Chapter 1
Introduction

Andrew Sixsmith and Gloria Gutman

The challenge of population aging requires innovative approaches to meet the needs of increasing numbers of older people. Emerging information and communication technologies (ICTs), such as *pervasive computing* and *ambient assistive living*, have considerable potential for enhancing the quality of life of many older people by providing additional safety and security, supporting mobility, independent living, and social participation. This book presents a snapshot of the current state of the art and serves as a pointer to directions for future research and emerging technologies, products, and services.

The idea for the book originated at the International Society for Gerontechnology's 7th World Conference held in Vancouver, Canada, May 27–30, 2010. Globally, this series of conferences is the foremost platform on the topic of technology and aging; it brings together internationally recognized research leaders from around the world to speak about new developments in R&D in their respective jurisdictions as well as collaborative work across borders and boundaries. The aim was not to produce a book of conference proceedings but rather to invite chapters some of which would be based on presentations in selected symposia at the conference and others specially written for the book so as to reflect the diversity and the most theoretically and technically challenging directions in the field. The resulting book explores these and some of the key application areas.

Rather than presenting specific technical (engineering and computing) problems and solutions, the book is written so as to be accessible to the nontechnical reader. Underpinning the chapters is a gerontological perspective that critically explores the needs of older people in society and their implications for design and technology solutions.

A. Sixsmith, Ph.D. (✉) • G. Gutman, Ph.D.
Gerontology Research Centre, Simon Fraser University, Harbour Centre,
#2800-515 West Hastings Street, Vancouver, BC, Canada V6B 5K3
e-mail: Sixsmith@sfu.ca; gutman@sfu.ca

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As the title suggests, a key concept behind the book is that of *active aging* which currently occupies a central position in the international discourse on policy for aging, particularly in the 27 European Union countries which declared 2012 the European Year for Active Aging and Solidarity Between Generations (YA2012).

1.1 Active Aging and Gerontechnology: 2002 and Now

The idea of active aging first became prominent among gerontologists in 2002 with the publication of *Active Aging*: *A Policy Framework*, a contribution of the World Health Organization to the Second United Nations World Assembly on Aging held in Madrid, Spain. This landmark document drew attention to the fact that population aging was the product of two converging trends: more and more people living to be old at the same time dramatic decreases were occurring in fertility rates; that population aging was to occur in both the developed and the developing worlds; and that if it was to be a positive experience for countries and individuals, "longer life must be accompanied by continuing opportunities for health, participation and security" (WHO, 2002, p. 12). *Active aging* was identified as the process for achieving this vision. This term, adopted by WHO in the late 1990s, was meant to convey a more inclusive message than healthy aging—in particular, to draw attention to the fact that health care was only one of a number of determinants of how people and populations age (Kalache & Kickbusch, 1997). It was also meant to include persons with less than optimum physical and/or mental health. The latter is clearly reflected in the definition of *active* provided in the policy framework document:

> The word "active" refers to continuing participation in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labour force. Older people who retire from work and those who are ill or live with disabilities can remain active contributors to their families, peers, communities and nations. Active aging aims to extend healthy life expectancy and quality of life for all people as they age, including those who are frail, disabled and in need of care (WHO, 2002, p. 12).

While the intention was laudatory, one of the unintended consequences of this definition is that since 2002 much of the effort by individuals working in the field of aging, and especially in the subfield of gerontechnology, has been to concentrate on providing assistive technologies and devices for the frail and disabled. While this is an important line of research, in this book, our intention is to explore how technology can positively contribute to the health and quality of life of *all* seniors and to put the spotlight on seniors as proactive participants in a digital society. These critical ideas are developed in Chap. 2 of this volume where it is argued that the research and development agenda needs to expand and address the needs of several key subgroups within the seniors' market including healthy and active seniors, people with chronic diseases, people with dementia, and people with mild cognitive impairment. In addition, more effective translation of existing research knowledge is needed if we are to develop useful new products and services that will, in fact, be accepted and used by seniors.

In the chapters that follow Chap. 2, we have attempted to highlight gerontechnology developed for the four groups identified above. We have also attempted to identify other gaps in the knowledge base. For example, Chap. 3 looks at ethical issues which attend the use of assistive technologies. Three areas are examined: first, ethical approaches commonly in use and their limitations for application in the field of assistive technologies; second, the ethical issues which arise around the design and execution of research with users of assistive technologies; and third, the contribution of assistive technologies to the search for that mainstay of moral philosophy, *the good life*. The latter is broached through a discussion of quality of life indicators.

In Chap. 4 the focus is on the use and acceptance of technology by seniors. The chapter begins with a description of e-health applications that facilitate self-care, in particular online health information seeking. Interesting data are presented on the extent to which seniors search the Internet for health information and what they search for and important questions are raised as to how they deal with the vast amount of information that is available. Discussion then turns to monitoring technologies that may permit early detection of illness—with the goal of enabling preventive measures to be put in place that will delay or deter the onset of disability. A key issue here is privacy trade-off and what information people are willing to share about themselves and their day-to-day functioning and with whom.

Chapter 5 introduces the concept of resilience which can be understood as the capacity to adapt to and recover from adversity. The context that it is applied to is natural and human-made disasters which are a source of large-scale adversity that disproportionately impacts older adults. The authors examine the potential for technology to promote disaster resilience for older adults. Technological solutions that could be applied to practical problems are considered for each phase of the emergency management cycle (prevention/mitigation, preparedness, response, recovery). The technologies considered include tracking and mapping systems, intelligent building systems, medical and assistive devices, communication and notification systems, needs assessment strategies, medical support strategies, security strategies, and reconstruction strategies. This chapter concludes with a discussion of factors that may influence the acceptance, uptake, and application of technology to increase disaster resilience in this population.

The Active Aging Policy Framework requires action on three basic pillars: health, security, and participation. Assistive technology provides a platform to support participation, but some devices work better than others and/or even within a particular disability group, are more effective for some users than for others. While there has been significant progress in developing measures of the effectiveness of assistive technology, some important challenges remain because there are many things that contribute to a person's level of participation. Chapter 6 reports the experience of developing the Assistive Technology Outcomes Profile for Mobility (ATOP/M) and lessons learned for measuring the participation of older individuals who use mobility assistive technology.

The focus of Chap. 7 is on technology developed for persons with dementia and their carers. This chapter outlines the services that are commonly provided

following diagnosis including how assistive technologies and in particular devices that are categorized as telecare are increasingly becoming part of the *service offer*. Some of the benefits and potential issues with telecare are posed. This is followed by illustrations of how new technology can be developed to meet the changing needs of people with dementia in a wide range of domains including recreation and leisure. This section includes examples of technology developed in partnership with people with dementia in a way that maximizes their retained abilities while playing down the aspects of functioning they find difficult. It then goes on to examine the potential of using everyday technologies to assist people with dementia. Finally, it looks towards a future where the full potential of technology is harnessed to enhance quality of life for people at all stages of the dementia trajectory.

Chapter 8 describes a European research project, SOPRANO (Service-oriented Programmable Smart Environments for Older Europeans), which developed supportive environments for older people based on the concept of Ambient Assisted Living (AAL). AAL uses pervasive information and communication technologies (ICTs) to enable older persons to live independently in their own homes and to increase their quality of life. The focus of this chapter is on the steps that need to be taken to meet these objectives, starting from a user-centered approach to define the AAL system and ending with the actual implementation of developed technology and services in real-life situations.

Computer-generated graphics are becoming more advanced and sophisticated, and realistic simulations of the built environment offer a useful tool to researchers and designers. Potential changes to the built environment to create more age-friendly settings can be tested using a simulation before actual design changes are implemented. People are able to experience the virtual environment and provide their opinions, and researchers can observe their interactions in a safe and secure context. Chapter 9 discusses these and other practical applications of a computer-generated virtual environment as a tool for age-friendly design visualization and communication.

Chapter 10 explores the importance of happiness in older adult's lives and the contribution technology can make to people achieving it. In this context, happiness can be seen as shorthand for the positives in life, the things that make life meaningful and fulfilling. Besides health and well-being, these include satisfying relationships, opportunities for continued achievement, as well as hope and optimism for the future. Building on the foundations of positive psychology, this chapter examines ways in which technology can contribute to making the lives of older people happier and ultimately worth living.

An issue that continues to be a pressing one is the problem of social isolation amongst seniors. Chapter 11 returns to the participation pillar of the Active Aging Framework and explores the potential of videoconferencing to help older adults remain socially engaged. While this and other forms of ICT may be seen as potential solutions to isolation, it is important to consider the ways technologies transform social relationships, often in unintended ways. For example, many potential users of videoconferencing expressed concern about the possibility of overreliance and reduced face-to-face interaction with caregivers, family, and/or friends.

Chapter 12 provides an overview of some of the initiatives and activities in the area of gerontechnology that have emerged in Europe, North America, and the Asia-Pacific region and research at different levels: national, regional, and international. The chapter begins with a description of an international program, Everyday Technologies for Alzheimer's Care (ETAC), funded through a partnership between the Alzheimer's Association and the INTEL Corporation and designed to develop technological solutions for people with Alzheimer's disease, their caregivers, and families. The second section focuses on emerging research on technology and aging in the Asia-Pacific region. The third section focuses on national level programs and describes work being carried out in the UK funded by government agencies such as the Environment and Physical Sciences Research Council (EPSRC). The fourth section describes the very extensive program of work being funded by the European Union under the Ambient Assisted Living Joint Program. The chapter concludes by identifying some of the key common themes within the various research programs described and discusses the drivers, emerging directions, and opportunities in a rapidly expanding global research landscape.

References

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