

Innovations in Technology and Aging

Introduction

By Sara J. Czaja and Richard Schulz, guest editors

It is estimated that by 2030, people over the age of 65 will represent about 22 percent of the population in the United States, with the fastest growing cohort within this subgroup those 75-plus years of age. Currently there are about 44.5 million people over the age of 75, and by the year 2050 there will be almost 50 million people 75-plus years of age (National Center for Health Statistics, 2005). Similar trends can be seen worldwide. By 2030 the percentage of people ages 65-plus will be about 24 percent in Europe and about 12 percent in Asia and Latin America. Coupled with the demographic changes in the population has been enormous change in technological capability. Technology has become an integral component of everyday life—in work, education, communication, and entertainment. Technology is also being increasingly used within the healthcare arena for service delivery, in-home monitoring, interactive communication (e.g., between patient and physician), transfer of health information, and peer support.

The topic of aging and technology is receiving increased attention from researchers and policy makers, in part because they regard application of advanced technologies as an important means for maintaining and enhancing older people's quality of life. Much has been written on this topic, and national and international

Potential and reality.

meetings have addressed it. In 2003, the National Research Council and the National Institute on Aging sponsored a workshop to discuss ways in which developing technologies could be applied to improve the lives of older adults and outlined a research agenda to help ensure that technologies could be successfully translated to useful products and services for this population. Now, a recently established professional organization, the International Society of Gerontechnology, is devoted to the subspecialty and publishes a scientific journal, *Gerontechnology*.

It is clear that technology will play an important role in the lives of older people and holds great potential for improving their quality of life. For example, technology and telemedicine applications hold promise for increasing the physical and emotional well-being of older people. Use of technology can also enable older people to remain connected to family and friends, especially those who are distant. Technology also can help older people remain employed and maintain or upgrade their skills or ease the transition to retirement. However, to date there is only modest evidence that the potential of technology for older adults is being realized. Recent data for the U.S. indicate that although older adults increasingly use computers and the Internet, an age-based digital divide still exists. In

2005 about 26 percent of people ages 65-plus were Internet users, as compared to 67 percent of people ages 50–64 and 80 percent of those 30–49 years old. Furthermore, people ages 65-plus are much less likely than younger people to have a high-speed Internet connection (Pew Internet and American Life Project, 2005). In addition, older people who do use the Internet tend to be white, highly educated, and living in households with higher incomes (Pew Internet and American Life Project, 2004). Data also indicate that older adults use other forms of technology such as ATMs and VCRs less than younger adults do (Czaja et al., 2006).

The objectives of this issue of *Generations* are to summarize what is known about the current use of technology by older adults and to consider this and the potential role of technologies in the future in supporting individuals as they age. The articles are organized according to activity domains that are particularly important in the daily lives of older people and thus where technology is most likely to be used. These domains are health, living environments, communication, work, learning, and education. We include both low- and high-tech applications and examine a range of crucial issues like privacy and usability. We have included overview articles on these domains and topics and, where possible, articles about specific applications.

For example, Wendy Rogers and Arthur Fisk discuss how “smart” technologies can be used to support older adults in the home environment, allowing them to age in place, and the importance of ensuring that the design of these systems matches the needs and abilities of older adults. Complimenting this article, Martha Pollack presents a case example of a system, Auto-minder, that uses artificial intelligence to support elders with cognitive impairment by providing them with flexible, adaptive, and personalized reminders about their daily activities.

Pamela Whitten’s article focuses on the potential of telemedicine as a solution to concerns regarding increasing healthcare costs and access problems for people who need healthcare to remain at home. She highlights pressing issues surrounding the implementation of these types of systems such as deployment strategies to ensure equal access, potential social conse-

quences relating to physician-patient relationships, ethical issues, and privacy concerns. The article by Michael Cantor focuses on home-monitoring technologies, a common telemedicine application. He presents an approach to help protect privacy and minimize the risks of harm from these systems. The article by Jeffrey Kaye and Tamara Hayes provides an example of a system for in-home monitoring of motor and cognitive functions, two key areas in which problems can lead to loss of independence among older adults. Jennifer Kinney and Cary Kart also provide an example of an “off-the-shelf” in-home health monitoring system to aid family caregivers of patients with dementia. The authors conducted a field test of the system and found that despite design and implementation challenges, these systems are a potential resource and source of support for caregivers.

Judith Matthews also discusses how technology can be used to make it possible for community-residing older adults to manage their everyday health concerns and remain at home, noting the wide array of technologies currently available and considering crucial issues of usability, privacy, and access.

The focus of the article by Gregg Vanderheiden is how advances in telecommunications technology hold great promise for enhancing the communication and social interactions of older adults, especially those with hearing or speech limitations. He highlights the promise and challenges of exciting new options, based on Voice over Internet Protocol (VoIP) formats, that could serve to make accessibility features on telephones more readily available and easier to use.

As discussed by Sherry Willis, technology is also becoming an integral part of education and training. Her focus is learning activities that are encountered in everyday life. She notes that two aspects must be considered—the use of computers and the Internet to acquire knowledge and skills, and the need to first acquire the knowledge and skills required to use the computer. To complement this discussion, the article by David Kaufman and Maxine Rockoff provides an example of a community-based program designed to enable older adults with low incomes to develop the skills they need to obtain

information about health on the Internet. Consistent with Willis, these authors underscore the importance of ensuring that training programs and materials are specifically designed to meet the needs of older learners. The article by Raymond Ownby underscores the point that successful use of the Internet by older adults is also dependent on website usability. He provides an overview of age-related changes in abilities that are relevant to website design and discusses recommendations and strategies to help ensure that older adults can easily use the Internet.

The article by Neil Charness focuses on how the influx of technology into work settings might affect employment opportunities for older adults. For example, automation processes can minimize the needs for physically demanding work and promote more flexible work options, which benefit older people, but at the same time the introduction of technology creates potential problems with skill obsolescence and the need for retraining.

Finally, the paper by Karlene Ball discusses how meeting the transportation needs of an aging society will require a comprehensive strategic plan that incorporates technology solutions. She provides examples of technology-based improvements in the driving arena including driver assessment tools, training programs, and roadway and vehicle design that support the continued safe mobility of older adults and discusses related policy issues, mainly concerning costs and benefits.

Overall, as illustrated in this issue, technology affords many opportunities for enhancing the quality of life for older adults and, although research and interest in the topic of aging and technology have increased, many questions remain unanswered and many issues still must be addressed. In particular, we need to know how to best train and motivate older adults to use new technologies, and we need to know more about the factors that influence technology adoption among minority elders and elders with less education and lower incomes. Issues regarding privacy and trust in technology also represent critical areas of needed research, and understanding the circumstances under which technology undermines individual autonomy and

dignity or causes other negative outcomes should receive high priority. Even relatively simple questions such as how access to Internet information affects healthcare behavior and patient-physician interactions have not been answered. Investigation is also needed to help us understand how to integrate technology with caregiving and other important areas of practice and research (Schulz et al., 2002). Finally, more attention must be paid to how technology in the workplace affects employment opportunities and the work performance of older people.

In summary, many needs of older people could be met through technology. However, as demonstrated in this issue, while we have made great progress in turning the promise of technology into reality, much work remains to be done. Overall, what is lacking is a systematic effort to understand these needs and incorporate them into design solutions and bring them to the marketplace (National Research Council, 2004). Our hope is that this issue of *Generations* will stimulate future research and discussion on how we can best harness technology to improve the quality of life and foster independence of older people. ☺

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