

Chapter 2

Smart Homes to Support Elderly People: Innovative Technologies and Social Impacts

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ABSTRACT

Today the biggest challenge of our aging society is to enable people with impairments to have a better quality of life maintaining their independence. The chapter explores how technology can support elderly and disabled people in their home. Firstly, a classification of Smart Home Systems in Safety systems, Environmental control systems, Energy-control-systems, Reminder systems, Medication Dispensing systems, Communication and Entertainment systems is presented. For each of these systems some examples of different technological solutions presented in the literature are described. Moreover, an analysis of social and economic impacts of the use of these technologies on the society is presented. Finally, some studies about the perception and acceptance of these technologies by user are given.

INTRODUCTION

Society is facing the challenge of demographic changes: today, society is composed more and more by elderly people.

According to United Nation Population Division (UNDP) (*Population Division, Department of Economic and Social Affairs, United Nations Secretariat*) one out of every ten persons is now 60 years old or above; by 2050, one out of five will be 60 years or older; and by 2150, one out of

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three persons will be 60 years or older. Italy is the country with more elderly people in Europe: almost one Italian out five is more 65 years and over 80 are about the 5% of the total population (Istat, 2006).

This phenomenon implies that it is necessary to face problems tied to an ageing society (Koch, 2005) such as:

- increased demand of healthcare,
- demand for accessibility of care outside hospitals (at home),
- need of efficiency and quality in healthcare with limited financial resources,
- difficulties of recruiting staff for home healthcare services.

Today the biggest challenge is to help people not only to live longer, but also assuring them more years of health and independence. Several elderly people have some limitations in performing daily activities. The disabilities connected with oldness are mainly about reduced mobility and physical abilities, sensory acuity and altered mental clarity. Moreover, several elderly people have lost consort and friends and their families live away. These factors can bring to the lack of independence and safety and toward social isolation.

Nowadays, the governments, in conjunction with different kinds of organization and companies, are searching new models and systems for health and social care that improve the services quality optimising costs.

Information and communication technologies (ICT) run parallel to these societal changes and can play an important role in dealing with these challenges. Innovative technologies are emerging as a support for reacting to problems related to oldness, bringing care outside hospitals and increasing health services into the elderly people homes.

In particular, smart homes (also known as home automation or residential automation) address the promotion of the independent living by

using assistive technologies for higher quality of daily life, maintaining a high degree of autonomy and dignity.

This chapter aims at giving a comprehensive analysis of both the innovative ICT systems used in smart homes and the social and economic impacts that these systems have on the society.

In the first section a classification of systems used in smart homes has been made, analysing their functionalities and properties. In the second section, social and economic impacts of smart home technologies are discussed. Finally, in the third section the users' acceptance of these technologies is faced, starting from existing studies about the perception that users have on these technologies.

CLASSIFICATION OF SMART HOME TECHNOLOGIES

Smart Homes are defined by Cheek as “a collective term for information and communication technology in homes where components communicate through a local network” (Cheek, 2005). These technologies allows to remotely monitor, alarm and execute actions in order to assist elderly or impaired people in their daily activities, according to the different planned needs.

Celler et al. (1999) categorize Smart Home Systems or tools into three categories: first, second and third generation systems.

First-generation systems include personal alarm systems and emergency response telephones. These systems generate alarms with the intervention of the patient who can press a wireless pendant alarm worn around the neck or wrist and connect with a control centre (Celler et al. 1999).

Second-generation systems monitor health status changes and generate alarms automatically. For example, Smart Shirt is a wearable system (like a shirt) that allows to measure heart rate, electrocardiogram results, respiration, temperature

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