

**INVESTING IN E-HEALTH: PEOPLE, KNOWLEDGE
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Investing in E-Health: People, Knowledge and Technology for a Healthy Future

Selected Papers from the 22nd Australian National Health
Informatics Conference (HIC 2014)

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Preface

Around the world the healthcare industry is embracing information technology (IT). Historically the use of IT was administrative, financial, or statistical. Now it is transforming the way healthcare does business from the bedside, into primary care and patient and carer information management. As a part of this exciting change the Health Informatics Society of Australia, with the active support and involvement of the Australasian College of Health Informatics, is excited and proud to be active contributors to extending knowledge and understanding of these changes and the opportunities associated with them. The Australian National Health Informatics Conference (HIC) series of meetings is the largest national event of this type in Australia, with a dedicated scientific stream on health informatics. HIC provides a valued platform for academic and research contributions and interchange as well as industry updates and innovations.

The HIC 2014 theme of ‘Investing in e-health: People, knowledge and technology for a healthy future’ emphasises the journey being made in healthcare. As healthcare organisations and government projects look to information technology to capitalise and enhance healthcare the need for investment is clear, but where to invest, how to define success and understand opportunities and risks in this time of change are key issues. These investments extend past the technology required to provide infrastructure for the future. Investment is also required to enable the building of people, skills, careers, and professions to support and develop this infrastructure in a cost effective and clinically safe manner and lead change management. This e-health enabled healthcare environment offers faster and more wide reaching knowledge acquisition and best practice improvement, as well as improved healthcare.

Decisions made about investment in e-health need to consider what the successful outcomes would look like, rather than just considering a single project in isolation. Success can be seen as delivering

1. future focused infrastructure, scalable and adaptable to changing needs
2. capacity and capability building amongst our healthcare workforce, to enable them to meet the challenges of this information centric world and certainly doing no harm (preferably making care, or the care system better). It is also vital that systems enable secondary use of clinical data for biomedical research, public health and health policy. This necessitates a more active role from individuals in maintaining their health, facilitated by innovative technologies.

Questions arise such as: What investments will give the best short and long term outcomes, what activities could be undertaken, what works and what does not are all considered by papers in this volume. Papers represent experiences in Australia and New Zealand and further afield. As always, it is the strength of HIC that a wide diversity of work is presented and that a set of papers has been collected here that ranges from deeply theoretical to intensely practical. The careful reader will be rewarded with exposure to much diversity, and many elements of contemporary health informatics research endeavours.

The double blind peer review process established for HIC 2011 in a previous volume has been continued and augmented. All papers were reviewed by 3 experts in the field of health informatics, selected as prominent academics and industry specialists. The assistance of the Australasian College of Health Informatics in supporting this process through the voluntary efforts of a number of their Fellows is gratefully acknowledged, as is the similar contribution made by many senior members of the Health Informatics Society of Australia. This phase of reviewing resulted in the provisional acceptance of 28 from a much expanded submission field of 42. The Scientific Program Committee then undertook a validation process for all such papers that were resubmitted in amended form, to ensure that reviewers' recommendations were appropriately addressed or rebutted.

*Heather Grain
Fernando Martin-Sanchez
Louise K. Schaper*

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Gerontechnology: The importance of user participation in ICT development for older adults

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Abstract. With the ageing of our society and the increasing pressure on health and aged care services, the need for technological solutions to help older people stay in their own home for as long as possible is becoming increasingly important. To create information and communications technology (ICT) that will fit with the way older people live their lives and wish to use technology, necessitates their involvement in the design and development process. This paper will highlight some of the issues when designing for and with older people, and highlights the need for more research on how to involve older persons as stakeholders when designing technology for their use, as well as the need for easily accessible guidelines for how to do this.

Keywords. Gerontechnology, ageing society, systems development, technology design, older users

Introduction

It is clear from the predicted increase in the aged population, combined with the lowering of the number of working people per aged person, that Australia will face enormous challenges in the coming years in regards to the increased pressure on Australia's health and aged care infrastructure [1]. In 2010, 13% of Australia's population was 65 years and over, and by 2050 it is expected that this will increase to 23% [1, 2]. In the same period the number of working people per person aged 65 and over is expected to drop from 5 in 2010 to only 2.7 in 2050 [2]. Health spending on the elderly population is expected to rise dramatically in the years leading up to 2050 as proportionally more people fit into the elderly age group, the biggest user of Australia's health services [2, 3]. One of the challenges will be to keep the elderly population healthy and out of hospitals and care facilities for as long as possible. As a result there is a strong need to investigate ways to reduce the pressure on health services by keeping the elderly population living at home for as long as possible, including focus on the use of supporting technology.

Gerontechnology is one area that is working towards research and development of technology for the use of older people, and is of particular interest when it comes to

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support for older adults. This paper will briefly describe gerontechnology, before discussing issues and needs when designing technology for older people.

1. Gerontechnology

Gerontechnology, a relatively new discipline and term [4], is an interdisciplinary field which combines gerontology and technology. It can be described as “the study of technology and aging for ensuring good health, full social participation, and independent living throughout the entire life span” [5, 6]. Gerontechnology is thus the interaction between research on various characteristics of ageing and using the possibilities offered by the results of research and development of technology [7], including, but not limited to, Information and Communications Technologies (ICT). There is growing attention to gerontechnology due to the ageing population in most industrialised countries, and the higher strain this will put on healthcare facilities. The interest in Gerontechnology is also increasing in Australia [8].

The purpose of gerontechnology is to consider and learn about the goals and desires of older people, and then look for possibilities for technological solutions to satisfy these goals and desires [5]. “Ageing in place” and maintaining independence is very important for older people [5], and gerontechnology can enable older people to stay active and independent despite experiencing various physical, perceptual and cognitive age related decline [9]. Gerontechnology has as a goal to use technology to help counter these declines, either in the form of prevention, by delaying the onset of, to help compensate for, or to help care for these types of issues [6]. A fifth goal is to encourage more research in this area. These goals or aspects of gerontechnology are often called “Gerontechnology’s Five Ways”. To fulfil these goals, technology is applied to various domains of living, including health, housing, personal mobility and transportation, communication and work, as well as leisure, learning and self-fulfillment [6].

The following sections will look at designing technology for older adults.

2. Designing Technology FOR Older People

Designing technology for the elderly is becoming increasingly important in our society as we are currently faced with two very strong trends: 1. an ageing society, and 2, an explosion in technology development, infiltrating every part of our lives. As more and more of our society is relying on technological solutions and services, the older population is increasingly going to have to interact with this type of technology [10].

Designing technology for older people is quite a complex task. Older people can experience a multitude of age related issues, and these must be considered when creating the interfaces the elderly will interact with [11]. In addition, their lived experiences and ways they wish technology to fit into their lives must also be taken into consideration.

Previously suggested options to overcome these issues include incorporating ‘universal design’ principles [6, 12, 13], and using age specific design. There is a growing body of literature on designing specifically for older users [12, 14-17], looking at how to counter issues that older people may experience due to age related decline. This includes advice on ideal font size, target size and spacing, and so on [14, 18].

Guides on how to design for the elderly are easily accessible for designers and should be followed when implementing systems for this age group. Charness and Jastrzemski [12] claim that the ‘degree of fit’ between the demand of the system and the capability of the user (demand/capability fit) will determine the user’s attitudes and acceptance of a system. Ensuring that a system has a good ‘demand/capability fit’ and performs well in usability tests is one aspect that is needed for successful outcome of systems development, but good performance does not ensure that technology will be accepted, adopted and used by the intended user group. If the system is not created to fit in with the users and how they live their lives, it could lead to gerontechnology systems designed with perfect usability aspects for older people, but may not fit with their lives and they see no reason for using it.

3. Designing Technology WITH Older People

In addition to the increasing use of technology in every part of our lives, there are opportunities for supporting and enhancing many parts of older people’s lives by explicitly designing technologies for them. It is claimed that one of the main challenges for gerontechnology is older users’ acceptance of the technology [9, 19]. A reason for this may be that often when gerontechnology is designed and created “elderly people are considered as receptors of a predesigned, specific technology, and not as an active part of a process” [20].

The best way to create technology that the elderly will find useful, is to develop technology from a ‘user demand’ perspective, rather than from a technology advancement perspective: Piau, Campo [19] indicate that “inadequate comprehension of user needs (technology-push rather than demand-pull approach)” is a major issue in technology development for the elderly. Eliciting older adults’ views of how they want to be supported by technology, and having continued user involvement when researching, designing and implementing gerontechnology products, can be highly influential on improving acceptance and usage [21]. This makes it important to involve the user right from the inception, and throughout all stages of the development process [9, 13, 19, 22].

This is not a new way of thinking in gerontechnology, as already in 2000 Fozard stated that “The user should directly influence, and indeed, determine the direction of technology development and distribution because gerontechnology addresses how technology can meet the needs and interest of a group of people – aging and aged persons” [6]. Despite this early way of thinking, progress has been slow on involving elderly throughout the whole process of technology creation from inception to completion of the new product. There is recognition that including older adults in the creation process needs to be done, but little literature and guidance on how to do this [13]. There are guides available on how to best design **for** older people given the implications of age related change, however “this body of work does not look at how the designer should adapt the design process itself when working with older users” [23]. The existing literature that discuss inclusion of older adults in technology development and research is often focused on recruiting and using older people as subjects in experiments and making measurements to learn how to better design for older people, rather than recruiting older people as co-designers on design teams [10, 17]. Useful information can be found in these resources on issues like participant recruitment and attendance; however no guidance is given on how to adopt the design process to

include older adults as participating user representatives. The following sections describes some issues that can make designing with older adults challenging, and illustrates the need for further research in this area.

3.1. General Issues

When designing there is a 'similarity assumption' where the designer assumes a certain likeness to the user, including common vocabulary and terms, the ability to interact with prototypes and so on [23]. However, when designing for older users, this similarity assumption does not hold true [22-25]. Designers are often younger adults who have grown up with technology. With today's family structures, they often lack experience in interacting with older persons, leading to a lack of empathy with the elderly's lives, experiences and possible age related declines. The gap between younger designers and older people is problematic and has implications for the interaction between older users and designers [22]. Learning about older people in general, as well as the particulars of the older people's lives in regards to the design question is a necessity, but is not sufficient and could not be used as a substitute for the inclusion of elderly people when designing the product [23, 25].

Older adults are much more diverse than the general younger population, considering the over 65s can comprise of several generations and a multitude of cognitive and physical abilities, and their health status, backgrounds and technology experience vary greatly [10, 22, 25, 26]. This can be a challenge for designers when working with this age group. The following section describes some specific issues design teams have experienced when involving older adults as participants in designing technology for their use.

3.2. Specific Issues, Including Issues Related to the Use of Low Fidelity Prototyping

It has been found during design session with older people that they often have problems imagining new technology [22, 27], and if the tasks at hand are not directly relevant to the older person's interest, they could easily become disengaged and lose motivation and focus [22, 23].

For some projects low fidelity (paper) prototyping caused issues, attributed to the fact that many things about the design that matter to older people, such as the size and contrast of text, was not apparent on the low fidelity prototypes. In addition there was a lack of comprehension of the explanations accompanying the prototypes [23]. Another project experienced only some initial problems with engagement from older people when using low fidelity prototypes [27], whilst another project used this kind of prototypes without reporting of any problems [22]. It is unknown what caused the differences in experiences with low-fidelity prototypes in these projects.

An essential activity for users involved as stakeholders in technology development projects is to critique the user interfaces. When it came to critiquing screen designs, Massimi and Baecker [27] reported that their participants were very good at this, however this opposes the experiences of others [13, 23], who reported that older people tended not to want to say anything negative about the prototypes, and instead wanted to give praise to the younger designers. In addition, it was noticed that the older participants tended to blame themselves rather than poor design if something did not work well. Another experience was the risk of group breakdowns and issues in group

dynamics caused by discussions of sensitive issues or by age related problems such as hearing loss [22, 27].

To accommodate for the differences when designing with older people, all of the authors found it necessary to modify common practices in regards to participatory and user centered design, as well as when it comes to user testing, to ensure that errors will not negatively affect the possible fragile confidence of the older participants [13]. There is a need for guidelines for how to modify the design and development process when working with older people, to accommodate for the kind of issues described above.

4. Conclusion and Opportunities for Further Research

Creating technology that suits the lives, needs and wishes of older people require their involvement the design and development process [22]. This is vital for a successful outcome and to avoid designing technology based on technology development rather than on genuine user needs and preferences [6, 9, 19, 22, 23, 28].

Studies and guidelines on how to involve older users throughout the whole systems development process is sparsely reported on, despite the gerontechnology literature describing the advantages and need for inclusion of the elderly in this process. There are contradictions in the literature in regards to best practice for this emerging area, possibly due to the low number of projects that have reported experiences of what is problematic and what works well. There is a need for further research involving older people as participants in the development of technology for their use. When the result of this type of research is published, it needs to include experiences and advice on how to improve design and development **with** older people.

Including elderly as participants in technology design from conception to completion can be time and resource heavy, and researchers have encountered resistance from designers [22]. Easily accessible research-based guidelines can help designers and developers to capitalise on the time and resource investment of involving older users, ultimately leading to a better fit between gerontechnology products and the intended user group.

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