

## Chapter 14

# A Home-Based System to Support Delivery of Health and Social Care

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### ABSTRACT

*The world-wide problem of an ageing population is introduced. This will require older people to be looked after for longer in their own homes. A brief overview is given of care delivery in the home, focusing on computer-based home care as a likely component of future solutions. The challenges faced by home care technology are discussed. It is explained how the MATCH project (Mobilising Advanced Technologies for Care at Home) is addressing these issues. The philosophy, architecture and approach of this project are discussed.*

### INTRODUCTION

The problems arising from an ageing population have been recognized at the highest level. In the UK, for example, older people in 2000 accounted for 24.4% of the population – the ratio of older people (65 or over) to those of working age (16 to 64). By 2050 this ratio in the UK is estimated to rise to 39.2% (Select Committee on Economic Affairs, 2003). This pattern is being repeated across all developed countries, for example see (Gavrilov & Heuveline, 2003). It is economically infeasible for society to provide specialized care

facilities for such a large number of people. For example, the cost of looking after someone in a UK care home is about £24k per annum (roughly US \$39k). It is also socially undesirable for older people to leave their own home and enter a care facility – especially since older people are increasingly healthier and largely able to look after themselves.

There is therefore a strong need for technology that can help to deliver health and social care in the home. This may be necessary for the end user due to a variety of reasons: a long-term medical condition, a physical or mental disability, or reduced capability due to ageing. A strong element of

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human involvement must remain in care delivery. However, appropriate technologies can help to support someone receiving care at home. These technologies can inform the dialogue of care, provide the user with advice, identify trends or anomalies that may require intervention, monitor potentially undesirable situations, provide reassurance to family members and informal carers, and relieve professional carers of routine low-level monitoring tasks. Technological support can also bring economic benefits since looking after someone in a care home is expensive. It will also become increasingly difficult to provide sufficient care homes. The need for home care technology has been recognized in all developed countries.

Technologies in support of home care go under a number of labels. Assisted Living refers to devices and services that allow users to prolong independent living at home. Assistive Technology covers all kinds of devices that help with daily living. Telecare refers to home-based devices and services that support daily life, but with a remote link to support services such as a call centre. Telehealth (also called Telemedicine or e-Health) refers to remote monitoring, consultation and diagnosis of health issues. Telehealthcare includes aspects of both health and social care. Smart Homes focus more on home automation and monitoring.

The term Home Care System is used in this chapter to mean the computer-based devices and services deployed in the home to support care delivery. This covers both health care and social care as these two aspects are increasingly becoming interlinked. For example, there is a trend towards integrated care needs arising from whatever cause. Similar technological solutions can also support all aspects of care. The contention of this chapter is that an integrated approach is desirable for supporting delivery of care to the home. There is good support in the UK for this approach, e.g., the 'Whole System Demonstrator' projects and the health service initiative on 'Shifting The Balance of Care'.

## **BACKGROUND**

### **Technology in Support of Home Care**

Many commercial devices are available for monitoring health care in the home: (Korhonen et al., 2003) give an overview of the field. Typical devices monitor aspects such as heart rate, blood pressure, blood oxygen and blood sugar. Body Sensor Networks (BSNs) are a promising approach for recording health data using instruments that are worn (Yang, 2006). More specialized devices can monitor risks such as epileptic seizure or ischemia (blockage of blood vessels). Health Level 7 (HL7) is a widely adopted set of standards for collecting clinical information (Dolin et al., 2001). Although this was originally designed for use in a clinical setting, it has obvious applicability to collecting data from home health monitoring (Lebak et al., 2004).

Many commercial devices are available for monitoring social care in the home: (Bayer et al., 2007) review the field. Early telecare devices provided simple alerts using pendant alarms, smoke detectors, flood detectors and the like. Over time, more sophisticated sensors have been developed to detect conditions such as falls. The trend is now towards more proactive support (Alderson, 2008). For example, data can be collected about the user's normal Activities of Daily Living (ADLs). This can be used to identify issues such as deteriorating abilities (e.g., due to poor health or ageing) or poor sleep patterns.

Smart houses (or homes) tend to focus on home automation and smart devices, though care monitoring aspects have also been addressed. As a few examples from many projects, consider the Gator Tech Smart House (Helal, 2005), the Gloucester Smart House (Adlam and Mihailidis, 2002), and PlaceLab (Intille, 2006). Wireless sensor networks have been adapted for health monitoring in the home (Pattichis, 2003). Home monitoring for social care uses a mixture of wireless and wired solutions (Cenelec, 2008).

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