Chapter 15
Integrating Supports for Ubiquitous Eldercare

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ABSTRACT

The demographic compression, along with heightened life expectancy and decreases in fertility rates, is dramatically raising the number of older adults in society, thus putting many countries' healthcare systems under significant pressure. Eventual loss of physical and cognitive skills makes it quite difficult for elders to maintain autonomous life-styles and often forces them to move to assisted living environments, with severe emotional and social impacts. The main challenge for the years to come is, therefore, to identify more sustainable approaches to eldercare, capable of improving elders' independence in order to avoid, or at least to delay, hospitalization. Providing suitable support for elders is, indeed, a highly challenging problem. However, recent advancements in pervasive computing enable the development of advanced eldercare services. The main focus of eldercare research to date has been directed towards the development of smart environments capable of assisting elders, for example, in monitoring their psychophysical conditions, and of reminding and facilitating their routine activities. Few research efforts have been directed towards the investigation of solutions capable of improving social engagement for elders living alone, and of facilitating the coordination of care-giving efforts. The chapter provides an overview of the state-of-the-art technology in eldercare research and suggests the extension of available solutions by adopting integrated approaches that aim at addressing both assistance and social/coordination issues stemming from eldercare.

INTRODUCTION

Healthcare spending accounts for a significant fraction of any nation's budget. In the years to come, the demographic compression will undoubtedly increase the number of older adults in society, thus raising both the number of healthcare beneficiaries and the average cost per healthcare beneficiary (United Nations, 2000). As a consequence, ongoing demographic changes will put many countries' social and welfare systems under tremendous pressure, with the risk of undermining economic sustainability of healthcare institutions.

Finding suitable answers to medium and long term economic sustainability of healthcare systems is a rather challenging task. Wise and long-term welfare-oriented policies that take into account the novel challenges posed by the aging in society are mandatory. However, technology can play a crucial role in compensating effects for the demographic changes in society. The main goal is to provide elders with solutions capable of improving their independence in daily life and of limiting their needs for assistance, thus avoiding the need for hospital care as long as possible, with a positive impact on emotional and social costs (Mann, 2004).

Since the early nineties, the emergence of the Web has forced medical institutions to rethink and to redesign healthcare service provisioning. Today, growing numbers of resources are invested in the development of Internet-based healthcare services that permit users to access their medical records, to schedule clinical tests, to interact with medical staff, or simply to keep in touch with people affected by the same disease/pathology.

Unquestionably, the existing solutions are an important step ahead. However, the widespread diffusion of low-cost portable and embedded devices, and the growing availability of wireless networking solutions, offer unique opportunities to improve healthcare service delivery and to envisage new classes of eldercare applications available anywhere and at anytime, i.e., ubiquitous eldercare service (Bellavista, Bottazzi, Corradi, & Montanari, 2006; Soomro & Cavalcanti, 2007). Ubiquitous computing technologies permit the development of solutions enabling the mitigation of the impact of patients' disabilities (elder patients in particular) by assisting them in everyday life activities and increasing their independence, safety, and quality of life.

However, providing suitable solutions for assisting elders at home is a rather challenging task (Hirsh et al., 2000; Mann, 2004). Aging leads to the decline of vision, hearing, motion, and cognitive skills of individuals. Motion impairment can affect a person's ability to walk, use the hands, and move the trunk or even the neck. Vision impairments pose continuous challenges to safety and autonomy for elders. Hearing impairments reduce elders' abilities to communicate with others, and may lead to dangerous situations, e.g., misunderstanding between elders and caregivers on medical prescriptions. Cognition impairments undermine elders' abilities to meet safety, self-care, household, leisure, social interaction, and vocational needs, and eventually lead them to lose even the ability to perform basic activities such as eating and putting on clothes.

Along with the decline of physical and cognitive skills, elders also tend to reduce social relations with friends and family members (Hirsh et al., 2000; Mann, 2004). As a result, the aging process may lead to physical isolation of seniors that is correlated with late-life depression. It is worth noting that loneliness does not only reduce quality of life of seniors, but it may also have a serious impact on elders' safety. For example, accidental falls may be very dangerous for elders living alone (Doughty, Lewis, & McIntosh, 2000). In fact, it may be quite difficult for an injured elder to ask for or get help. As a consequence, it is essential to promote broad involvement of the elder's friends and family members in eldercare.

Several research efforts have been directed at addressing elders' physical and cognitive im-

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