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Ageing on the Web: The role of the Web in supporting aged services

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Abstract

This paper reports on two recent studies in Australia that relate to aged services and the Web. Interviews with the aged and their carers about aged care needs in a regional area in N.S.W. (Wallace, Newton & Garbutt 2003) revealed that many older people (over 65 years old) were using the Web and e-mail to access information, education and to combat isolation. Access to information and services that would contribute to older people's independence for as long as possible, preferably in their own homes, was important. This study raised a number of issues regarding Internet access and the usability of the Web for the aged and their carers to access aged support services.

Based on the information requirements emerging from the aged care survey, some Australian Web sites catering for aged services information were surveyed and recommendations were made to inform better practice for their development. In particular, it is proposed that there is a need for improved dynamic contextualisation of these Web sites: the need to customise Web information for these users and to structure the Web site to provide relevant entry points and information in a number of ways reflecting different information needs and contributions. A 'one-stop shop' approach providing well contextualised Web sites that include the support of a maintained, searchable database of associated services in a regional format would provide a good basis for the aged and their carers accessing the Web.

Introduction

Research on the use of computers and the Web in relation to aged care services in Australia has been fairly limited. However, research into the opportunities offered by the Web to improve health access and quality of life for aged people (over 65 years old) living at home or in aged care residences is described including: telemedicine (Banks & Tongo 1999; Peterson 2000; Wilson 2001); online administration and financial management of aged services (Freaan 2001 [HREF5](#)); accessibility (Tay 2001) and creating friendship and support (Buys 1998; Barnett & Adkins 2001).

This paper reports on two recent studies in Australia that relate to aged services and the Web. From the first study (Wallace, Newton & Garbutt 2003) gaps in aged services information requirements and trends in aged Web use are discussed. These findings informed another study into how Australian Web sites are supporting the potentially growing need for the aged and their carers to access the Web for aged services information. These findings are reported in the second half of the paper. Recommendations for how the Web can best support information and access to aged services are then described.

Background

A recent community consultation study by Wallace, Newton and Garbutt (2003) of aged care gaps in a regional area in N.S.W. revealed that many older people were using the Web and e-mail for information and to combat isolation. Classes in computer and Web use, online learning and accessing Web information were being used enthusiastically to provide 'intellectual challenges' and mental stimulation: a 'use it, or lose it' incentive. While most of these aged respondents were living in their own home, the benefits of increased mental stimulation for nursing home residents using computers and the Web have also been documented overseas (Purnell & Sullivan-Scroyer 1997; Buys 1998; White et al 1999). One health worker mentioned the importance of providing new intellectually stimulating experiences for those with early dementia who 'need new ways to learn' (Wallace, Newton & Garbutt 2003). Purnell and Sullivan-Scroyer (1997) report on the benefits from using computers for nursing home residents with Alzheimer's and stroke. Further, the social contact provided by emails and interest sites on the Web 'opened the world' for respondents, particularly those limited by distance or mobility (Wallace, Newton & Garbutt 2003). Online social communities have also been

documented as important for older people for friendship and social support (Barnett & Adkins 2001; Leavengood 2001; Roberts 2001).

It also emerged from the Wallace, Newton and Garbutt (2003) study that the provision of information about aged services was inadequate. A similar community consultation process by the Department of Ageing, Disability & Home Care for the Northern Region of N.S.W. (2003) also found that 'Improved access to information' was a priority for older people and their carers. There was a demand for a wide range of types of aged services information including information about local social activities, community transport, accessing aged care services, residential accommodation, day care, respite care and specific health issues, such as dementia care (Wallace, Newton & Garbutt 2003). This demand also included a range of urgency levels in the provision of this information; including needs for information to plan for ageing from early retirement through to more specific emergency care services. This was also the case for the carers of the aged who reported their frustration in accessing information for their relatives or friends, especially in emergency care situations. They needed ready access to practical information about local services and where to go for further support.

To access information about aged services, respondents used their doctor and other health providers, friends, local newspapers or social groups, such as, day centres or special interest groups (e.g. Independent Retiree Group). Information about aged services was available after an emergency from health agencies (e.g. hospitals). However, there was a demand for support or preventative information before an emergency occurred, such as home modification services. There was also some reference made by service providers to the Commonwealth Government's Carelink phone service but there seemed to be limited awareness of this service by the aged respondents. In general, people were accessing less urgent information about aged services in a very piecemeal fashion, depending on contact with someone in their social circle.

Thus, for people living at home alone or those who do not access community groups, either by choice or due to the limitations of transport (which are considerable in regional areas), there could be further problems in accessing this information. Similar problems were reported for accessing banking, shopping and other business related activities. Both the aged care agencies' and the older people interviews indicated a lack of coordination in the provision of aged information and the services provided. This problem was also identified in a recent Australian report (Myer Foundation 2002 [HREF6](#)): 'there are problems with the availability of community and residential care and with understanding what is available' (p. 2).

Further, Naughtin (2002 [HREF7](#)) identified an under-utilisation of technology in aged services. In particular, this report identified the need for an 'assistive technology strategy' (p.1) to enable older people to remain in their own home longer and to reduce the pressure on community services. For example, to contribute to the development of new models of aged care in regional Australia, Curran (2003) describes the implementation of Internet technologies and Web-based services, along with cable TV, computer communications for telemedicine, and alarms in a proposed N.S.W. retirement village.

Thus, it is proposed that there is a demand for a more centralised approach to information provision that coordinates Web-based services with aged care agencies and the services they provide. In particular, there was a need for this information to be readily available to the aged and their carers, either to make decisions independently or in consultation with an appropriate agency. This need for independence is supported a claim by an Aged Care Australia Chief Executive (Hook 1999, p. 26) that 'the community increasingly express(es) a preference for greater consumer control over the entire spectrum of health and aged care services'. The term 'one stop shop' was proposed by respondents in the Wallace, Newton and Garbutt (2003) study to describe the need for users and providers to be able to access information and services from a single point or agency. Such a service also needs to include a local or regional basis, particularly in rural and regional areas, to reflect local needs and the provision of aged services.

This needs analysis study led the researchers to the consideration of the role of the Web in providing aged people with information to contribute to this independence. As the Web can provide entry points to information and aged service agencies, the usability of the Web for the aged and the relevance of Web sites to the information requirements indicated in the needs study were examined.

Can we expect a demand for Web-based aged care information?

It can be expected that these issues will become more widespread with an ageing population. In 1998

there were 2.3 million Australians - 12% of the total population aged 65 and over and the Australian Bureau of Statistics (ABS) suggests that in 30 years time this group will represent about 21% of the population and by 2051 to about 24% (Australian Bureau of Statistics 1998) (Figure 1).

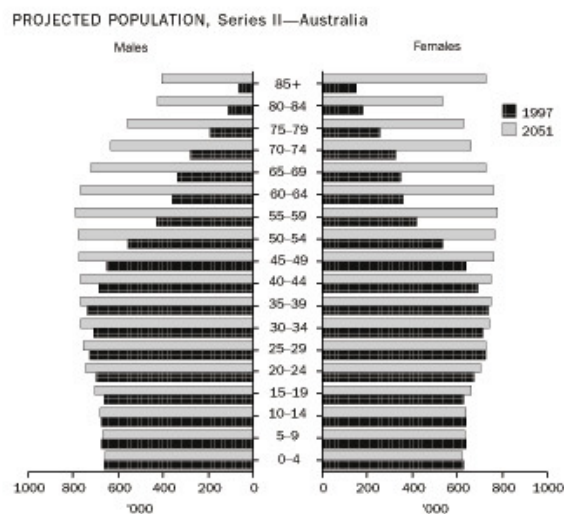


Figure 1: Population projection 1997-2051, Australia (ABS 1998, p.11)

Further, the percentage of people living alone, particularly women, increases in the older age groups (Figure 2). The role of the Web in encouraging social communication and activities for older people, particularly for women, was highlighted in an Australian survey by Barnett and Adkins (2001) who found that 'older women can appropriate computer technology to maintain their independence and identity' (p.23).

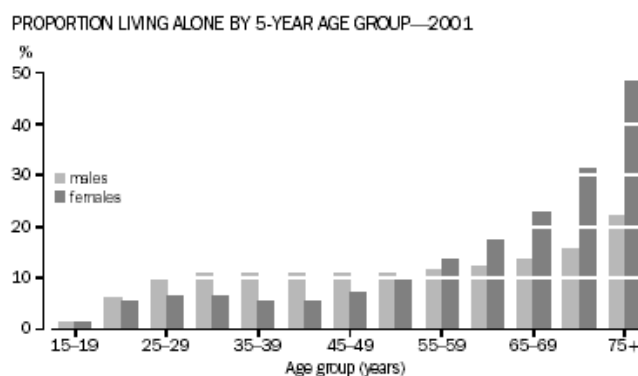


Figure 2: Proportion of people living alone by age (ABS 2002b)

ABS Internet access figures for adults (Figure 3) indicate an increasing level of Internet use, especially from home, for the adult population. The trend for older people to choose to stay at home (Hook 1999) and government funding to keep them independent at home raises issues of equity in access of the elderly to technology (Frean 2001 [HREF5](#)).

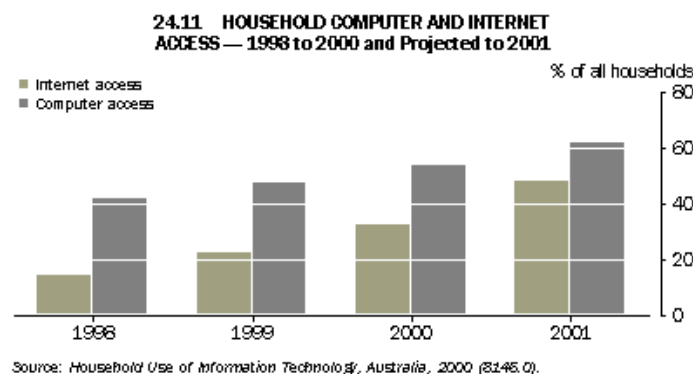


Figure 3: Adult Internet Access (ABS 2002c)

Further, Figure 4 shows that people aged over 45 years had the strongest growth in computer use for the adult age groups (27% over the two years to 2000) compared with 11% increase in the younger adult age groups. The 2001 Census asked for the first time about computer use and reported as a percentage of the total respondents: 14.2 % were aged 0-19 years, 17.9% were aged 20-44 years, 8.7% were aged 45-64 year and 1.2% were aged 65 years and over (ABS 2001). It is difficult to compare these figures due to the different sampling methods.

| Age group (years) | Number of adults | | Proportion of adults | |
|-------------------|------------------|------|----------------------|------|
| | 1998 | 2000 | 1998 | 2000 |
| | '000 | '000 | % | % |
| 18-24 | 1 555 | 1635 | 86 | 89 |
| 25-34 | 2216 | 2325 | 79 | 83 |
| 35-44 | 2076 | 2259 | 74 | 78 |
| 45-54 | 1456 | 1764 | 60 | 70 |
| 55-64 | 538 | 795 | 34 | 47 |
| 65 and over | 244 | 340 | 12 | 16 |

Figure 4: Adult computer use (ABS 2001)

The older aged groups are also increasingly adopting Internet use with the highest increase (20%) for the 45-54 years age group from 1998-2000 (Figure 5). The 2001 Census (2002c) did not ask for Internet use by age but there was a concentration of people using the Internet at home only (18.7%) with (5.4%) who had used the Internet at work only, and 3.8% who had used the Internet elsewhere only.

| Age group (years) | Number of Adults | | Proportion of adults | |
|-------------------|------------------|------|----------------------|------|
| | 1998 | 2000 | 1998 | 2000 |
| | '000 | '000 | % | % |
| 18-24 | 1048 | 1375 | 58 | 75 |
| 25-34 | 1297 | 1750 | 46 | 62 |
| 35-44 | 1005 | 1508 | 36 | 52 |
| 45-54 | 646 | 1199 | 27 | 47 |
| 55-64 | 198 | 439 | 13 | 26 |
| 65 and over | 37 | 179 | 2 | |

Figure 5: Adult Internet access (ABS 2001)

Thus, with this rapid adoption of computer and Internet usage in the 45-64 years and group it can be assumed that there will be increasing computer literacy and Internet usage in the 65 and overs group. It is proposed that associated with this growth will be a raised expectation in the aged community that aged care information will be available through the Web. Similarly, their carers in the younger aged group could expect that information to be available on the Web.

Given the convergence of these trends we assumed that there will be increasing interest in Web-based age service information. This raised many questions about Web site usability and the type of Web-based information and services that were being provided. As an initial research study, we investigated the usability and content of twenty-two Australian Web sites providing aged services information.

Methodology

Thus, our research question was: How are aged services best exploiting the Web to provide support for the aged and their carers?

The aim of this study was not to provide a comprehensive summary of available Web sites; rather it was to obtain an overview of the relevance and usability of a range of Web sites in relation to the information needs of the aged and their carers. Thus, the focus questions were:

- What are the types of Web-based aged services information provided in Australia?
- How do these Web sites provide relevant and usable information for the recently retired, the frail aged and their carers?
- What are the features of best practice for Web sites that support aged services provision?

A survey approach was adopted. Publicly available Australian Web sites were surveyed as this approach provided an efficient process to gain an overview of Web site features. An initial Google search ('aged care' Australia) retrieved over 100,000 sites. Frustration in obtaining access to Web-based information about aged services is highlighted by such a result. While browsing through these sites is a feasible way of obtaining information, it was more effective to approach the search from a service provider approach (e.g. government departments and their agencies) and searching for specific aged care support groups (e.g. dementia groups).

The twenty-two sites (Figure 6) were selected based on established criteria for evaluating Websites: relevance, type of source, accuracy, reliability of links and currency. The aim was also to obtain examples from different organisational types providing aged service information. These were classified as: community, government, commercial and peak body. This range reflects the range of approaches to information for coping with 'Life Event Stresses' outlined by Paietta (2000). While this is a relatively small sample, these sites provided an overview of the type and range of sites available with a convergence of findings occurring.

To gain further understanding of the types of Web site information being provided, these sites were further classified depending on the main purpose of the aged care information provision on the site. Although a site can have many purposes, the overall reason for providing information was determined from its content and structure. These were:

- organisational promotion - information about the organisation and its' function
- service provision - providing information about aged care services from the organisation and links to other services
- advertising - provides limited information about aged care services with most Web links linked to commercial Web sites
- database service - provides information about aged care services through a searchable database
- entertainment/general interest - an e-zine format

Within each of these groups there was variation in the structure of the information provision. For example, within 'service provision', some sites provided only Web links to other Web sites while others provided more information about aged services and relevant external links (e.g. community.gov.au). Similarly, 'database' Web sites provided searchable community databases and contact information (InfoXchange Northern Rivers) or provided support aged care information with the database (Respite North). Other sites included a searchable database within their site (e.g. aged care accommodation vacancies - Aged Care Queensland Inc).

| Organisation | Organisational type | Information purpose |
|---|---------------------|--------------------------|
| Aged & Community Services Australia HREF8 | community | organisational promotion |
| Aged Care in Victoria HREF9 | government | service provision |
| Aged Care Queensland Inc HREF10 | community | service provision |
| Aged Care.com HREF11 | commercial | advertising |

| | | |
|--|---|------------------------------------|
| agedcareOz HREF12 | commercial | advertising |
| Alzheimer's Australia HREF13 | peak body | service provision |
| Anglicare HREF14 | peak body | organisational promotion |
| Australian Dept of Health & Ageing HREF15 Office for an Ageing Australia HREF16 | government | services provision |
| Benevolent Society HREF17 | peak body | organisational promotion |
| Carelink HREF18 | government | organisational promotion |
| Carers Association of Australia HREF19 | community | organisational promotion |
| community.gov.au HREF20 | government | service provision |
| DAISI HREF21 | community organisation- information service | database service |
| Department of Ageing, Disability and Home Care-NSW HREF22 | government | service provision |
| Grey Path Pty Ltd HREF23 | commercial | entertainment/ general interest |
| InfoXchange Northern Rivers HREF24 | community | database service |
| InfoXchange Respite North HREF25 | community | database service |
| Seniors Information Service-South Australia HREF26 | community | service provision |
| Seniors Online HREF27 | commercial | advertising |
| Uniting Care NSW ACT HREF28 | community organisation | |
| Dept of Veteran's Affairs HREF29 | government- commonwealth | service provision |

Figure 6: Aged services Web sites use in the survey

However, this data collection approach makes the important assumption that someone looking for aged care information would have an understanding of the agencies involved. This could be a major hurdle for people looking for this information, particularly in an emergency care situation. It is also acknowledge that this represents a top-down approach to searching. That is, from the agencies to the aged services information. It is likely that people would search for an area of concern on the Web, such as, 'emergency care', 'dementia care' or 'nursing homes'. However, it is also likely that they would be directed to agency sites from such a search. It is proposed that a user needs' approach to Web-based age services information is more likely to be useful.

The researchers were not expert in aged care services but they had a general knowledge of the agencies and services involved from the previous study (Wallace, Newton & Garbutt 2003). Also, it needs to be acknowledged that the researchers were computer literate with considerable experience in searching the Web (although both authors are in the 45-55 year group-bordering on the target group!). However, this assumption cannot be made for potential aged services clients. Further research into user studies would assist in understanding how people search for aged care service information and how computer literacy is a factor in accessing these Web sites.

The sites were considered in terms of relevance to information requirements and usability. Based on the 'information requirements' that emerged from the Wallace, Newton and Garbutt (2003) study the Web sites were approached from the viewpoint of a recently retired person requiring planning for ageing information, a frail aged person requiring more urgent information and a carer.

These **information requirements** were summarised as:

- links in with the full range of local (or regional) aged care services;
- caters for emergency needs (e.g. respite care);
- caters for longer term planning for ageing (e.g. retirement home information)
- covers a wide range of health and social activities (which also relate to preventative health);
- caters for an individual's need for information and service provision (i.e. a case management approach);
- encourages independence.

The **usability** of the sites was also focus in this survey, Cooper's (1995) basic user interface design principles, 'hot, simple and deep' were considered. These are interpreted for this survey as:

- Is the site contextualised to the users' needs?
- Is the information distilled down into small easily understood blocks?
- Can the user easily drill down to access more detail information?

These principles were noted for each Web site examined in terms of the features that could assist or distract the user. From this initial analysis and consideration of aged services information requirements, features of best practice on the Web for aged services provision were suggested, along with areas for further research.

It was recognised that issues of accessibility are also very important. As the aged may have limited manual and visual dexterity, and limited computer experience (although this will decline as an issue over time), it is important that interface accessibility design issues are considered. Web designers need to refer to accessibility standards for the Web developed by the World Wide Web Consortium (W3C) (2003 HREF30). Research into accessibility for an ageing population is vital.

Results

By analysing these Web sites using the usability criteria and the information requirements some best practice features were determined. These results and recommendations are summarised under each of these criteria.

1. Usability Criteria

1a. Is the site contextualised to the users' needs?

These sites were selected due to their stated focus on the aged or seniors in their heading or home page descriptions. Some sites did not provide a description of their purpose or range of services on the home page. Novice users would need to know to go to 'About us' or similar links. This would be improved with a brief description of the purpose and structure of the site on the home page (Respite North). The main problem with contextualisation was the lack of discrimination between information relevant for providers of services and information relevant for the general public. There were some cases of inappropriate information being provided for the general public from general public entry points (e.g. recurrent funding for nursing homes).

Some sites used targeted menus for various users that provide an immediate relevant entry point (e.g. 'I am - an older person - a carer - a family member or friend of an older person' Department of Health & Ageing). This structure also encouraged the customisation of information relevant to different groups of users. This potentially reduces the guessing necessary on many of the sites about the appropriateness of the menu links. Providing discussion forum or chat areas allows the users to contribute to the site (Grey Path; Department of Ageing, Disability and Home Care-NSW). These discussions could be used to inform Web site owners of the interest areas and gaps in information provision or site structure.

1b. Is the information distilled down into small easily understood blocks?

Most of the sites provided menu driven links to either short descriptions of services or to further links pages. Except for the e-zine approach, most sites limited the amount of information on each page to short paragraphs with relevant headings. This would be particularly important if the user has enlarged the font on their browser, limiting the amount of text seen at once. A different approach, which could assist a user in locating information for a particular issue, was a focussed question/answer approach in the menu (e.g. Older Person-'Do you need help to continue to live at home?' 'Are you considering moving to an aged care home?'- Department of Health & Ageing). Linked to each of these questions is a short description of relevant agencies with further external links. This is similar to a Frequently Asked Questions approach that provides short case study questions and answers referring to relevant agencies and contacts (Aged Care in Victoria).

Some sites provided links to Adobe Acrobat PDF fact sheets. While providing a print friendly version, it would be useful to have Web versions of these documents, or summaries of them on the Web page. Providing Web-based fact sheets also allows linking to other relevant Web information and contacts.

Also a downloadable link to Adobe Acrobat with some explanation for new users would be beneficial.

1c. Can the user easily drill down to access more detailed information?

Linking text to other internal Web pages, external Web sites or email addresses was not always fully exploited. There was tendency to provide phone contacts for further information in many of the sites rather than providing more detailed information on the site (e.g. 'See the White Pages'- Aged Care in Victoria). Carelink is an example of this phone approach. It provides a 1 800-phone number and street addresses of Carelink centres for all further information. While providing these contacts is important for personal support, it tends to make the user dependent on the centre, rather than enabling them to initiate their information searching through appropriate Web links. The potential for a national Web-based information site could develop from the Carelink database and needs further investigation.

Providing targeted user menus and a related structure for the Web site enables the user to find deeper information if they need it. Consistency in this structure throughout the site can assist users to find more specific information (Alzheimer's Australia). Many of these sites did not provide this depth of information and instead used sorted lists of external Web site links. These lists can be useful as a reference index to services and agencies if sorted by appropriate subject headings or regional links with some annotation of their role.

There were examples of using graphical rather than text links for deeper information. Maps with clickable regions were used well on some sites for further information about accommodation vacancies or aged services (Aged Care Queensland). The InfoXchange Web sites use this dynamic map approach as an entry point for their database searching. This provides a geographical approach that is easy to use and could be very relevant in obtaining more detailed local information. Graphical links could also be easier to use for people with minimal typing ability, although the level of mouse control and download time would need considering.

2. Information requirements criteria

2a. Links in with a range of local (or regional) aged care services.

Most sites did not provide a geographical entry point. This could be a disadvantage for users who need access to local services. Links to other support agencies by region would also be useful (Benevolent Society). The government sites tended not to provide a regional approach with the Commonwealth providing some State information (Department of Health & Ageing) and State departments not providing regional information.

The most common geographical entry point was for aged care residential listings and vacancies (Seniors Information Service-SA; Department of Health & Ageing; AgedcareOz). Some of these provided listings with links to residential Web sites or further contacts. Others provided searchable databases with searches that could be limited by various criteria (Respite North). The data base information sites had a regional focus, such as Far North Coast NSW (DAISI; InfoXchange Northern Rivers; Respite North). This raises the issue of the importance of the maintenance of such databases and the need for cooperation from the various agencies to contribute current information to them.

2b. Caters for longer term planning for ageing and for more urgent needs

In general, sites did not focus on a planning for ageing approach. There were some fact sheets provided about planning for retirement (Respite North; Benevolent Society) and general health and lifestyle information. The aged residential sites that allowed searching for vacancies could assist with planning with the provision of a searchable vacancy date range. For example, Respite North provides many search limitation criteria for respite care requirements, including date required. This would cater for planned and emergency respite situations. Links to accommodation or services without this dynamic link could still provide contact information that the user can follow up if sufficient details of services are provided. Providing a 'last update date' was often missing. This alert notice is important to determine if the information is current for planning and emergency accommodation requirements.

2c. Covers a wide range of health and social activities (which also relate to preventative health)

This requirement was catered for through information about health issues or Web links to information outside the agency's immediate responsibility. This reflects the association of other activities with health and other interests of the aged. Health & Lifestyle links to other Web sites or fact sheets were common (Seniors Information Services; Department of Health & Ageing). There needs to be some consistency in the type and quality of the information provided within the sites for this more general information. This information could also be tailored and with entry points for different types of user (e.g. stress management for the aged or their carers-Alzheimer's Australia).

2d. Improves access to community and business services

The commercial sites tended to have a wide range of Web links covering shopping, finance and other business services (Grey Path; Seniors Online; AgedcareOz). Generally, this was not a focus on the other types of Web sites. However, the Department of Health and Ageing provides special interest pages from their Seniors Card link with Web links to Travel, Techno Seniors, Special Offers, an E-mail newsletter and an online Internet and computer usage survey. It also provided information about computer use and an interest group online area for seniors. The relationship between the provision of such online business links and online interests groups in relation to aged health and welfare needs further exploration. Further research into the usability and accessibility of business related Websites (e.g. online banking) for the aged and the relationship to their welfare (in relation to limited mobility) needs investigating.

2e. Caters for an individual's need for information (i.e. a case management approach)

In general, sites did not provide a structure that encouraged someone to explore their options for a particular issue. There was more of a focus on the agencies and their roles rather than providing entry points via problems that could arise and solutions. The targeted user menu used on the Department of Health and Ageing does contribute to this approach. However, there is a need for deeper information provision from these links. A deep information structure should lead the user to other information and information sources. The Alzheimer's Australia site provides this deeper approach that could help guide an individual through the information and the contacts to agencies to support those needs. Providing a range of options in a search could assist an individual with their information needs (Seniors Information Service).

Discussion forums on some of the sites also provide an online interactive opportunity to ask for information and to share it with others (Aged Care.com). This assists with existing communities (e.g. agency groups) and assists to create an online community for the aged. This information could be used to build a profile of information needs that could feed into the Web site development.

2f. Encourages independence

A well-structured, relevant Web site would allow a user to confidently explore their options for aged care services. Databases that provide current information and controlled searching (terms or conditions) could also encourage better decision-making. Discussion areas or chat rooms can provide the user with opportunities to participate in online information gathering and sharing. The social aspects and importance of these features for older people (particularly those living alone or isolated from families) also needs exploring.

Conclusion

Thus, this survey has highlighted the need for more consideration and integration of the needs of the aged and their carers in aged services sites. There were many features that contributed to the usability of these Web sites. Although many of these features would be common for all users, they are especially important for sites aimed at aged person access where unfamiliarity with computers and the Web could be factors. Similarly with information requirements, these concerns could be issues for other community information Web sites. The main issue was contextualisation: the need to provide 'special-purpose entry points' (Kupersmith 2003) for particular users and to structure sites to provide information in a number of ways reflecting different user needs. Agencies and government departments, in particular, need to discriminate between potential users of the Web site and tailor the content and structure of the information and the site appropriately. Providing a consumer needs (or problem based) focus for aged services information provision (bottom-up), rather than an agency focus would assist with this process. Thus, a dynamically linked Web site that provides information in

a number of ways or 'conceptually plausible views' (Staab et al 2000 [HREF30](#)) reflecting different users' needs would be useful.

People need to be able to understand, locate and contact aged services in their local area. Providing a combination of well-structured information targeted at particular users, with the support of a well maintained, searchable database of associated services in a regional format would provide a good basis for aged care information on the Web. A 'one-stop shop' approach where a central Web site links in with contacts to appropriate agencies and services is proposed as a model for the Web effectively supporting aged services provision. This would enable the user to be informed and to participate more actively in managing their quality of life.

This study has a number of limitations but also points to extensive areas for further research. One limitation is that the study has essentially adopted a top-down, provider model and sites have been analysed by the authors attempting to adopt the perspective of an aged person or their carer. A second limitation is that only a small number of relevant sites have been analysed. Thirdly, the more overarching issues of access and education have not been addressed.

Further research could examine sites from the perspective of the aged through engaging in an action research process with elderly people where trialing of site configurations could be analysed. Issues of physical access and egress to computer workstations could also be examined. A wider range of specific aged care sites and a large number of public access sites, such as those related to e-banking or medicine, could be analysed for aged-user-friendliness, including overseas sites. Issues of cost effective access by aged people to computer facilities, design of aged care facilities to accommodate an e-environment and economical learning and development programs could also be examined. This is a growing area of research as the population ages. We all have a vested interest in making this a robust area of enquiry! Exploring options for using the Web to support aged services in the future requires creative thinking that challenges existing forms of information and service provision.

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