application* is a *web browser* which is controlled by *menus* and a *mouse*.

It is hardly surprising that users unfamiliar with the digital world, let alone those with cognitive impairments, have difficulty using information systems.

Many developers would claim, however, that their applications are accessible because they are compatible with screen readers and have "accessibility options". These developers are providing "accessibility" but not "usability", and, in some cases, these accessibility options significantly increase the users' cognitive load.

Some Specific Projects

A number of our projects address these challenges.

Our "Cybrarian" internet portal was an email and search and navigation system designed primarily for "older people for whom the internet was an alien territory". This had a radically simple interface with a small number of on-screen options, an easy to understand linear progression through the system, and continuous specific help and instructions. Evaluations with older people showed a substantial preference for Cybrarian rather than a commercial email system, and the general design principles have been adopted for a government supported internet portal. Our "non-browser" was an even more radical approach consisting of a touch screen with only five buttons mounted in a control panel at the bottom of the screen.

We showed that predictive word processors, such as our "Predictive Adaptive Lexicon", could be of significant benefit to dyslexics and people with poor spelling. More recently we developed SeeWord - a successful approach to alleviating the symptoms of dyslexia by providing a readily configurable word processor with a radically simplified and direct interface which both reduced cognitive load, and made changes immediately visible. For motor impaired computer users we developed disambiguation software of the type now appearing in mobile telephones - this

representing a practical example of the benefits of the "ordinary and extra-ordinary HCI" approach.

Our Digital Media Access Group have been researching into accessibility options and provide an audit and advice service, which crucially includes assessment by experts and disabled people as well as automatic tools. This led them to highlight that, although the legal requirement in many countries is for "accessibility", this is often at the expense of "usability".

Our research into supporting people with cognitive impairment has expanded to address the needs of people with dementia. This is a particularly difficult HCI challenge, but our interdisciplinary team of computer scientists, psychologists and graphic artists have developed CIRCA (a multi-media communication support tool) for people with dementia. Detailed evaluations of this software have shown that it significantly increases the person with dementia's control over conversations. This has encouraged us to research into multi-media entertainment and also in to digital television based memory prompting systems

Other projects have investigated communication systems for non-speaking people and home monitoring systems for older people

These projects are described in [2] and [4] further details can be found at:
www.computing.dundee.ac.uk/projects

Laboratory Support.

The promise of a new building led us to consider the appropriate facilities for this research. Our research in these fields had led us to suggest new paradigms for

research in this field including "User Sensitive Inclusive Design", and "Design for Dynamic Diversity". We also recommended "mutual inspiration" - that users and designers should work together in a creative mode as an integrated design team. We wished to instantiate these concepts within the new building.

We had developed cohorts of older and disabled people, who worked closely with us to develop and evaluate our ideas and systems, and we thus decided to create an area in the building as the "User Centre", which would be dedicated to our users and which they would use both for social occasions (it was designed to be adjacent to coffee facilities), learning about information technology and for informally and formally working with current IT systems and prototypes from our research.

Our initial thoughts for were for a traditional usability laboratory with two-way mirrors, coupled with a demonstration flat for older users into which we could install research prototypes for more in-context research. Our reservations about this approach were:

- (a) The barriers this approach erected to real contact between users and designers - we wished to build on our "mutual inspiration" model ,
- (b) We were aware that designers and users were often in an antagonistic relationship, but this was rarely if ever acknowledged in usability studies, and
- (c) That a demonstration flat would be inflexible, and, was unlikely to ever be seen as a real home.

We realized that both the usability laboratory and the demonstration flat were a form of theatre, and thus looked to the theatre for inspiration for a HCI laboratory environment. Our thoughts were:

- i) A usability experiment is a performance where the user is the actor and the usability engineer the audience, but usually every effort is made to conceal that this is the case (two way mirrors, etc.). Thus interaction between the user and the usability expert is severely restricted, and there can be no contact at all between the users and the software and HCI designers.
- ii) Theatre encourages interaction between the actor and the audience, and, in some forms of theatre this is an integral part of the performance
- iii) Theatre has many ways of simulating real environments, and good theatre can "suspend disbelief" in a way that other artificial environments may not be able to achieve.
- iv) Theatre, with the acceptance of a large audience, encourages close interaction between the actor and the audience and "Forum Theatre" is designed to encourage discussion between various factions in the audience [1].
- v) Theatre provides a natural outlet for protagonists and antagonists to work together towards solutions to challenges, and the Forum Theatre metaphor in particular would encourage users to take a creative role by engaging in discussion with the various stakeholders in the design team, rather than simply being observed.

Our collaborative research with the Foxtrot Theatre (in Education) Company, who developed videos for us, to use in requirements gathering, and for raising awareness of the challenges of designing information technology systems for older people, confirmed to us that theatre had much to offer HCI and usability research. Further details of this research can be found in the CHI2006 experience report [5].

Conclusions – an HCI Research Theatre.

These considerations led us to include an intimate fully equipped studio theatre with a steeply raked 50 seat auditorium as part of our new building and to employ a script writer and theatre director as an "artist in residence" within our research team. The theatre will be used both for professional theatre and also for usability experiments with "real" users with active observation from the design teams. In those cases where a one-on-one experiment would be appropriate, we allocated an office where both user and experimenter can sit in the same room – thus encouraging interaction, and we believe empathy between the two protagonists.

Our future research will use these laboratory facilities and evaluate their effectiveness.

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