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Abstract

To address the challenge of an ageing population in an information society, it is important to introduce information systems to assist the aged people in maintaining and improving their quality of life. An understanding of what information aged people need, how they seek and use information, and how they adopt Information and Communication Technology (ICT) is required. This paper reports the findings of an empirical study undertaken in Australia to understand the information needs of senior citizens who reside in the community. The study aims to understand how ICT can support the independent living of senior people in the community from both the social and health perspectives. We offer a new understanding of the information needs of aged people in the community and extend the information systems research in aged care. This research also contributes to the development of innovative ICT enabled aged care service solutions in community aged care.

Keywords: Aged Care, Health Informatics, Information needs, Information behaviours.

BACKGROUND AND RESEARCH OBJECTIVES

The motivation of this research is to improve social connection and support healthcare (especially self-care) amongst the senior citizens in the community through innovative Information Communication Technology (ICT) enabled solutions. In the context of an increasing proportion of older Australians in the population this research investigates the opportunity of adopting ICT enabled solutions to improve aged care services for the elderly who reside in the community.

Recently, there has been a substantial amount of research confirming demographic shifts in the Australian population with such studies reporting an increasing proportion of older Australians in the population (defined as individuals aged 65 and above) (Access Aconomics Report, 2008; Singh, 2008). Indeed statistically controlling for increased population growth (for a review of patterns of migrations among older age groups cf. Baldassar, 2007) reveals that the number of older Australians is increasing at a greater rate relative to increases in other age groups. Additionally, recent prospective research suggests that this trend is increasing with ABS data indicating that the number of Australians over the age of 65 will double by 2051. Such an increase means that this demographic would account for over a quarter of the Australian population (Australian Bureau of Statistics (ABS) 2002).

Although the vast majority of Australia's population (and hence population growth) is confined to major cities (approximately two thirds; cf. Deacon, 2000; Australian Bureau of Statistics, 2008) there are a growing number of older Australians who are located in regional and remote areas. Older adults in regional areas pose unique challenges and difficulties in terms of the provision of community based care – a factor largely resultant from greater physical distances.

Older Australians that reside in the community are supported by the Australian aged care planning framework which is administered by the Commonwealth Department of Health and Ageing as set out in the Aged Care Act 1997 (Cth). Each year new aged care places are available to service providers, such as Villa Maria, through the competitive annual Aged Care Assessment Round which comprises packaged care in residential and community aged care. Service providers deliver support, referral and

co-ordinating of specialist care services for care recipients and carers via professional care staff such as case managers and resource consultants.

Whilst studies have consistently shown that the elderly prefer to stay at home, often largely due to their proximity to family and community support, the recent emergence of ICT enabled web technology such as sophisticated web based video telephony systems has the potential to allow them to keep in contact with family. This technology could be usefully adapted in particular to the cases of the elderly from remote and regional communities. In such cases, this technology could make the transition to residential care facility in a larger community more appealing. This technology could also make such a transition less difficult by providing social support for community aged care recipients new to long-term residential care settings (in terms of acting as a buffer again possible depression). Supporting this argument, a recent feasibility study (Dow et al., 2008) found that in a sample of older carers (mean age = 65.5 years) reported a reduction in self-reported depression and loneliness following a three month trial of computer based communication. Additionally, they found that although the participants reported low computer confidence at baseline, self-reported confidence in computer use had increased significantly by the end of the trial. While this study did not trial the intervention in an aged care setting, its results are nevertheless promising and warrant further investigation in this area.

As described above, the population is ageing, and ICT adoption can be seen as a vehicle for improving services in aged care. It is important to understand information needs and ICT adoption of aged people in order to support their everyday, social, healthcare activities and thus improve aged care quality. The findings reported in this paper comprise the first phase of a larger research programme to investigate information, communication and social needs of the aged people in the community, and develop an intervention framework to increase social inclusion in aged care community services.

This paper describes an exploratory study of the first research stage. It offers:
- An understanding of information needs of the aged people in the community and their current ICT use and attitude toward ICT adoption;
- A discussion on technology adoption and barriers and opportunities; and
- A conceptual framework for further research investigation centred around service implications for service providers.

INFORMATION NEEDS OF AGED PEOPLE

The theoretical foundation adopted in this study is one proposed by Wilson (2006; 2000) to study human information needs and behaviours. According to this theory, information seeking behaviour is triggered from physiological, socio-psychological, and cognitive needs as perceived by the information user. The information user may seek information from different sources, for example information systems or people. Information can be used or transferred. Wilson (2006) especially stressed the importance of studying the users' information needs and that such needs are embedded in the user life world, the user him/herself, his/her role (e.g. job tasks, care needs) and the environment.

Information needs of care recipients and carers

Logan and Tse (2007) synthesised various concepts from information needs, information behaviours, and health informatics (Wilson, 2006) from which they derived a framework to understand consumer health informatics. The framework comprises five main components. The central components include consumer information needs and behaviours, information channels, and information sources and are placed within a macro-environment or global context of socio-cultural and economical factors. The fifth component is the outcome focusing on quality of health and healthcare. This framework can be applied equally to aged care people in the community and carers, with the outcome focus on quality of life for both.

There also exist conceptual models which are useful to understand the information needs of health consumers as information users. Adams and colleagues (Adams and Blandford, 2005; Adams et al., 2005) developed an patient information journey through four empirical studies in two domains of healthcare and academia. Their patient information journey model consists of three stages of information initiation (i.e. information need recognition), information facilitation (i.e. information search), and information interpretation. These authors also pointed out that family plays a role in all these three stages of the patient information journey. Nguyen and colleagues (2008) conducted an in-depth case study in chronic cancer care and extended the information journey model with an additional

stage called information sharing. The family carer not only searches for and uses information; he/she also creates and shares information content, personal reflections, emotions, and experiences with other patients, carers and doctors. Therefore, the family carer can also be seen as an information source. The family carer's information journey is continuous and dynamic. His/her information needs evolve over time and are grounded in illness progression, care needs, carer's on-going and ad hoc learning, and family and socio-cultural context. Both the patient information journey model (Adams and Blandford, 2005; Adams *et al.*, 2005) and the family carer's information journey model (Nguyen et al., 2008) can be useful in investigating information needs in aged care.

Information needs of aged people

Williams and Asia (2009) criticised the dearth of studies in the information needs and behaviours of the elderly. Regardless, a large survey by Barratt (2000) had shown that this segment of society needs access to everyday practical help and contacts for information, support and advice. The important role of carers as information seekers was also highlighted and, indeed, the study served to raise public awareness. The role of IT/IS, however, was unfortunately, not considered.

With a view to understanding information behaviours of the elderly, Williamson and Asla (2009) conducted two major empirical studies consisting of a series of long interviews with over 200 elderly people in Victoria, Australia and an ethnographic field study with a retirement community in USA. According to their findings, aged people tend to acquire information incidentally rather than through purposeful or formal information seeking and that their range of information topics of interest tends to be narrower compared to that of younger people. The authors explained that their incidental information acquisition and a narrow range of topics of interest were due to age factors (physiological and cognitive losses) rather than loss of interest. Mass media and social engagement were found to be important in information dissemination and acquisition for aged people. There are several important implications. First, improving social connection for aged people and engaging them in social activities can support their incidental information behaviours. Second, ICT and the Internet can offer benefits in addressing their information needs. Third, as family carers can act as proxy information seekers, their information needs and behaviours should also be understood and supported.

Internet adoption barriers for health consumers

There are recognised and documented barriers in the adoption of technology by health consumers. Keselman et al. (2008) described numerous barriers including accessibility issues, lack of ICT skills, trust, security and privacy concerns when communicating with others using information on the Internet, limited understanding of public health information needs, complexity of health information content, multiple information sources, and a number of information channel issues.

According to Czaja (2005), aged factors, such as problems with eyesight, hand-eye coordination or loss of memory and some cognitive abilities, can be seen as additional obstacles for aged people. It is important to note that technology skills are not simply based on chronological age (Czaja, 2005). Having reviewed various consumer health informatics technologies in relation to supporting aged people with chronic illness, Nguyen (2010) concluded that aged users are sensitive to interface design and information content which if designed appropriately can support their information needs and information behaviours.

Synthesis

There are two well-recognised social demographic and technology phenomena: the ageing population and the pervasiveness of ICT innovations in many aspects of life. Community aged care is an emerging practice in addressing challenges introduced by the ageing population. It refers to aged care services for people who wish to maintain independent living in the community as long as possible. The technology pervasiveness phenomenon suggests an opportunity to support and improve community aged care through the adoption of technology. Our review of the literature in this section points out a gap in achieving this: consequently a good understanding of the information needs and perceptions about technology adoption of aged people is required. Three important observations emerge:
- The information needs of aged people who live at home can be understood as embedded in their care needs and their 'life world' (Wilson, 2006).

- Information behaviours can be understood through recognising information needs, searching, interpreting, and sharing. The information environment, including information sources and channels, will also need to be identified in the user's life world context.
- A good understanding of the aged people' experiences and perceptions about technology is important in identifying opportunities and barriers in technology adoption (Keselman et al., 2008), subsequently in introducing information systems to address the information needs and to facilitate information behaviours of the aged people in the community.

RESEARCH APPROACH

Research method

A study was conducted to explore and identify the information needs of aged people living at home in Victoria. The focus group research approach was used for this exploratory study. "*A focus group can be defined as a group interview - centred on a specific topic ('focus') and facilitated and co-ordinated by a moderator or facilitator - which seeks to generate primarily qualitative data, by capitalising on the interaction that occurs within the group setting*" (Sim and Snell, 1996, p. 189). Qualitative data generated though a focus group is both useful and relevant and enables researchers to explore the attitudes and opinions expressed by the participants and gain an in-depth understanding of the topic under study from the participant perspective (Sim and Wright, 2000; Pope and Mays, 2006). Focus groups have been widely used in healthcare research (for example see Powell and Single, 1996; Sim and Wright, 2000) as well as in information systems research (for example see Lichtenstein and Swatman, 2002; Cybulski *et al.*, 2003).

Research design

The focus group included three aged care recipients, four family carers, and three professional carers, and took place in September 2009 in Victoria. Except for one couple of husband (Care Recipient) and wife (Family Carer), all the other family carers and care recipients were not involved in a care relationship. The care recipients were in their mid 60s to early 80s. Three of four family carers were aged people themselves. The care staff shared their understandings about care needs and the information seeking of their clients including care recipients and family carers.

The focus group was a spontaneous and interactive exchange of ideas between the participants during a period of 2.5 hours excluding a tea break. The first session (before the break) focused on the care recipients' and carers' life world (daily living, social and healthcare activities) and their associated care needs and information needs. The second session (after the break) focused on their perceptions about and experiences with ICT adoption. The focus group was facilitated by an experienced researcher-moderator who maintained a personal impartial view to all discussed questions and yet he was able to lead a stimulating and actively engaging discussion. At times, there were emotional moments when the participants shared their strong feelings and personal experiences. As a result, a useful source of qualitative data was generated.

The flipchart notes generated during the session were presented to the participants at the end of the focus group and participants were invited to provide feedback and give additional clarification. The focus group session was audio taped and transcribed. Observation notes were made by the observer-researchers. All the audio files, transcripts, flipchart and observation notes data were collected as qualitative data. Qualitative data analysis methods employed include condensation and thematic analysis (Kvale, 1996). The data were read thoroughly, summarised and coded through several analytical cycles. Emerging themes and their relationships were identified, discussed, and evaluated by the research team.

Ethical considerations in this project include: privacy; depression and anxiety; and organisational issues and conflicts. The project adhered to NHMRC standards of ethics in research where the identity and privacy of the research participants were protected using pseudonyms and a secured storage for research data was in place. Participation in the project was voluntary and research participants could revoke their consent for participation at any time. Pseudo-names are used to protect the participants' identities.

The outcomes of the exploratory focus group provided directions for further in-depth data collection and analysis. Almost all the focus group participants were subsequently interviewed on an individual

basis. Their interviews, together with more interviews with additional participants, formed six in-depth case studies to develop a richer and more detailed understanding of the information and communication needs and behaviours of the aged people in the community. This paper reports findings from the focus group in terms of information needs of the care recipients and family carers.

INTERPRETATION OF FINDINGS

Information needs for daily living, social activities, and health self-care

The information user's life world

Most activities of aged people and their carers are home based. All participants live with their partners and one of them lives in an extended family with their daughter's family. Their usual activities include daily chores, such as cooking, washing, shopping and personal care; providing healthcare for the care recipients; house maintenance, such as gardening; entertainment, primarily TV watching; dog walking; and hobby related activities, such as craft and stitching. All four family carers do their housework and provide care for their care recipients. A family carer described his daily activities: "*I do all the cooking for instance and things like that and all the washing and all those general type of things that happen in the house*" [FC.3]. Depending on their health state, their care recipients' activities range from "*I watch TV a lot as well as sleeping… I just fall asleep*" (CR.1), to attending Tai Chi and hydrotherapy classes mainly for the health purpose (CR.2), or going out and visiting friends (CR.3). Many participants shared a common interest in dog walking. To them, dog walking not only provides emotional attachment but is also an important social activity. "*Over the last couple of years I've lost two of my bests friends and they've died, and it's left a huge hole in my life, so my dog people are very important*" (FC.3). This highlights a need of aged people to stay connected with their preferable social groups.

The participants described a common picture of their limited social circle including their (extended) family, old friends from work, a dog-walking group, hobby-related group, and a men's shed or carer support group. Social activities of the participants often take place in a cafe, restaurant, or a local park. Due to their care needs, carers often drive or arrange transportation for their care recipients to healthcare and aged care providers, and support groups. Compared to the care recipients, the carers have a more active social life and connections outside their family thanks to their better health. The participants' connection to a wider community was very limited. Only one female participant described her involvement with a wider community. She is an aged person and at the same time a family carer for her husband, a stroke patient of 14 years. She is also involved in annual exam supervision at a secondary school.

Personal healthcare is a common theme amongst all care recipients and carers. Almost all participants have one or more chronic conditions to some extent. Their activities include both home based exercises and medication as well as regular visits to their GPs, healthcare specialists, and aged care service providers. Stroke patients and their family carers experienced physical as well psychological difficulties. One couple told their story of how the husband's massive stroke about a year ago created a huge, sudden impact on their life. "*We lost our life together*" [FC.1]. The husband described his fear of falling and of being left alone at home after the stroke. This couple are still trying to learn and cope with the dramatic change in life. Two other family carers also shared their feelings of depression, weariness and helplessness in looking after their husbands, stroke patients, for a long period of time. Clearly, carers have their own care needs.

Information needs, information behaviours, and information environment

Overall, the information needs of both the participating care recipients and family carers are reflected in their life world. Their common information needs of both the care recipients and carers range from daily living (news, weather, housework), personal interests (entertainment and hobby), to social and healthcare information. However, carers specifically require care service information to arrange practical care for their recipients and themselves (as carers).

The information environment of the both types of participants tends to be informal and home-centred with primary information channels being face-to-face, telephone, and television. They receive most daily news and some interest-related information from the mass media, primarily television. Face-to-face and phone communication are their main ways to proactively seek information from various

informal, semi-formal, and formal information sources, such as family, friends, care staff, care organisations, hospitals and local communities.

Compared to other information behaviours such as interpretation, evaluation, and sharing, needs recognition and information seeking were more frequently reported by the participating carers and care recipients. A number of factors were found to influence their information behaviours. Although the information needs of participants are embedded in their everyday life, social and care needs, they may not necessarily be recognised or well formulated. This results in difficulties in expressing information requirements, for example, FC.2 stated: "*Because we don't know the questions to ask*". Based on the participants' stories, the information they received from healthcare providers and local councils largely comprised contact details, which although numerous, were hardly practical. A family carer shared her thought "*I know the help is there, possibly because I personally am reluctant to ask*" (FC.1).

Different expectations between the information seekers and human information sources can also be seen as an issue affecting carers and care recipients' information seeking. The care staff expected that their clients act upon the information provided by them: "*it's a little bit frustrating from our point of view because we know there is carer support there and I think it's just us giving the information*" [CS3]. Their clients, especially their family carers, expected immediate care solutions rather than information to develop a care solution. FC.1 assessed: "*Overall in all services across the board what I experience is that I have to think of something and ask. Is it possible that we see this person or we need a referral to this? … why is it that I have to think?*". The lack of information seeking and particularly information integration from multiple entities (care staff, health care providers, carer support groups) as separate information sources (and separate care providers) is a demonstrated problem.

As indicated above, the limited life world, social circles and engagement of all participants affords only a limited range of information sources. Indeed, social circles and social activates were found to be useful, even essential, in facilitating information acquisition in aged people (Williamson and Asla, 2009). Their lack of time and space for entertainment (see also section 4.1.1) and practical difficulties in participating in social activities lead to limited opportunities for information acquisition and dissemination. For example, referring to her interest in gardening information, a family carer said: "*I never have time to carry it through. But recently my main worry is that I don't spend enough time with the dogs. I spend a lot of time with my husband who has a lot of mental behavioural problems, I feel I am losing the ability to talk to people*" [FC.2].

It is self-evident that people's social needs are complex and even contrastingly different. In this research, carers specifically described a need for shared understanding from people in similar situations as well as a desire to socialise with 'normal' people. Carer support groups were found to be a good source of support information and shared understanding, and a place to share experiences and emotions. One carer stated "*…it's a great comfort to share what did you do when such and such and that's when the carer groups, and I don't know, I don't feel bad when we talk about problems at the carer's group*"[FC.4]. The family carers and care recipients said they wanted to meet with people in similar situations for empathy and understanding. A care recipient received practical assistance from another stroke patient. He explained, "*because he suffered the same thing*"[CR1].

While carers need shared information and support from other carers, as mentioned above, they also want to mix with 'normal' people. This was illustrated, firstly, by a couple who missed the previous life they lost after the husband had a stroke. He recognised that: "*She missed the girls, the gossip*" [CR.1]. And secondly, by the general view of family carers who shared their feelings of exhaustion and depression and their desire to mix with 'normal' people and talk about 'normal' topics. *FC.3 stated "they offer a lot of carer stuff which I don't go to for the very same reason that you don't go to, that I really don't want to talk about that stuff, I'd rather have time with normal people…"*

Such different social needs add a difficulty for the carers in identifying different sources of information and help, and approaching them for different care needs. FC.1 shared her frustration: "*Nobody can help me, that's the thing that I said to the family or myself more often, I find some comfort as well saying to myself nobody can help me, that's my problem, nobody can help me, so get on with it, and start again. But I (now) realise that there is a place for the carers' group that can help me.*"

While health and healthcare were an important aspect in the users' life world (see section 4.1.1), the participants' health information seeking is rather reactive. A lot of emotions, anxiety and depression are associated with their health condition and healthcare. The family carer looking after her husband for over 14 years was depressed: "*There is little left of me*" (FC.2). The relatively new stroke patient

shared his depression and helplessness in seeing himself as "*the one that got the stroke and put the whole family into hassle but it's not much I can do about it*" [CR.1]. His wife was also anxious: "*I am now going into the shock of thinking this is going to be our life forever*" [FC.1]. They needed help and information: "*We discover slowly, slowly,… the progress and difficulties*" [CR.1]. Although they were given contact details upon discharge from hospitals, they did not proactively make use of the information. At present, they receive physiotherapy and respite care from a care provider. Several participants described limited support from local councils and GPs. They relied on calling 000 in emergency. One care recipient seemed to show more active information sharing behaviour compared to other participants: "*get together in someone's private home and talk about our cases amongst themselves and what we can do and that was our outlet of communication with likeminded people who cared for and we fed the information from one to the other*" [CR.3]. As the social circles, health states, healthcare and aged care needs of the participants vary, the factors that influence their information behaviours will be studied in more detail in subsequent case studies.

In summary, the care recipients and carers had difficulties in recognising their information needs and identifying information sources. Their information skills and information environment were also limited and informal. Opportunities exist to extend their information behaviours and channels, for example through social engagement or accessing information sources using ICT-enabled solutions.

Technology adoption opportunities and barriers

Technology is both an enabler and a frustration to the carers and the care recipients within the focus group, and even well tried and accepted technologies such as mobile phones prove vexatious. As one carer stated: "*I don't like to use my mobile, I use it because I have to*" [FC.1]. The age profile of the focus group participants is such that they have grown up without ICT and may or may not have encountered it in the workplace. All carers and care recipients are retired and part time work is a rarity so any current usage of computers is home based. The cognitive problems of learning the "*new technology*" for such a group are considerable and the results mixed. Those who have encountered computers in their former employment have an advantage but in itself the experience so gained only partially translates to the operation and maintenance of the home computing environment. In the worst case carer FC.2 simply does not have the confidence to start. In reference to both the knowledge required and the cost incurred FC.2 stated "*So it's twice as hard for me to get started, I mean the whole things sounds terrible!*" On the other end of the scale FC.4 is brimming in confidence. When asked about the learning process she stated: "*I don't have problems with computers or anything new… I basically teach myself*" and the method of doing is this that: "*I just Google and help and all the rest of it*".

The median case, however, belongs to a range in which the carer or care recipient struggles to keep abreast of the technology. Generally this is due to change, reflecting the ever constant development speed of the cyber environment. "*I learn one way, now with the Apple you have to learn the other way and that's where the worm is in it or the bug is in it, it still keeps up what I had learned before and I am not a youngest one so I am forgetting things, even if it is written down it doesn't make sense to me, I just can't get in, so*" [CR.3]. A family carer thought that even lessons were of limited value. "*You take all the lessons but if you don't use it, you don't really learn what you have been taught*" [FC.1].

The avenues for assistance are also limited. For example, in trying to resolve issues with Apple technology CR.3 contacted both the local council and the local newspaper, only to be given a person's name. The outcome of this assistance was that the name provided was difficult to contact and additionally reluctant to provide the assistance that she required. In other cases where professional help was perceived to be beyond the time, financial or personal capacity of the user, family assistance plays an important role. Most families comprise a measure of computing expertise which is theoretically but haphazardly available. In the worst case this may be simply confidence draining. A family carer related "*we changed providers and the connection wasn't working*" only to be told by her son "*mum, you're main problem is that you reject technology, you just don't want to understand it, you don't want to learn it*" [FC.1]. At the time that this focus group occurred, the computer in question was still out of commission. As CR.1 stated "*One of my older sons is IT right… and he said don't worry, I look after the machine or the computer, we're still waiting*". At the other end of the spectrum when CR.3 was asked how she learnt the computer she briefly replied: "*Children showed me*".

Even within this limited focus group, there is not only is a realisation that the computer is an essential tool in general living but also a surprising level of expertise. The various uses of the computer

comprised communication, information seeking, business and entertainment. Email communication is considered essential to those who have overseas relatives. A care recipient, for example, stated that "*I send emails to my friends, also get any information I require on Internet. If I have some medical problem or I want to find out something about something or something like that I get it on the Internet*" [CR.2]. In the realm of business FC.3 stated that "*Banking would be my most crucial [application] in fact I pay all my bills for instance on the Internet*". The strength of opinion within the group reinforced the notion than the computer and the Internet are, or will be, an ever-increasing necessity with modern life. The reasons are several. FC.4 states: "*actually to me it is crucial because I actually have my social life on it…Because I don't have an outside social life, I play games on Facebook and things.*" In fact social networking is very limited and was confined to this single participant. Yet this case might be considered as a complete contrast to FC.2's dilemma: "*my children tell me I've got to get into the Internet but I can't face the thought of trying to learn*".

The issue of cost was of concern to some of the group. Family carer FC.3 commented on the cost of Internet connection and the possibility of financial assistance stated that "*The connection's not cheap either. When you are on a limited income, makes a huge difference, that could certainly be helped, they could help you with that*". Another family carer mentioned cost in relation to the technical support mentioned above. The issue in this case is more complex. "*Do you know what would be good perhaps is to have technical support, technical support would be good, because it would cost money when you do it privately so like in your case, that you have a problem and you don't know what to do, you have a place where you can ask please do it on the phone it's just so difficult on the phone, they can come and see your problem at home and give you an hour where they can resolve the problem or tell you what to do, I was just thinking what would be technical assistance would be perfect*" [FC.1]. Other participants also commented on the difficulty of understanding technical jargon. Another participant stated baldly "*Yeah speak another language*".

Certain members of the group expressed concern with issues of trust, security and privacy. FC.3 said: "*I think the biggest worry out there though is viruses and I'm, you know if I see an email there that I don't know who it's from, it gets kicked straight out*". Only FC.4 volunteered that she had bought anything over the Internet and was, in fact, very relaxed about it "*Yeah I do all the time*".

A wide variation in sophistication and resources exists within the group. Taken as a whole, however, there seems to be little argument that the speed of change and the technical support to sustain it are issues of major concern. Education and cost are related concerns, and trust, security and privacy, although subject to some discussion, seem to be rated as of lesser importance.

DISCUSSION, CONCLUSION AND FUTURE RESEARCH

Contributions to Information Systems research

The themes that emerge from this empirical study contribute to information systems research in several ways. First, ICT systems that are designed to support the information needs of senior citizens should not simply provide information about medical conditions, clinical care and contact details for support services. Information is often acquired incidentally within informal social processes and in the context of social interaction and from the mass media. Many senior citizens and their carers do not know what is available and also do not know what to ask for. They want solutions to their particular problems rather than general sources of information. Support systems should be designed to fit within this context. Our findings support the findings of Wilson (2006) that a primary driver of the information needs of aged people is derived from their care needs.

Second, there is a strong need for social connection with other senior citizens, carers and also the wider community. Sharing of information, understanding and emotions amongst communities of carers is particularly important. However, the need for connection to the broader community (to those with a 'normal life') is also important. Support systems must take these requirements into consideration. This point is consistent with the findings of Williamson and Asia (2009). A follow on from this is the actual awareness of carers and service providers to actually engage with aged people around their information environment, their information sources and channels. An implication for service providers may be to examine how they currently capture the information sources and channels of their clients.

Third, there are a number of significant barriers to the adoption of ICT based channels for information needs and social connection. These include cost, accessibility and the skills necessary to use the

information systems. Many aged citizens have limited knowledge of ICT systems and considerable fear in using them. These barriers are consistent with Keselman et al. (2008) and Czaja (2005).

In addition, the research questioned the very assumption that current human-computer interfaces are appropriate for all. There would certainly be merit in engaging with aged people, the computer industry and industrial/computer design architects to review the human-computer interface with a view to developing a simpler, integrated and more cost effective device that provides Internet, television, DVD and multi-media like services (Nguyen, 2010).

Service Implications

From a practical perspective this paper has identified service development opportunities for service providers in aged care. Aged care providers can ask themselves:
- To what extent do they provide their services to their clients via ICT based solutions?
- What opportunities exist to communicate with packaged clients and carers via ICT solutions?
- What assessment tools do providers have to assess the capacity for current and future clients/carers to use and be supported by ICT based solutions?
- What tools do providers have to assist clients with identifying information needs and information seeking?
- How do service providers train professional care staff to be aware of the external issues outside the provider-client model? and
- How do service providers assist carers' connect with 'normality'?

This paper has identified opportunities to integrate social and self-care components in community aged care by introducing ICT solutions within care packages to support information needs and subsequently social and self-care needs. These finding have implications for the current Australian aged care-planning framework. We would submit there is merit in reviewing current government funded community packages with a view to increasing the dollar amount of packaged care to assist in providing ICT based services, training and support to aged care citizens. Conversely, there may be an opportunity for service providers to conduct feasibility studies into offering privately funded ICT solutions for this ageing demographic.

In the context of trust and continued ICT support for aged care people, there is the possibility of exploring the establishment of a 'Senior's ICT Support Service' where senior citizens provide direct support to aged people seeking information on the Internet. Such a service could be linked to current Commonwealth services community service providers.

Future directions

There are a number of directions for future research. First, how can we design support systems so that social connection is enabled and information needs are provided to the senior citizens and their carers? Second, how can access and training be provided to senior citizens and their carers for effective use of ICT systems? A more integrated model could be explored to match information needs of aged people and the types of support provided. Such a model could initially be piloted on a small scale and include Local Councils, General Practitioners, Hospitals, Service Providers, Allied Health Providers, Carer's and Care recipients all working together via ICT enabled e-health solution. There is a strong need for intensive research studies using ethnographies to better understand how best to provide support and training for their incidental information acquisition through participation in social interaction. Furthermore, intensive studies of the use of prototype ICT support systems need to be undertaken. Finally we would submit that a larger study of this kind is warranted with a view to generating a deeper understanding of the information needs of the wider ageing demographic.

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