Chapter 7
Elderly Monitoring and AAL for Independent Living at Home: Human Needs, Technological Issues, and Dependability

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ABSTRACT
The population ageing is inevitably going to change the society and the elderly living dynamics. Optimization of resources, independent living and enhancement of elderly’s social, working, and physical activities are the key aspects of this changing. The current paradigm is Ambient Assisted Living (AAL), where the elderly person is enabled to live an independent and high-quality life by empowering the ambient around him/her. Home Automation can provide a two-way contribution: it represents an opportunity to help overcoming difficulties; while its pervasive instrumentation provides precious information. Being aware of the elderly’s activities has several applications: for the families, reassuring them about their beloved’s safety, for the caregivers, enabling them to provide prompt interventions. To highlight this aspect, it is possible to refer to AAML: Ambient Assisted and Monitored Living. This chapter introduces the design procedure of AAML systems, and their main challenges: user’s needs centrality, data visualization and dependability.

INTRODUCTION
The demographics are experiencing an elderly population growth. Based on a United Nations study (Department of Economic and Social Affairs United Nations, 2002), the population of elderly aged over 60 is projected to be nearly 2 billion in 2050, more than three times its size in 2000, comprising more than two persons out of five. Population ageing is characterized by attributes like unprecedented,
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pervasive, and enduring. One of the main concerns, related with this growth, is the cost of elderly care which is rapidly rising. Indeed elderly people are a significant part of the population which is not able to economically sustain itself anymore. Independently from the welfare model, the growth of the elderly population, as pictured by those data, will become not sustainable. Nonetheless, when referring to elderly care costs, it is worth to notice that these problems are not only applicable to elderly patients (and thus to cure and healthcare costs) but also to the non-patient healthy elderly who are losing their autonomy and independence. This fact opens another important perspective: a point of view that includes not only economic costs, but also the social costs and the affective sphere. Thus, picturing this scenario, a target can be identified in smoothing and delaying the transition that leads the person in his old age from the independent to the assisted living (Figure 1).

Among all the interventions that could be adopted toward that aim, a significant role can be played by technology, in particular by Information Technology (IT). In these years, Home Automation (HA) and Ambient Assisted Living (AAL), Tele-care and Tele-monitoring, Alternative and Augmentative Communication (AAC) have been interesting topics of innovation in the IT field. Research is currently considering to employ HA not only as a commodity, but also as an empowering tool to provide the elderly with security, independence, communication etc., following the AAL paradigm. Although it cannot be neglected that the criticalities of designing an assistive tool are significantly different from those arising when projecting a commodity. The results of these innovations are leading toward a kind of systems, whose purpose is not only to provide a significant aid, but also to collect information and allow monitoring some aspects of the inhabitant’s life. This monitoring is significantly different from

Figure 1. Assistance for the elderly paradigms; the top graph represents the currently diffused paradigm, the bottom one the smoother and lower-cost IT-empowered one.