Strategies for finding government information by older people

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Abstract
Governments increasingly expect the web and related technology to become their major way of exchanging information with citizens, replacing existing methods. They also give accessibility a high priority. Older people are a major user of government services. In this paper we describe a pilot study to examine attitudes of older people to the internet in comparison to other ways of obtaining the same information. We furthermore examine what individuals consider important in a strategy for obtaining such information, and the relative effectiveness for achieving an individual's personal aims of using the internet over other information sources. We do this in the light of psychological and neurological research on the effects of ageing on cognitive skills.

Introduction and background
All areas of government are being encouraged to put information about local government services on the web. This information provides important access to services for older and disabled people including information on what help is available, who is eligible, and forms to apply for services and financial support. It is not inconceivable that in the near future the internet will be used as the main, if not only, route both for giving out and collecting information. Indeed, in a keynote presentation at HCI 2003 (Pinder, 2003), the UK government e-envoy Andrew Pinder responsible for promoting the e-government agenda, suggested it was inevitable that online information sources would become the primary means of exchanging information with the government. Millions of pages of government information are now available online. Despite this they are little used. Pinder argues that this is due to the poor usability and poor accessibility of the information. For example, an intimate knowledge of the structure of government is needed to understand where to find given information. He further argued that government information should focus around customers not the producer (ie government), as at present, though with the underlying assumption that information would be delivered electronically.

We start from the premise that improvements in information and communication technologies have the potential to give extra-added benefit to an increasingly ageing western world population. Design philosophy often treats their needs as an add-on at the end of the design process or simply ignores issues pertaining to the elderly; they are not seen as part of the potential audience. The European Design for All e-Accessibility Network stresses the need for a methodology which includes elderly and disabled people in all areas of research and design so that developed products are not simply catering for a mainstream audience. It is very important to have an inclusive design process to ensure that if universal functionality is at the core of a system's design then the needs of all clients are to be catered for. This demands an early consideration at the beginning of the development process as to whether a central design will fit all potential users possibly with adaptations of the interface for different user groups. Otherwise an alternative strategy is required to ensure that different technological provision is available to groups with a potential interest in the technological development. Given the growth in the numbers of elderly people this is an increasingly commercial as well as ethical consideration, see, for example, Whitney et al (2003).

Elderly people will continue to be faced with an ever-increasing avalanche of new technology much of which offers them conceptually at least some useful benefit. It is important to be able to view and consider the tasks being provided for in terms of the user

groups who use them or who could potentially benefit from them. We all have our own rules of thumb, heuristics to be applied and strategies we adopt in context. However, whilst technology may be designed for a younger clientele there is some evidence that as we age we become less adaptive and find it increasingly difficult to adopt new ways of carrying out task and problem-solving (Rabbitt, 2000). In contrast ways of thinking and strategies for problem solving that have been crystallised over the years remain fully functional until deep into old age. Freudenthal's (2001) experiments suggest that elderly people have more trouble than their younger counterparts in internalising and applying recently provided foreknowledge. He promotes the incorporation of current knowledge into system development. This will continue to be a vital development issue for future generations.

While younger people and people in work often have ready access to computers and experience of searching for information they do not necessarily find this activity easy. It seems reasonable to assume that older and disabled people may have even greater difficulties due to a combination of lack of computer experience, the effect of ageing and poor interface design. However the same people may be extremely effective at finding information in more traditional ways. It is this issue that we explore here.

This work is part of a wider project to investigate what issues are important to future use of e-government sites by older and disabled users. In doing so we are investigating both the usability of current sites, and the user requirements of future users. Even more importantly as part of the project we are investigating what methods are appropriate to support the collaboration and participation of older and disabled users in requirements gathering, design and evaluation.

The effects of ageing on cognitive processes
Rabbitt (2003) gives a good overview of neurological and psychological research on ageing. We outline results relevant to this study here that suggest that a proportion of older people could be poorly served as a result of the e-government approach. The first point of note as summarised by Rabbitt is that whilst peak performance at a variety of physical and mental activities occurs at relatively young age, people can retain extremely high levels of competence at a variety of skills throughout their lifetime. At well-practised skills, whilst competence does drop with age, older people can still perform at levels much higher than unpractised young individuals. Furthermore ageing only accounts for a small proportion of cognitive variability (20% across cohorts between 56 and 85 years of age). Research suggests further that the best model of the decline in cognitive ability is that the incidence of major cognitive impairment increases with age, rather than that of a model of a whole population increasingly being affected. Cognitive impairment does not affect everyone equally as they age. Just because someone is old does not mean their cognitive abilities are degraded.

The second result of particular note is that ageing affects some cognitive skills more severely than other skills. In particular, ageing has little effect on existing problem solving skills that have been practised over a lifetime, nor on skills dependent on knowledge about the world built up gradually. These are known as "crystallised" mental abilities. Older people are likely to be able to continue to perform such mental tasks at a high level if they have performed them throughout their lives and continue to practice them. On the other hand, "fluid" mental abilities that depend on information processing speed or on the learning of new problem solving skills are likely to degrade. In particular, where ageing is having an effect working memory capacity is likely to be reduced, information processing speed slow, ability to access previously learned information quickly reduced, as is the ability to solve novel problems. An exception to this is where the fluid skills are being used in the performance of specific crystallised activities in which case performance is less problematic. Crystallised

skills that depend on fluid skills are not affected by degradation even where the fluid skills do show degradation as part of other similar activities.

If these results hold with respect to information search skills, then this clearly has relevance to the agenda for achieving both accessibility of information for an ageing population whilst also pushing forward an e-government agenda. In particular these results seem to suggest that older people who have developed information-seeking strategies over a lifetime will continue to be extremely effective at finding information using them. On the other hand a proportion that increases with age will have problems learning and using new information seeking strategies based on electronic sources of information. This will be especially so if these new methods require fluid skills such as high working memory capacity, fast information processing speed, quickly accessing learned information etc. Poor performance in these fluid skills will not similarly degrade existing performance in previously developed information seeking skills. In this paper we describe a qualitative pilot study to investigate if there is foundation in such concerns to direct our further research.

Methodology

Our general aim in this preliminary study was to determine issues of importance to the introduction of an e-government agenda in the design of e-government information systems. In the first stage we are concerned less with detailed design of such systems but in determining and exploring major issues. To this end a qualitative research methodology has been followed. People using e-government web-sites are neither customers in the sense described in Contextual design (Holtzblatt and Beyer) nor employees as described in Participatory design (Schuler , Namioka). Currently they may have no great interest in accessing information in this way, although it may become an essential communication channel in the future. A Contextual design process was used as a starting point by observing users in an environment that was as close to their natural setting as possible.

A scenario-based approach was chosen (Braille, 2003). Subjects were asked to perform an e-government information seeking scenario using a computer web search engine. They were asked to think-aloud while undertaking the scenario, and also the observer noted the major actions being performed. At this stage in the study we were less interested in the detailed behaviour so did not automatically record keystrokes etc. This also would have been difficult given the natural settings used. The observer took written notes – no tape recording was done, again to maintain the relaxed nature of the observations. The specific task initially defined was to access a local government site to find information and an application form for housing benefit thereafter the person could look for other information of interest. Themes explored in follow-up questions concerned 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.

It was important that the observations took place in natural settings rather in labs. Where possible the observations were carried out in the person's own home using their computer, or in other cases at the home of a relative or friend who had a computer. Work by, for example, Lave (1998) highlights the importance of natural settings to investigate cognitive phenomena. The setting affects the cognitive processes involved. Indeed in our study, one observation did involve the subject leaving the computer to find other resources to help solve the problem to be used in conjunction with the computer search. It is unlikely that such behaviour would have occurred in a laboratory setting.

Furthermore, a major issue was the sensitivity of issues surrounding ageing on the one hand and the use by novice users of possibly difficult to use technology. Technology can fuel people's feeling of inadequacy. Subjects may worry about breaking the computer or feel generally stupid. It was therefore ethically important that a sympathetic approach be taken to

such issues and the pilot study aimed to used subjects that were well-known to the researcher undertaking an interview. The levels of trust already in existence possibly meant that even when subjects felt inadequate or disadvantaged they were willing to continue with the exercise and discuss their problems. It also ensured that participants were willing to allow the researcher into their own homes that in turn possibly made the participants more comfortable. However, this possibly extended the halo effect in so far as subjects seemed willing to persevere for longer periods than had been anticipated resulting in a successful outcome which possibly would not have occurred in a more natural setting. However, this does not negate the usefulness of this research. The next stage will include using subjects that do not have a personal relationship with the researchers.

Participants were aged between 62-82. Summary details are briefly listed in Figure 1.

Person	Male/female	Age	Current computer User	Ownership of PC used for test	First Language English
A	M	75	Yes	Family pc	Yes
B	F	73	No	Family pc	Yes
C	M	67	Yes	Researcher's	Yes
D	F	62	No	Researcher's	Yes
E	F	70	No	Researcher's	No
F	F	67	Yes	Own	Yes
G	F	82	No	Researcher's	Yes
H	F	79	No	Researcher's	Yes

Fig 1: Details of participants

Findings

Use of Existing Strategies

Evidence of their reliance on existing strategies was shown both directly through their activity and also anecdotally. For example, subject B, when asked about how she would search for such information recounted the following

"I would have given up in 2 minutes and gone to the phone book. We tried it [using the internet] with train times once and it took so long I went to the phone [leaving husband on the computer] and I found it all before he got anything on the computer".

A similar position was adopted even more strongly by subject G who stated

"I would never use this in a million years I would use the 'phone!!".

Subject C similarly suggested he would use a different approach to obtain housing benefit information.

"I would have gone to the council offices and ask to see someone"

Overall the participants could perceive no immediate advantage in using the internet for their searches although they were generally keen to understand more about using the computer obviously preferred to use their tried and tested methods for searching for information. They felt their methods were often quicker and less frustrating or simply fitted in with their lifestyle and known strategies for seeking reassurance.

C noted that the internet would be really useful if he was physically incapacitated in some way, but as he was not he would be able to solve the problem by talking to someone: the inference being that this was a more desirable approach.

"If I found it difficult to get about then yes but as its not a problem I wouldn't have thought about it [the web]"

He recounted an anecdote to support this:

"It has arisen before with a planning application. I went in. 'What do I have to do'. I was sent to a room. A woman sat me down and got the actual papers out of a series of filing cabinets"

He also noted that he went to the local town several times a week, and given he was retired his pace of life was such that it would be an easy approach. This physical aspect was clearly important. Whilst being observed searching for family tree information he came across the home page of the local records office:

"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."

Subject A provided more direct evidence of the importance and effectiveness of existing search strategies. Having spent much time typing various versions of search terms into the search box of the web browser and finding no links considered worth following, he turned from the computer and looked to his shelf:

"No its downstairs"

He left the room and returned with a telephone directory and in a few seconds found the relevant whole page advert giving all the details of numbers for different council departments. He quickly scanned down the page and found the entry "Housing Benefit Enquiries". He then turned back to the computer and typed in this term as a search term together with "London Borough of ...". Apparently he was using the phone book, not to find the phone number or a web address (it did not contain one but he gave no indication that that had been what he was looking for), but to find out what the council called its housing department. It was thus an elegant, fast and relatively successful method of finding out about the government view of how their services were structured and so find the appropriate search term.

The fact that this information was found in minutes, including finding the relevant resource in the first place as part of a process taking far longer using the web to find equivalent information (the web address as opposed to a phone number) is indicative of how existing life learnt skills can be much more effective than apparently better, more modern approaches. In fact the information was found faster than the time taken to switch on the computer. Of course having a phone number or address may then lead to a much slower phase in comparison to the web of finding the actual information in that source. However, in this case had the phone book contained web addresses as well as phone numbers for businesses it is plausible that the whole process could have been much faster and less frustrating – using a paper local information resource to find the place to look on the web for the actual information. As a result of this observation, later participants were given a local paper telephone directory at the end of the interview and asked to show how they would find the information in it. All could find a telephone number within a minute or two, often searching in several places in this time before finding the appropriate place. This suggests that all retained sophisticated search abilities with resources they normally used.

Subject A also appeared to attempt to transfer search strategies from the physical environment to the computer. When typing in search terms, he first typed the council name. Due to a spelling mistake that brought no results so he added ", housing benefits" to the query. This gave no satisfactory results so he swapped the order of the search term to "Housing benefits" followed by the council name. In a local directory getting the correct ordering can be of vital importance and switching term orders is an effective thing to do.

Measures of Information Seeking Effectiveness
The most obvious measure of effectiveness of a search strategy would be speed at obtaining the desired information. Indeed this is clearly the measure used by subject B.

"I found it all [in parallel on the phone] before he got anything on the computer". However, by this measure the subjects seemed to rate the web poorly. This could of course perhaps be overcome with practice.

Other comments suggest that speed is not always the most important criteria. For example, C was happy to wait several days before next going into town. Whatever his personal measure of effectiveness it was not speed. This was reinforced by a later anecdote where he pointed out that he would not think of using directory enquiries to find a phone number but would instead wait until the next time he went into town when he would go to the library, as he had the last time he needed a number. There they had a full set of telephone directories, meaning he could look up the number himself. Being able to do it directly by manipulating physical objects, and/to talking to actual people seem to be an important factor. In a follow up interview subject C, claimed his main criteria for doing things the way he did was familiarity – he had a lifetimes worth of experience using physical libraries, card catalogue systems etc. He also noted that an important feature of libraries was that if you could not find something you could just ask the librarian. He finally noted that using physical approaches you gained a confirmation that whatever you were trying to do had been done, citing the example of a bank where a cashier would actually tell you "That's done", reinforced presumably by the fact that you could actually see them do it. He used ATMs for obtaining cash and phone banking when convenient. However, with phone banking he claimed he always went straight to the option of speaking to someone for similar reasons.

All subjects had a vague understanding that you could search on some criteria. Even subject G with no computer experience input a valid criteria as a search keyword having been presented with Google by the researcher. A total lack of computer experience rendered the use of the computer extremely difficult as they did not know the possibilities provided for example what search engines were available, how to locate them, or the importance of the URL. Beyond these conceptual entities are the problems of navigation. The windows environment offers its own means of moving backwards and forward through the search and scrolling up and down the page. Generally web pages offer their own navigational and hypertext facilities. An added layer of navigational complications are added when long pages require the use of the scroll bar. Without assistance for person G the navigation would not have been possible. Not only was the experience of traversing a virtual space totally alien but the physical requirement of holding down say a mouse to manipulate the scroll-bar was a huge barrier. Subject G's instinct was to try to move the scroll bar on the screen as this appeared physically possible – a whole hand movement rather than a finger depress as well as a controlled hand movement.
Furthermore physical inhibitions meant that though subject G recognised that an A-Z listing would for instance require them to access H for housing they didn't even try to click the mouse on it despite understanding at this stage what they should do. This person was also deeply attracted and diverted by the adverts which successfully drew on their attention.

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. The search concepts that link with users previous search activities, like a telephone directory's A-Z listing aid the cognitive processes required but the physical barriers and the modern culture of multiple activity on screen (adverts) appears to work against the requirements of elderly people with decaying physical abilities and for them is potentially a demoralising experience.

In direct contrast person F who frequently uses the internet located the requested information from an e-government information site in less than 5 minutes. This person was used to using the computer for word-processing and extensive internet searches and owned a computer. This is not the person who would be generally using a public facility for example in a library and it seems reasonable that such facilities will require a different approach.

Reasons for choice of Information Seeking Strategies
Subject C who would go to his local town to solve information seeking problems noted:
> "Some of this is I'm used to going to libraries. I've spent my life going to libraries. There must be 50 computers there now. I would not go to the computer first. I would go to the catalogue index and see what they had on the shelves in the stacks, but that's what I am used to. If I couldn't find it I'd go to the librarian 'I cant find this have you got it?' "

This would appear to support the conjecture that people with good information seeking strategies developed over their lifetime would naturally prefer to continue using those.

Libraries
One of the key strands of the government's approach to accessibility is to make internet accessible computer's available in public places such as libraries. Statements from subjects that touched on this suggested a certain amount of ambivalence.
In pre-observation interview subject E, who had no little practical computing experience and no computer at home, on being told that internet connections were available at libraries grimaced and pointed out that she did not want to make a fool of herself in public and expressed concern about breaking the computer.
Even subject C whose main information gathering processes revolved around libraries whilst noting there were now lots of computers in the library was not interested in using them.
> "Some of this is I'm used to going to libraries. I've spent my life going to libraries. There must be 50 computers there now. I would not go to the computer first. I would go to the catalogue index and see what they had on the shelves in the stacks, but that's what I am used to. If I couldn't find it I'd go to the librarian 'I can't find this have you got it?' "

As commented upon above, those with computers at home do not generally require this facility but it is those without computer access or experience that seem immediately worthy of further investigation – how can we make information, which they may be required to have access to, more accessible to them.

Losing track of location
Frequently the subjects lost track of which site they were currently looking at. Repeatedly adverts were clicked on and comments made by the participants suggested they believed they were still in the original government sites. This led to wasted time and confusion. For example, subject D started to fill in a form for information about mobile phones until they realised it was not relevant. They had clicked on a phone advert "More information". In particular subject G who has no computer experience found navigation almost impossible. If we are considering public provision of information sites, the problems of turning on the pc and possibly even linking to a search engine could be reduced but the navigation of virtual space and the conceptual underpinnings of the search need to be carefully researched.

Conclusions
All the participants showed a keen interest in learning to use computers to search for information, however in all cases even with help finding the information about housing

benefits was not trivial. The difficulty was not in finding the information once an appropriate web site was found, but in finding an appropriate site in the first place. Problems existed even beyond the obvious ones of lack of knowledge about basic things such as how to use a mouse. Such skills are not easily gained and certainly not without help. Suggestions that these problems are only with the current generation seem misguided. Several of the subjects had used computers as part of their jobs, including one who taught their use. The technologies had in the mean time 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. Problems with the internet contrasted with the use of telephone directories where the equivalent phone contact information was found almost instantly. This is consistent with the psychological research suggesting that such skills are retained even when gaining new ones is problematic. If user-centred design is really an aim then ideally ways need to be found for existing search strategies and skills to be continued to be used. This may mean supporting use of combinations of traditional information seeking approaches with internet based ones, rather that seeing the latter as a replacement for the former. Novel interface design that is based on traditional search strategies may also help. More research is needed in this area. Furthermore the subject's criteria for effective information searching was not just speed of access, as exemplified by the subject who was willing to wait till a next trip to town. Other aims are important such as getting out, socialising, and actually talking to humans. Such issues are vitally important if social exclusion and isolation is to be avoided. e-government can provide a vital additional source of information to older people. However it appears from this study that it is best seen as complementary to other sources of information rather than as a replacement. e-government strategies should work to this end if an aim is truly to serve the interests of this group of society. This study was only a pilot and as such is best seen as raising important issues that now need more detailed investigation, rather than giving definitive answers.

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