D1.2 Summary of current state of assisted living provision in participating countries

By

Dr Ranjit Bassi and Dr Keith Quillin (BRE)

Dr Michael Hellenschmidt (Fraunhofer)

Dr Kees Tuinenbreijer (Philips)

Dr Péter Hanák (Budapest University of Technology and Economics)

Classification: Internal

Contents

INTRODUCTION....5

ASSISTED LIVING....6

Assisted Living Solutions....6

Category 1: TeleCare....6

Category 2: TeleHealth....8

Category 3: TeleMedicine....8

Category 4: Hospital at Home/ Hospice at Home....9

Other terms....9

Integration across Categories of Solution....9

Other terminology....10

Requirements....11

CURRENT STATE OF ASSISTED LIVING PROVISION IN GERMANY....13

Telemedicine....13

AGnES....13

Med-on-ix @....14

Asklepios Future Hospital Program....15

MEDCOM TraumaStation....16

Telecare – Living Labs and Smart Homes....19

Fraunhofer inHaus-Zentrum....19

Fraunhofer IESE AAL Lab....22

FZI Living Lab (Forschungszentrum Informatik)....25

OFFIS Senioren-Appartement (ideAAL)....27

Smart Home Paderborn....28

SOPHIA....30

Smart Living North Rhine Westphalia 33

Smart Assisted Living for Seniors Bochum 36

Cross-Generational Living Kaiserslautern 38

STAR Projects in the context of CCE 39

BelAmI G5- Bilateral German-Hungarian Collaboration on Ambient Intelligent Systems 39

ROSETTA 40

ENABLE 42

ALADDIN - A technology pLatform for the Assisted living of Dementia elDerly INdividuals and their carers 43

ALADIN – Ambient Lightning Assistance for an Ageing Population 45

Empowered Living – Helping people to live a more independent life 46

COGKNOW – Helping people with mild dementia navigate their day 47

Developments for increasing the personal independence at home 48

Statutory health insurance 49

Private health insurances 51

Main differences between statutory health insurance (GKV) and private health insurances (PKV) 53

CURRENT STATE OF ASSISTED LIVING PROVISION IN HUNGARY 55

Telemedicine 56

Inco Club Consulting Group 57

Inco Klub website 57

Telecare 58

The future 62

Bibliography 64

CURRENT STATE OF ASSISTED LIVING PROVISION IN NETHERLANDS 66

(Prevalence of) Dementia in The Netherlands 66
National research programs and projects 67
RIDE 67
Nationaal Programma Ouderenzorg 67
Ambient Assistive Living 68
Involvement in other EU-funded projects 68
Implementation projects 69
Telecare 69
Telehealth 70
Other services 71
Domotica/smart home projects 71
Bibliograpy 72
CURRENT STATE OF ASSISTED LIVING PROVISION IN UK 73
Overview 73
Current UK Government Initiatives on dementia and care of the elderly 74
Telecare 75
Size of telecare market 76
Typical costs of providing telecare by a local authority 76
Telecare in Wales 77
Current Telecare devices 78
Telehealth 79
Telemedicine 80
Telehealth and Telemedicine devices 80
SUMMARY OF ASSISTED LIVING PROVISION IN OTHER EU COUNTRIES 82

Introduction

The aim of the CCE project is to support the development of a common, open, standardised and integrated European platform to deliver connected ICT-based assistive living solutions for the elderly building on initiatives at the national level. Taking account of different funding mechanisms in EU member states (Social insurance-based; Germany and Hungary, private insurance-based; Netherlands and taxation-based; UK) it will develop and assess business models to support the mainstream provision of assistive solutions.

The focus will be on dementia sufferers, but the platform will offer the potential to be extended to other chronic conditions.

One of the objectives of the project is to establish the current state of telecare and telehealth markets in the partners' countries. This report gives details of the current telecare and telehealth in Germany, Hungary, Netherlands and UK.

Assisted Living

This section of the report gives an overview of the various forms of assisted living, and common terminology

Assisted Living Solutions

'Assisted living' is an exciting area of technology-assisted human care is developing rapidly in many places and through many channels. It is therefore not surprising that differences of terminology arise. For the purposes of this report, the total space labelled "Assisted Living" is divided into a number of categories:

> *"Telecare is the remote or enhanced delivery of health and social care services to people in their own home by means of telecommunications and computer-based systems. Telecare is characterised by continuous, automatic and remote monitoring of real time emergencies and lifestyle changes over time in order to manage*

Telecare

Telehealth

TeleMedicine

Hospital at Home and Hospice at Home.

The common feature is that these are technology-assisted care systems that are available to people outside traditional care settings. Assisted living solutions are effectively technology designed to provide assistance or enable health or lifestyle care for people with some health problem

Category 1: TeleCare

This category include systems designed to actually deliver "care" to people without necessarily making direct reference to the details of the health of their bodies. A commonly used example is that of a pendant alarm. This device enables someone with some level of incapacity to access "care" that may alleviate some immediate need, typically by contacting human help quickly. It therefore makes no specific reference to their particular condition: this service simply access "help". Another example may be an expert system that would alert human help if an elderly person falls over in the night, or if

> *"A service which provides people who are usually elderly or vulnerable with the support to help them lead independent lifestyles. Telecare equipment makes it possible for them to call for help and assistance*

a blind person trips in the street or if a dementia patient gets lost. Measurements taken in this category are typically of a patient's surroundings, or of the immediate physical position of the patient.

Category 2: TeleHealth

Systems in this category make use of Information and communications technology to assist a person to manage their own health conditions directly. Typically they would include the measurement of certain parameters in a long-term condition that would allow a patient to monitor their state of health and adjust their care regime themselves. Measurements made in this category may not necessarily have the accuracy typically taken by medical professionals but would be accurate enough to be considered "Health Indicators", allowing the general trend to be observed and to trigger more professional help should a condition deteriorate.

"Telehealth is the remote exchange of physiological data between a patient at home and medical staff at hospital to assist in diagnosis and monitoring. Amongst other things it comprises home units to measure and monitor temperature, blood pressure and other vital signs for clinical review at a

TeleHealth systems may typically be used by patients with long-term but stable conditions, by people recovering normally from illness or operations at home. But they may also be useful to people without known conditions but who are interested to manage their normal fitness (in order to adjust a fitness regime) or their ageing process obtaining reassurance that early changes in health indicators can alert them to seek medical help before more serious symptoms occur. In this respect, TeleHealth systems may be "elective" for fitness or normal ageing purposes, and "prescriptive" for those with diagnosed conditions.

Category 3: TeleMedicine

Systems under the label TeleMedicine are designed to be used by medical professionals in conjunction with patients. In his category, the measurements taken by systems are designed to be of sufficient quality to be used for diagnostic purposes. The key factors here are:

"Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve patients' health status. This typically involves remote consultations with specialists

Expert availability: TeleMedicine would normally at some stage involve the direct participation of a medical professional, or in some controlled cases, expert software systems under the supervision of medical professionals.

Location: the patient no longer has to be in a clinical environment for diagnostic quality measurements to be taken.

Remote links: the medical professionals do not have to be in the same location as the patient

Trust: medical professionals need to be able to trust that the information provided allows them to take serious decisions about prescribing treatment.

Category 4: Hospital at Home/ Hospice at Home

Hospital at Home and Hospice at Home represent more serious levels of care that allow patients to be treated in their home settings as if they were in a hospital or hospice. Such care regimes necessarily involve higher quality systems and professional involvement, but may still be cost-effective (because of the higher costs of providing such services in hospitals) as well as preferred by (patients because they are more comfortable in their home). It may well even improve outcomes because of the lower risk of hospital-acquired infections. Many of the systems provided by TeleCare, TeleHealth and TeleMedicine may well find a place in Hospital-at-Home and Hospice-at-Home settings.

Other terms

Other terms encountered are:

- Telerehabilitation (essentially a support and counselling service)
- Telesurgery (offering specialist consultations via remote links).

These services may make use of standard videoconferencing technology, though specialised systems also exist (such as “Health Presence”, a version of “TelePresence” from Cisco). Such services are normally deployed in hospitals rather than in patient’s homes.

Integration across Categories of Solution

Figure 1-1 shows how the various categories of solution can be integrated to provide seamless care as a person may progress from one level of need to another, via a single healthcare record. Various parties will have authorised access to this healthcare

record, each with appropriate filtering and presentation management so that their interaction is controlled according to their relationship.

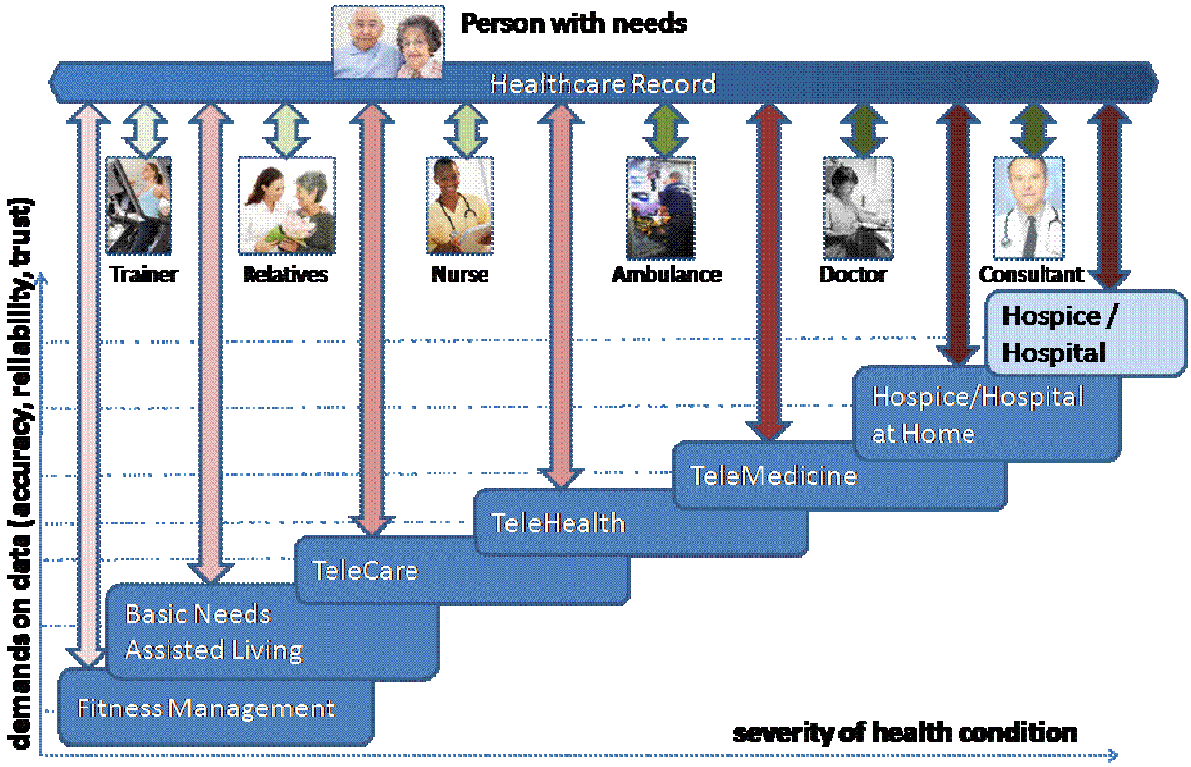

Figure 1-1 Integration of various categories of solution (add reference)

Other terminology

For the purposes of this report, the following terms are in general use:

End-users, patients:	the people with conditions which require technological solutions
Care providers:	the public or private organisations with contractual or statutory duty to provide care
Medical professionals Clinical professionals	GPs, nurses, consultants, other medically-qualified persons
Care professionals	People with direct responsibility for caring for patients, including nurses, but generally not including other medical personnel.

Social network	the group of people known to the end-user who have a relationship that may involve care or concern for the person
Health Indicator, Health observations	Devices designed to give an indication of a patient's health in some respect, without necessarily being accurate enough for diagnostic purposes.
Health measurement	Devices making diagnostic-quality measurements of some aspect of a patient's health.

Requirements

Home based performance:

Solution must work at any place in the home

Must work in any home

Must work in places outside the home and to work in another person's home who does not have any installed equipment.

Immune from interference from other ambient signals (entertainment, phone, comms networks etc.)

Low cost

Must aim to minimise the cost of installation in existing homes

Must minimise the disruption to residents during installation and minimise impact on their fabric and fittings through unobtrusive product design and positioning.

Must aim to minimise the cost of installation in new homes

Cost of operation needs to be attractive to all stakeholders.

Future proofing

Must be capable of altering functionality if a patient's needs change.

Must be upgradeable so that additional features can be added without obsoleting the installation.

Must be capable of adding functionality to keep up with the requirements of service provision enhancements.

Cost of altering functionality must be minimised for all stakeholders.

Environmental

Must take reasonable steps to minimise the power consumption requirements.

Batteries and other consumables should be recylable where possible.

Current state of assisted living provision in Germany

Telemedicine

A historical review elicits that Germany was the first country to start developing a national health information technology network in 1993. In many rural regions in Germany, the proportion of the elderly population increases rapidly. Simultaneously, about one-third of the presently active GPs[1] will retire until 2010. Often it is difficult to find successors for vacant GP-practices. These regions require innovative concepts to avoid the imminent shortage in primary health care. According to the German Ministry of Health, there is no specific line and applications Germany follows, but many projects concurred by the ministry of Health. Some of the most important projects in Germany will be explained below.

AGnES

Goals

The AGnES-concept (german acronym for doctor-relieving, community near, e-health-supported, systemical intervention)[2] comprises the delegation of GP-home visits to qualified AGnES-practice assistants (AGnES: GP-supporting, community-based, e-health-assisted, systemic intervention). Main objectives were the assessment of the acceptance of the AGnES-concept by the participating GPs, patients, and AGnES-practice assistants, the kind of delegated tasks, and the feasibility of home telecare in a GP-practice.

Evaluation

Some first results of the implementation of this concept in regular GP-practices are available, conducted November 2005-March 2007 on the Island of Rugen, Mecklenburg-Western Pomerania, Germany. This study was meant as a proof of concept. The GP delegated routine home-visits to qualified practice employees (here: registered nurses). Eligible patients were provided with telecare-devices to monitor disease-related physiological values. All delegated tasks, modules conducted and

[1] GP: *general practitioner*: A local doctor who provides a wide range of medical services.

[2] http://www.it-science-center.de/eng/seiten/projekt-agnes.htm

questionnaire responses were documented. The participating patients were asked for their acceptance based on standardized and the competences of the AGnES-practice assistants.

550 home visits were conducted. 105 patients, two GPs and three AGnES-practice assistants (all registered nurses) participated in the project. 48 patients used telecare-devices to monitor health parameters. 87.4% of the patients accepted AGnES-care as comparable to common GP-care. In the course of the project, the GPs delegated an increasing number of both monitoring and interventional tasks to the AGnES-practice assistants. The GPs agreed that delegating tasks to a qualified practice assistant relieves them in their daily work.

Conclusion

A part of the GPs home visits can be delegated to AGnES-practice assistants to support GPs in regions with an imminent or already existing undersupply in primary care. The project triggered discussions among the institutions involved in the German healthcare system and supported a reconciliation of the respective competences of physicians and other medical professions.

Med-on-ix @

Each year, 20,000 people in Germany die because of a traffic accident. Altogether, yearly productivity loss caused by these injuries is estimated to be around 5 billion Euros. International and national studies revealed the trauma center level of the primary hospital as the major predictor for trauma related mortality.

The research project Med-on-ix @[3] is currently the largest research project in the German rescue service and explores the use of current telecommunication technology in the emergency rescue. The key aim within the project is to create a tele-emergency medical center, which is highly qualified emergency physicians, the tele-emergency physicians as they called, busy. Of the rescue unit and from the ambulance data, readings and live videos will be transferred directly to the Tele ambulance headquarters. The Emergency Medical Services in the National Tele-ambulance assessed the situation and values. If necessary, it brings additional information such

[3] http://www.medonaix.de/ (in German language only)

as in the poison, or in databases, and supports the local rescue team, and eventually end the use in the treatment of patients. The concepts are therefore based on uniform quality standards and medical guidelines.

In this way, an emergency medical care can be given to the patient on site before the arrival of the emergency physician. On the other hand – in cases where the manual skills of an emergency physician on site are not necessary – well -trained paramedics can optimally treat patients under the instructions of the emergency doctor via telephone or emergency physician can be supported on site by an experienced emergency physician via Telephone not only in the treatment of patients, but In addition, efficiently supports operational procedures.

Asklepios Future Hospital Program

Over-supply in the urban areas and shortage of doctors in some rural areas – these are the two phenomena that currently exist in parallel in the German healthcare system. Patients particularly in rural areas are feeling the impact of this development. To offset this threat of unequal distribution of medical care and specialists, it is increasingly important that hospitals and doctors are better networked and cooperation could be improved.

The world's first hospital chain Asklepios is now implemented by its partners in the framework of the Asklepios Future Hospital Program[4] that implements a comprehensive knowledge and skills management, which aims to reduce the effects of this phenomena and moreover to ensure the full medical coverage that is needed. The objective of the project, which was introduced under the name "OneIT +", was to improve the networking of participating knowledge providers of the medical sector and to promote medical dialog via online and offline methods. With the implementation of an internal standard, a new quality of cooperation of all stakeholders in the health sector and a significant intensification of communication are achieved.

One of the unique features of Asklepios is that diagnoses and situations could be indexed: If a doctor’s diagnosis is not clear due to – for instance – possible multiple illnesses or indistinctness of the investigation, he is able to search in the "Knowledge Guide" or search individually using keywords. As a result, clinic's experts can answer

[4] http://www.asklepios-future-hospital.com/english/default.asp

the question but also relevant publications as well as journals will be recommended. With one click on the desired expert-profile a second opinion via SMS, phone call or instant messaging can thus be gathered. Consequently the patient can have shared views on the diagnosis data that can be additionally discussed in real time via video conference. Thus, a form of group expertise is available, where it is needed: directly at the patient who stands in the focus of the Asklepios system.

This was made possible by the system OneIT +, the combination of a digital knowledge and skills management system with cutting-edge communications technology. The system, which was introduced in June 2008, based on the Microsoft Office Communication Server (OCS) and Microsoft Office SharePoint Portal Server as well as the Collexis Fingerprint technology SyynX Solutions, the German subsidiary of Collexis Holdings, Inc.

MEDCOM TraumaStation

MedCom GmbH is located in Darmstadt, Germany, and has been founded in October 1997 as a spin-off company of the Fraunhofer Institute for Computer Graphics Research IGD. One of the missions of MedCom is to implement and boost Fraunhofer's commercial (in conjunction to R&D) activities. One of Medcom’s products enhances the mobility of the medical doctors by realizing a portable medical device called “TraumaStation” (see Figure 1).

The medical trauma station is an ultra light portable tele-medical first-aid device, which provides the physicians with an ultrasound and electrocardiogram apparatus within a suitcase. In addition, the ultra portable device is equipped with all available telecommunication gateways (e.g. GSM, UMTS, ISDN, DSL, Satellite) providing a great communication convenience to the physicians. In its current original form TraumaStation combines several medical devices ultrasound, electrocardiogram 12 leads, blood pressure, oxygen saturation meter, real time video conference.

This medical trauma station is plug and play medical solution. It can be used in emergency as well as in routine medical examinations. The software running on the medical trauma station called “TeleConsult” and enables online and offline medical assessments and discussions based on acquired and transmitted 2D/3D medical images and vital parameters such as blood pressure, electrocardiogram and oxygen saturation. The design and implementation of the system is based on a detailed

analysis of the user requirements as well as the corresponding functional specifications. Its software supports Internet, ADSL, Satellite or analogue phone line as communication channels.

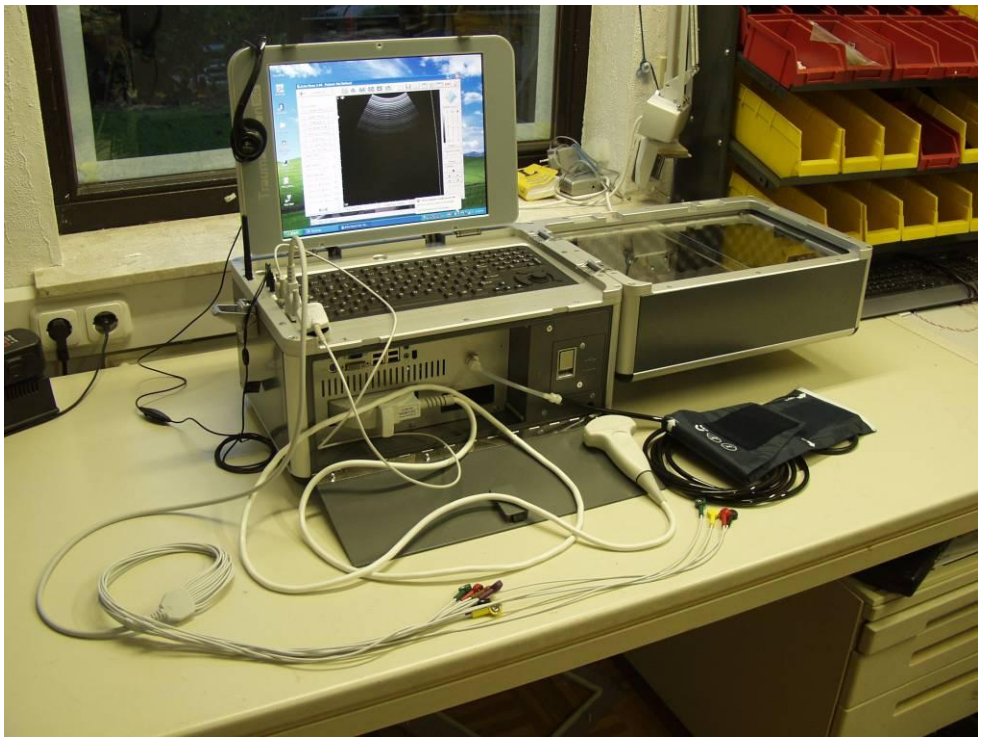

Figure 1: MedCom's TraumaStation

The software provides a wide spread of possibilities to enrich a given image material with additional information and to send it as a message. It operates in two different modes:

Off-line: In this mode the software might be used to collect data, form a question and send the data for example over night to a remote consultant centre which can answer either on-line or by an off-line reply.

On-line: The On-line mode can be used to transfer and discuss the case in interactive manner by means of two connected workstations which display the remote actions (like mouse movements) in real-time. This mode is especially useful together with the off-line mode in order to discuss about previously sent data. This mode is supported by a **TelePointing** option that is intended to point to certain details in a graphical image window. If activated a second mouse pointer in both connected workstations is

representing the remote pointer. Additionally a separate **TeleChat window**, which allows text-based discussions, can be used as well.

TraumaStation provides by different functions the construction of a health telematics network. In the connected database patient and image data and all incoming and sent messages will be stored. A client/server architecture provides the central storage of all data of a health telematics centre and the access to this data from every PC that is equipped with the client-software. Members of a health telematics network store their data in their local database and send their queries to the consultant centre via Satellite and ADSL/ISDN or other available channels supporting TCP/IP layer. The medical history of a patient, which is necessary for the assessment of a case, will be sent anonymously and automatically with the messages.

Telecare – Living Labs and Smart Homes

There has been a considerable amount of research activity in the field of telecare in Germany in recent years. For the most part, the amalgamation points –where theories, models and approaches are being tested and being put to practice – are pilot sites and labs in research settings. Market-ready solutions, however, are few and far between.

The following overview therefore lists two different kinds of practical implementations: Firstly, “living labs”, laboratories that are currently being used by researchers and project partners to evaluate either prototypical solutions or complex systems in a controlled environment. Germany has quite a lot of those going at the moment.

Secondly, there are projects that feature lived-in homes, usually through cooperation with housing associations. They have (or have had) a research focus, but are unique in that they are not controlled environments, but rather living, indwelt pilot installations as well as smart homes already available on the housing market. Being actively used by seniors, they give invaluable feedback which benefits the AAL community as a whole.

We selected only smart home projects with a strong focus on Ambient Assisted Living, and among those, only the ones that are exemplary in one way or another. They are neither exhaustive nor representative – they provide a glimpse of what is currently being done in the field and on the market. However, there is only one project which we would describe as being advanced enough that it can be described as “on the market” without restrictions and the usual caveats – SOPHIA.

All smart home projects listed here roughly belong to the second technological generation, with some exceptions, where an older level forms the technological base, as noted in the project descriptions.

Fraunhofer inHaus-Zentrum

Goals

The “inHaus innovation center for intelligent space and building systems” is the cooperation platform of the Fraunhofer-Gesellschaft, the largest organization for applied research in Europe, for residential and commercial real estate properties. It aims to find new and innovative technology and application solutions in the context of real estate. Its focus is not solely on technological development, but also on market

research and acceptance studies. In close cooperation with partners from industry and research, innovative domotic system solutions are developed and tested.

The main goal of inHouse is therefore the development, integration and testing of solutions, exploring the complex interrelations of all components in a given system. In this function, inHaus is an important piece in a holistic development and design process.

The inHaus Center consists of the inHaus1 facility (250 sqm), covering the domain of residential properties. The inHaus2 facility, with its area of 3,500 sqm, deals with commercial properties, such as hotel and events, office and service as well as hospital care.

Research areas include:

- Smart metering
- Environment
- Safety and Security
- Ambient Assisted Living
- Comfort

For the intents and purposes of this report, only the AAL-related activities within inHaus1 and inHaus2 are described in more detail.

inHaus1

In inHaus1, new technology and application solutions for private residential properties of all kinds and for different real estate of property developers and owners are created. The objective is the reduction of energy consumption, environmental protection, increasing security and independent living for Senior Citizens.

inHaus1 is a twin house: Because one of the houses is equipped as a residential lab (the other being a r&d workshop and control centre), evaluations can take place in a realistic environment.

It features a comprehensive technical infrastructure to research, test and develop assistive solutions for the domestic environment. In cooperation with manufacturers

and housing associations and the spin-off inHaus GmbH, over 100 inHaus systems have been marketed and realized.

inHaus2 Hospital care

In contrast to this, inHaus2 is a research & development platform and testbed for the commercial building sector. Nine Fraunhofer Institutes under the leadership of Fraunhofer IMS joined forces to build and jointly use it. The project has a total volume of EUR 26.2 million[5].

Among other application fields (with their respective labs), Health & Care has its own lab with dedicated infrastructure and modular room systems for the hospital and nursing home sectors.

As an example, central spaces of nursing homes can be recreated realistically. The interplay of different system components can be evaluated easily in this way, such as sensor fusion.

On top of that, researchers explore to streamline the care documentation process, potentially leading to significant cost benefits.

Also part of the Health & Care lab are demonstrators of the Health & Care solutions group at Fraunhofer IMS[6]. This group is specialized in the development of components and solutions in the field of ambient assistance for nursing staff and patients.

Notable projects include inBath, a modern, generation-spanning, intelligent bathroom which provides user-dependent help and reminders and supports care.

Contribution to the field

inHaus1 is a generic domotic platform for integration with a wide array of application fields and domains, a test bed for researchers and practitioners. AAL and telemedicine are thus part of a larger picture. On top of the provided infrastructure, telemedicine services have been experimentally tested, such as transmitting vital signs. Its significant contribution to the AAL landscape in Germany lies in its function as a test bed. Evaluation Results as well as complete systems have already been transferred to

[5] Hochtief Company Website, http://www.hochtief.com/hochtief_en/2523.jhtml?id=2523

[6] HCS Group, Fraunhofer IMS, http://www.inhaus-zentrum.de/site_de/index.php?node_id=2604

inHaus GmbH and installed into pilot sites, such as Smarter Wohnen NRW (also described in this report).

The contribution of inHaus2 lies in a different domain: It aims to create the next-generation nursing home. Processes, even vital ones, such as in the emergency ward, will be optimized so that staff have all the vital information and hand and can act quickly. The electronic patient file is a central component to this. Specialized single solutions with an assisted living slant such as inBath complement those research activities in a more generalized way.

Partners

The main research partners are primarily various Fraunhofer Institutes. There is a wide array of other partners, which can be categorized into several broad categories:

System partners: Important partners who represent a technology segment and/or product, such as BASF AG, Hochtief AG and T-Systems AG. . They have a R&D budget at inHaus.

Component partners: Responsible for system components; mostly indoor installation firms such as Vaillant, Hager of Schindler. They have a limited R&D budget at inHaus.

Application partners: Mostly facility operators and associations, such as the ambient assited living GmbH. They have marketing and usage rights, but no r&d commitments.

Data & Facts

Budget (€): EUR 26.2 million (inHaus2)

Coordinator: Fraunhofer-inHaus-Zentrum

Project Website: http://www.inhaus-zentrum.de/site_en/

Timetable/state: active; inHaus1 opened April 3, 2001. inHaus2 was inaugurated on November 5, 2008.

Fraunhofer IESE AAL Lab

Goals

The Assisted Living Laboratory (ALL) of FRAUNHOFER IESE. allows simulating real-usage features in the frame of the dynamic database, and allows in-depth testing of the technical robustness, reliability and quality of service. This simulation before

proceeding to the deployment in real environment reduces the technical upgrades and bugs' tackling additional costs that can occur once the solution is deployed over spread premises. It is integrated into the building of FRAUNHOFER in Kaiserslautern, Germany, and looks like a typical flat for elderly people (Figure 2). The lab comprises some facilities to perform measurements of project specific solutions (not every facility will the used in all projects context).

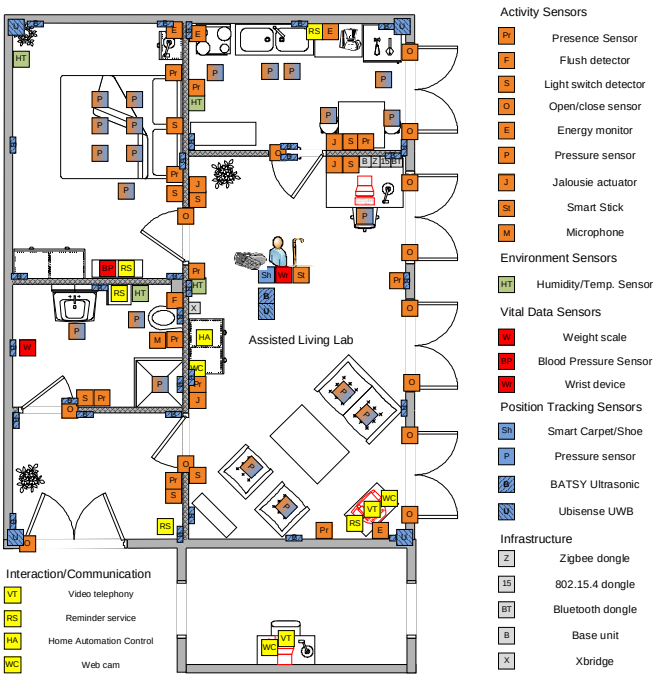

Figure 2: The Fraunhofer IESE Assisted Living Lab

Functions

The Labs functions are focused around Indoor Assistance. Indoor Assistance refers to all functions within a precisely defined, physically enclosed environment, which might be houses or apartments, but also hospitals, senior citizens homes, or vehicles, for example. Since the conditions of the environment are better known in these areas than in the case of outdoor assistance, assistance systems, respectively support services, can be realized using existing technologies and can be integrated into the existing technical infrastructure.

The environment is set up like a small apartment. With a usage area of approx. 60 square meters and a practice-oriented division into entry area, living room, bedroom, kitchen, and bathroom, the realistic environment is typical for a single person. What is

important, however, is the technical equipment, which is less obvious, since it is integrated in an unobtrusive (“ambient”) manner.

Technical infrastructure

The environment is equipped with a whole series of sensors, interaction possibilities, and assistance functionalities. Many of these sensors were taken from conventional home automation technology; however, they are sometimes used in different ways. Classical motion detectors, video cameras, and magnetic contacts can be found as well as state-of-the-art, pressure-sensitive mats equipped with ultra-sensitive sensors and RFID transponders for capturing and transmitting data in the floors. In addition, unobtrusively mounted readings recorders detect levels of brightness, movements, or humidity, and register objects via ultrasound.

The equipment currently in operation includes:

KNX-based home automation with sensors and actuators such as light switches, motion detectors, blinds controls, door and window contacts, as well as power outlets. These are used especially to track everyday activities such as the use of rooms or devices.

Position tracking systems for persons or objects: RFID chips in the wall-to-wall carpeting, ultrasound and ultra-broadband position tracking system.

Intelligent home appliances such a refrigerator equipped with an RFID reader (detects expiration date of food items) or a sensor-equipped cup (measures the amount of liquid consumed)

Sensor-equipped walking aid, which detects acute falls via a fall sensor and generally records movement behavior

Vital data sensors for the unobtrusive monitoring of basic body parameters such as pulse, blood pressure, or weight using non-invasive technology

IP video telephone system for audiovisual interaction on the basis of a commercial television set

Autonomous assistance robot; can be used either as an assistant for transporting things or as an audiovisual situation detection system including mobile communication

Multimedia information system for caregivers or relatives that can be accessed via the Internet

Audiovisual devices for multi-modal and bi-directional interaction of Assisted Living applications with the users.

The technical equipment of IESE's Ambient Assisted Living Lab is being continually expanded. Devices and sensors, which are currently available, are interconnected by different wired and wireless communication infrastructure, like EIB-bus, Ethernet, USB, WiFi, UWB, ZigBee, Bluetooth, etc.

FZI Living Lab (Forschungszentrum Informatik)

According to FZI, the FZI Living Lab AAL has been set up in order to aid strategic research in the field of AAL. Interdisciplinary research teams work together with industry partners, health care providers and professional care on technologies and concepts for independent living.

Objectives/Goals

Technologists and researchers often do not have a clear idea about user needs and priorities, while on the other hand users and care professionals often are not informed about what is possible in the area of technology. FZI aims to bring the two parties together in order to create viable scenarios and conceptual solutions that are realized prototypically in a realistic environment. The lab is therefore a work environment as well as a demonstration and testing environment where solutions can be developed and tested using a methodical, user-centered approach.

Goals include:

- Integration of existing and new technologies into a single platform
- Linking solution components into complex services
- Evaluation the viability and feasibility of different approaches/solutions
- Demonstrating initial solutions and bringing them to life for users

FZI's focuses for the AAL lab are cross-sectional issues, touching on all identified layers present: hardware, middleware, services as well as processes. Its holistic view and approach supports the establishment of integrated, seamless care processes and

the creation of a flexible service infrastructure for AAL services. The projects and prototypes developed in this lab will furthermore yield suitable methods and tools for the development of AAL environments and services. In this sense, the FZI AAL lab is an interesting best practice example for CCE, not only because one of the application scenarios deals with care for dementia patients

More Details

The lab itself is patterned after a typical living environment for Seniors, including adequate furniture and accessibility features

- Application Scenarios
- Care for dementia patients
- Monitoring via sensor-infused environment
- Early detection of worsening dementia
- Assistance through compensation of cognitive deficits
- Mobile services to assist ambulatory care
- Due to the increasing number of ambulatory care, professionals working in this field could be assisted through AAL services
- Monitoring of important events since the last visit
- Change of day plan in the case of an emergency
- Electronic care file

Related projects

SOPRANO, VitaBIT, AMICA

Partners

Institut für Angewandte Informatik und Formale Beschreibungsverfahren (AIFB), Biocomfort Diagnostics GmbH & Co. KG, CAS Software AG, Future-Shape GmbH, Institut für Informationswirtschaft und -management (IISM), ISGPN – Internationale Stiftung für Gesundheits- und Pflegenetze, Institut für Technik der Informationsverarbeitung, Miele & Cie. KG, Pflegenetz Heilbronn, ProSyst Software

GmbH, SWING Gesellschaft für EDV-Systemlösungen mbH, TARA Systems GmbH, Vitaphone GmbH, WIBU Wirtschaftsbund Sozialer Einrichtungen eG

Data & Facts

Project Website: http://aal.fzi.de/

Coordinator: Forschungszentrum Informatik (FZI)

Timetable/state: active, in use

OFFIS Senioren-Appartement (ideAAL)

The IDEAAL Senior apartment is an early attempt to harmonize the diverse and often conflicting requirements that come together when faced with the task of creating an advanced assisted living solution that builds upon the then state of the art. It is an example in that it shows how living labs can change and adapt over time.

Objectives/Goals

The IDEAAL Senior Apartment has three main purposes:

- Integration Lab
- Feasibility and usability studies
- Showroom for AAL technology.

IDEAAL, “Integrated Development Environment for AAL”, is the term of the carrier (OFFIS) for a holistically developed smart home, working together with partners from different backgrounds, taking user’s needs into account. The main goal is user-focused and scenario-based development, thereby the apartment serves as a “crystallization point” for developers, researcher and users alike.

More Details

Aim: user-focused and scenario-based development where user is in focus of research

Subliminal, unobtrusive assistive solutions

Fully functional two-room apartment with kitchen and bathroom on 48 sqm, representing the typical living environment of a Senior

Construction started in 2005, expansion of one room apartment into two room apartment in 2008

Every living situation now has one room for demonstrators

Central control console (touchscreen) makes it possible to control all functions centrally and intuitively via a graphical representation of the flat

Standard smart home functions (activity simulation, heating, light and window blind control) implemented, but also more advanced technology demonstrators, such as:

Networked training bike (rehabilitation)

Sensor floor and sensor bed (fall detection and sleep monitoring)

Sensor fusion and central processing of sensor data

Smart pill box (medication)

Person recognition and visitor announcement (security)

Related Projects

Hearing at Home (HaH), SAPHIRE, OSAMI, “Gestaltung altersgerechter Lebenswelten“ (Design of Environments for Ageing) (GAL)

Data & Facts

Budget (€): 3,1 million (Project GAL)

Project Website: http://www.ideaal.de/front_content.php (ideAAL), http://www.altersgerechte-lebenswelten.de/ (GAL)

Coordinator: OFFIS, Oldenburger Forschungs- und Entwicklungsinstitut für Informatikwerkzeuge und –Systeme. Associated with the University of Oldenburg.

Timetable/state: Construction started in 2005, expansion of one room apartment into two room apartment in 2008. Development environment still active as part of the GAL project (Nov 2008- Nov 2011).

Smart Home Paderborn

SmartHome Paderborn has a very “down to earth”, rational approach to smart homes, using what is currently available and combining it intelligently. It serves as an example of what can be done today, with available regional resources, if partners, builders and assembly sections work together with one unified vision. AAL is not the primary focus

of the venture; however, as a demonstrator, it is valuable and might raise awareness for smart homes in the public.

Objectives/Goals

SmartHome Paderborn is envisioned and realized as a building which demonstrates and integrates products that are available on the market today. It is a low energy building with digital interconnectedness of all living areas as an information and marketing platform for interested parties. Members of the association can use SmartHome as a sales platform for their own products in context with complex services.

More Details

Energy and heat is provided through photovoltaic modules on the roof and an efficient heat pump. Light, heating and ventilation are controlled by the system.

Integration of heterogenous systems is done via IP-Symcon, a home integration software.

Three characteristics are important to the members of the Smart Home Paderborn association:

- Energy efficiency
- Security and safety
- Convenience

Daily routine assistance is provided through several scenarios:

- “Shopping”: A sensor reads the transponder card in the bag/jacket and grants access to the house, illuminating the entryway and opening the front door automatically
- “good night”: Night lights go on while TV set and radio are turned off; roller blinds close and telephones are configured for “night”. In other sections, lights fade out.
- In the area of Ambient Assisted Living, the following services are provided:
- Built-in vacuum cleaner
- Telemedicine

- Monitoring of vital parameters
- Reminder of measurement due date
- Notification if parameters are out of the ordinary
- Transmission of vital parameters to nursing service or doctor
- Video conference with doctor

Partners

Among others: E.ON Westfalen Weser, Miele & Cie. KG, Loewe AG, Stiebel Eltron, ZVEI - Zentralverband Elektrotechnik- und Elektronikindustrie e.V.

Data & Facts

Project Website: http://www.smarthomepaderborn.de/

Coordinator: SmartHome Paderborn e.V, Project management: GO Redaktionsbüro

Timetable/state: active, used as a demonstrator

SOPHIA

Goals

SOPHIA aims to provide social care with a strong focus on personal support. In this sense, it is, in its own perception, more than just another telehealth solution because of two key features:

An "intelligent" wrist watch (VIVAGO[7]) which senses the user's activity (hand movement, skin temperature and conductivity). In contrast to a conventional pendant, which only activates a broadcast channel, the VIVAGO watch continuously transmits its state to a central hub.

Video communication. An additional "SOPHIA package", the video channel enables health workers to communicate directly with the clients.

[7] Vivago Oy, Finland. Website URL: http://www.istsec.fi/en.php?k=48440.

By connecting participating households with a sufficiently staffed service centre, SOPHIA manages to provide direct, 24h personal assistance to people with disabilities and special needs such as senior citizens. The idea is to substantially enhance quality of life, while allowing SOPHIA customers to stay in familiar surroundings for as long as possible. SOPHIA's conceptual focus is on safety and personal contact rather than technology itself.

Project partners and history

SOPHIA was conceived as a model project of partners Joseph Stiftung Bamberg,

xit.forschung.planung.beratung GmbH Nuremberg, the University of Applied Sciences Nuremberg, St. Getreu Hospital, Bamberg, and the University of Bamberg. It has been funded by the Federal Ministry of Health and other institutions; at the end of 2004, the successful project undertook the transition into a commercial product. Initially regionally limited to the Bamberg area, it is now being distributed across Germany as a franchise system. It must be noted that SOPHIA is one of the few model projects which successfully continued life as a commercial enterprise after initial funding was cut off.

Functions

The aforementioned core functions (wrist watch for safety, video communication) are part of the SOPHIA "safety" and "contact" packages, respectively. In sum, the following packages are available[8]:

SOPHIA Base: 24h availability via phone, regular calls at set intervals, service placement and individual assistance

SOPHIA Safety: All of the benefits of the base package, plus VIVAGO emergency call system including the wrist watch

SOPHIA Home Safety and Security: Installation of smoke and water detectors as well as burglary alarm system

SOPHIA Contact: All of the benefits of the base package, plus video communication via TV

SOPHIA Comfort: Base package, Safety and Contact packages combined

[8] SOPHIA Franken GmbH und Co. KG. „SOPHIA Pakete", Website URL: http://www.sophia-tv.de/index.php?menuid=23

SOPHIA Family: Relatives and friends can get in touch with users of SOPHIA contact

Technical infrastructure

In general, SOPHIA does not require nor incorporate technology that exceeds the current technological level: It operates on standard hardware and infrastructure. DSL (digital subscriber line) is used for transmission of video data; for all other data, POTS (plain old telephone system) is used. System components are:

- Wireless base station (with built-in intercom)
- VIVAGO wrist watch
- TV set top box
- Remote control

Evaluation

SOPHIA's most striking quality is its rather successful business model, which rests upon the successful integration and activation of volunteer care workers. Those volunteers provide 24h, around-the-clock personal care and support to SOPHIA customers. This level of personal care is quite unusual for a project of this generation and can only be sustained and maintained through involvement of all stakeholders, especially housing associations. For them as well as the tenants using SOPHIA, there's a win-win situation: The tenants can stay in their homes for a prolonged time period, being cared for and feeling safe, while expensive retrofits (using other solutions) and vacancies on the part of the housing associations can be averted.

SOPHIA, being a service company, franchises the SOPHIA model to select housing companies which in turn offer the system to their customers (tenants). The tenants themselves subscribe to the services offered by the housing companies. Regional service centres, staffed with volunteers and professionals and maintained by SOPHIA, remain the centrepiece of the concept, which are financed by the franchising revenues. Even so, 24h care puts a strain on the budget of the service centres – but through the franchise system and the honorary nature of the care worker's status, SOPHIA successfully reduced some of the initial costs and is now expanding its franchise network.

In total, SOPHIA combines a solid care concept revolving around personal attention with components that offer real, tangible benefits, and bases both upon a suitable business model that ensures its financial viability and sustainability.

Data & Facts

Website: http://www.sophia-tv.de/

Coordinator: SOPHIA Franken GmbH und Co KG, Bamberg, Germany

Timetable:

2002: Start of the model project SOPHIA (duration two years)

2004: Inception of SOPHIA Franken GmbH und Co. KG and start of commercialisation in Bavaria

2006 Inception of SOPHIA Holding (to promote the SOPHIA concept among housing associations)

Smart Living North Rhine Westphalia

Goals

The idea behind Smarter Wohnen NRW ("Smart Living North Rhine Westphalia", henceforth abbreviated as SW) is to provide a standardized, redistributable solution for housing associations that is easy to install, maintain and cost-effective.

Project partners and history

SW is a cooperation of two Fraunhofer Institutes -- Fraunhofer IMS in Duisburg and Fraunhofer ISST in Dortmund – as well as the HWG housing association. It has been publically funded from 2004 through 2007. After funding stopped, 50 homes in the Hattingen area were equipped with SW technology.

Initially it was planned to equip a whole suburb of Hattingen with the technology; but because many of the existing buildings were old – requiring an extensive retrofit – it was decided to retrofit only a small number of existing homes and concentrate also on new buildings.

After the completion of the project, the goal was to bring the system to market, including services. To this end, a collecting society (serwo, “Service Wohnen”) manages its economic exploitation.

Functions

SW covers the areas health, comfort as well as safety and security. All technical devices are integrated into a unified infrastructure. The following features are installed in each home:

- Sensors, such as smoke and gas detectors, to provide safety features
- Networked motion detectors to monitor activity and to provide dynamic indoor lighting
- Home automation features like the display of open windows, heating control, and a central “off” feature for all devices
- Broadband internet access
- Selected services accessible through a centralised touchscreen console.

Using the touchscreen console, called “SLIM” (smart living manager), it is possible to select and compile specially tailored services, such as weather news, local news, events and usage data. This is thought to enhance Senior’s sense of accommodation. It is also possible for tenants to get in touch with relatives and their doctor, for example, via video communication.

In practice, tenants were able to use the basic home automation functions (especially the “everything off” feature) without problems, because the one-knob interface controlling this feature as well as the security and safety functions was intuitive to use. The touchscreen, however, providing access to the advanced functions, proved rather difficult to use, because familiarisation training was insufficient; also, the additional value of the (informative) services was often not clear[9].

[9] Meyer, S.; Schulze, E. 2008. Smart Home für ältere Menschen. Handbuch für die Praxis. Fraunhofer IRB Verlag, Stuttgart, Germany, p. 58.

Technology

The new buildings have been equipped entirely with KNX bus systems, whereas the old buildings use a mixture of KNX (as a backbone in the hallway) and wi-fi.

Sensors and devices are connected as a platform, which evaluates sensor data andacts according to a given set of rules. The processes are largely automatic, due to the "intelligent" nature of the single components of the system. Technologically, the system used in SW is more advanced that the single components in SOPHIA, which do not act in a highly coordinated manner, and therefore belong in the second category.

Service provision is realized through a central gateway, which relays important information (as well as alarms) to the external service provider.

Evaluation

SW's overall technological level is quite high, facilitating the deployment of useful and "close-to-home" services and features. In this sense, SW is one of the most advanced Smart Home projects in the field that we have seen.

Its stated goal, to turn housing associations into comprehensive service providers[10], is the outstanding feature of the project. It remains to be seen if the collecting society, serwo, succeeds in accomplishing that goal. Its website is still a "work in progress" since 2007[11]. The pilots themselves, however, are still lived-in, and enjoy continued popularity among tenants.

Generally speaking, the SW concept is an important step towards Germany-wide distribution of AAL solutions. It makes sense to concentrate technological and business expertise in one society which acts as a "one-stop" provider, which can fulfil the needs of the housing associations as well as the general public.

Data & Facts

Website: http://www.smarterwohnen.net/

---

[10] Fraunhofer ISST. *Smarter Wohnen NRW.* Website URL: http://www.smarterwohnen.net/deutsch/startseite/index.html.

[11] serwo GmbH & Co. KG i.G. *servo Service Wohnen.* Website URL: http://www.serwo.biz/index.html

Coordinator: Consortium consisting of:

Fraunhofer ISST

Fraunhofer IMS

HWG eG

Timetable:

Project start: 2004

Pilot phase: 2005-2007

Smart Assisted Living for Seniors Bochum

Goals

Smartes Betreutes Wohnen für Senioren Bochum („Smart Assisted Living for Seniors Bochum“, abbreviated as SB) is – in contrast to the other examples – no pilot project and therefore did not procure public funding. SB was initiated on the initiative of a single housing association, VBW Bauen und Wohnen GmbH in Bochum. One motivation was to invest in future-proof technology, and another to study the feasibility of future investments in this area. As with all other projects, user acceptance was an important factor as well.

History

Faced with a large housing area in desolate condition, VBW decided to pull down the existing old buildings and build something new from scratch – this time with Assisted Living in mind: One of the buildings features assistive technology for Seniors. 24 well-equipped, accessible flats in the midst of green space were the basis for smart technology, installed from the get-go.

Functions

The premise was to equip the 24 flats with sensible, reasonable functionality only, the kind which really gets used by the tenants. Therefore, the list of functions is rather short:

- Networked smoke detectors
- Presence simulation

- Different lighting scenarios
- Control of room parameters (including rolling shutters)
- Emergency button

However, one of the main non-technical features is a very practical and cost-effective care concept. Located in the same house is a care worker's office. The care worker's job is to provide assistance to the tenants living in the house and to create optimum conditions for the social life and social interaction of the tenants. This service is included in the rent.

Technology

All of the apartments sport a KNX bus infrastructure, laying the groundwork for sensors, devices and services on offer in the apartments. The network was planned by inHaus GmbH in Duisburg[12], a spin-off of Fraunhofer IMS, with extensive expertise in networked smart environments.

The function bundle can be accessed via central touchscreen in the entry area. However, all basic functions can be controlled through conventional means, i.e. knobs and switches in the usual locations in the rooms. It is noteworthy that the system preferences, configured at the time of procurement, have in almost all cases never been altered; this indicates an unwillingness to take advantage of the ability to make changes on the part of the tenants – something that could be observed in all projects.[13]

Evaluation

Two aspects of this undertaking are especially interesting: First, the fact that it was one housing company, on its own, that wanted to fathom the promise of smart technology in the home, without external funding; and second, the focus – as in SOPHIA – on care and service provision through local caregivers. In contrast to Smarter Wohnen NRW and its SLIM service device, technology plays a minor role in the background, whereas direct, personal assistance becomes central. This normally cost-intensive arrangement was only possible through the exploitation of synergetic effects, namely the accommodation of care needs in one place.

[12] InHaus GmbH. Website: http://www.inhaus-gmbh.de/site_de/index.php.

[13] [Meyer 08], p. 65.

Data & Facts

Website: http://www.wohnungswirtschaft-aktuell.de/hammerpark/?contUid=381 (description only)

Coordinator: VBW Bauen und Wohnen GmbH, Bochum, Germany

Cross-Generational Living Kaiserslautern

Goals

The goal of the project was to built and refit buildings at four locations in the state of Rhineland-Palatinate to built senior suitable housing units. Technical solutions from existing building automation were used to support senior and handicapped persons in daily living situations.

Technology related research

In a subproject of the automatic control engineering chair of the Technical University Kaiserslautern, it is investigated which existing technologies from medical technology, home automation, safety engineering and communications technology are suitable to support elderly persons in daily living situations.

A general requirement of the technical solutions was to use scalable technologies. This requires to provide only as much as support as really needed or necessary. Thus the amount of support varies from inhabitant to inhabitant. Beyond this, the used technology should be extendable.

Sociological related research

The sociological research by the chair for city sociology is primarily concerned with the inclusion of the user perspective. The goal is to examine especially the needs, habits and requirements of humans as well as activities of daily life with the use of technology. The evaluation and acceptance of technical innovations are crucial, in order to be able to support an independent life in the age with technology.

Dates & Facts

Project website: http://www.eit.uni-kl.de/litz/assisted_living/projekt.html

Coordinator: Technical University of Kaiserslautern, Germany

STAR Projects in the context of CCE

BelAmI G5- Bilateral German-Hungarian Collaboration on Ambient Intelligent Systems

Goals

The project G5 “Adaptive Human-Computer Interfaces for AmI systems” in the context of the BelAmI collaboration was tasked with three main goals:

Unification of dynamic device ensembles: As new services might appear during runtime in an AAL environment, new functionality must be dynamically presented to the user. It is required that the resulting, integrated user interface is still as homogenous and natural as possible.

Accessibility for elderly: In the domain of Ambient Assisted Living (AAL), the user interface has to present input and output in a way suitable for the user’s physical and mental abilities. Furthermore, the user interface has to adapt to available services, the usage situation and the user’s specific capabilities and needs.

Adaptivity: As the usage situation like environmental conditions (e.g. noise, contrast), system operation status (e.g. malfunction, normal) and available interaction possibilities change at runtime, the adaptation of the user interface is necessary to support the user in a best possible way.

Based on these challenges, the overall goal of the G5 project was the improvement of usability and accessibility of user interfaces for elderly people in the AAL domain.

Functions

The key approach of the G5 Belami Project is the Apartment Metaphor. The envisioned idea was to use the apartments of the individual persons for structuring services found in their own homes. The main concepts are tasks, devices and rooms. Tasks are real-life activities that a person intends to do at home, for instance, making a phone call or closing a window. Following this metaphor, each task is assigned to a device, which people traditionally use to perform the task. For example “making a phone call” will be assigned to a “phone”. Each device typically has a (fixed) place within the owner’s home. So, following the Apartment Metaphor, each device is assigned to a room it is traditionally located in. In the phone example, this could be a

hallway, a kitchen or a living room, depending on the habits of the individual. All rooms together finally form the whole apartment.

A user interface following this metaphor maps the mental model of elderly people (the users): They mentally identify the traditional device required to perform a task, and the room it is located in, and then easily navigate the other way around by entering the room and selecting the device virtually. If they want to make a phone call, for instance, they will definitely first head for a room containing the phone (in this case the hallway) and then perform the task. Thus, to perform the intended task, they always need only two navigational steps.

Dynamic aspects of AAL systems, i.e., appearing and disappearing of ser-vices at runtime, can also be handled by this metaphor: A service will automatically appear in or disappear from a room it is assigned to, while the number of rooms remains constant. Therefore when a new real device is put into a room, the services provided by this device will be immediately available in the corresponding virtual room on the user interface.

More details to the technical implementation of the Apartment Metaphor can be found in [BelAmI Deliverable D.5.1.4, Technical report on revised UI modeling approach, Fraunhofer IESE internal report, 2008].

ROSETTA

Goals

ROSETTA will follow three main tracks to develop an innovative, integrated system aiming at prevention and management of the problems that can occur to elderly persons as a result of chronic progressive diseases.

Details

Target group:

Patients with Alzheimer's/ dementia or Parkinson

Their informal caregivers (spouses, children or other relatives)

Their professional caregivers

Focus: Prevention, early detection and efficient management of treatable psychological and physical consequences of chronic diseases that are accompanied

by progressive cognitive decline and an increased risk of staying and falling during the advanced stages of the disease.

Basic product: Unattended Autonomous Surveillance System (UAS) (Partner TNO): Ambient emergency recognition with motion detectors, contacts, foot mats

Development of an Advanced Awareness and Prevention System (AAPS), as an enhancement of the existing UAS monitoring functionality

- Prevention of accidents
- Prevention of caregiver fatigue
- Management of chronic conditions
- Integration of existing situation detection approaches into an Early Detection System (EDS)
- Detecting changes in chronic long-term conditions based on behaviour monitoring
- The Elderly Day Navigator (EDN) support platform (Cogknow)
- Supporting people in their own environment (indoors and outdoors)
- Supporting people to remember, maintain social contact, perform daily life activities and enhance their feelings of safety

Data and Facts

Project Cost: 3,5 Mio
Project Funding: 2,2 Mio

Coordinator: Eaton Electric BV, NL

Timetable:

Start Date: 01/04/2009

End Date: 31/03/2011

Duration: 36 months

ENABLE

Goals/Objectives

The objectives of ENABLE were:

Develop a test series of products that aim to enable the person with dementia to keep him/her occupied with activities which give pleasure, support memory or facilitate communication, and to validate products that are commercially available.

Develop a methodology for assessment and analysis of effects of products aimed to enable people with dementia living in their own home.

Develop an approach towards cost/benefit analysis and make preliminary estimations based on the experience of users and carers.

Examine whether such products can enable people with dementia and support their wellbeing by giving positive experiences, reducing worries and unrest, and reducing the burden on carers.

Disseminate knowledge to people with dementia, their carers and organisations as well as to health and social care service systems and industry about the potential of enabling products.

Make an overview of problems and needs which each of the products aim to solve or reduce both for the person with dementia, for their carers and for society.

Details

The ENABLE project was concerned with development and adaptation of technological products which people with dementia (e.g. Alzheimer's disease) can use to carry out daily tasks which they previously were unable to do, due to the dementia disease. The selected products fall into three categories:

- devices to support memory (time orientation, taking medicines etc.)
- devices to provide pleasure and comfort (multimedia programmes)
- devices to facilitate communication (pre-programmable telephone)

People with dementia have tested the products up to one year, and effects of using them were studied through interviews with the users and their carers. Mitigation or

solving problems for people with dementia, enhanced self-esteem and well-being as well as costs and benefits at individual and society level were recorded and analysed.

Ethical issues were addressed. Methodology for assessment of effects was developed as part of the project. The methodology provided a basis for outlining the protocol for the intervention trial with technological products. It included a set of methods and tools related to assessment of health condition, body structure and function, personal factors (personality, attitudes, education etc.) as well as environmental factors (home environment, level of care services).

Qualities of the products as well as other factors of importance for the observed effects were examined.

Dates and Facts

Project Website: http://www.enableproject.org

Coordinator: The Norwegian Centre for Dementia Research, P.O Box 2136, 3103, Tønsberg, Norway

Timetable:

Start Date: Sep 2001

End Date: Sep 2004

Duration: 36 months

ALADDIN - A technology pLatform for the Assisted living of Dementia elDerly INdividuals and their carers

Goals

The aim of the project is to utilise state-of-the-art in ICT in order to develop an integrated solution for the self-management of dementia patients, and develop innovative tools to support this procedure. This solution can be conceived as an integrated platform enabling distant monitoring of patient status and facilitating personalised intervention and adaptive care. The project aims at: (1) Supporting maintaining health and functional capability, through the risk assessment and the early detection of deterioration symptoms of the patients and distress signs of their carers. (2) Providing the means for the self-care and the self-management of chronic

conditions, through the development social networking as well as educational tools. (3) Providing added value to the individual, leveraging his/her quality of life, and supporting the moral and mental upgrade of both patients and carers. (4) Enhancing the home-as-care environment through the provision of user-friendly ICT tools for frequent, unobtrusive monitoring.

Functions

- Patient generated records
- Monitoring parameters (blood pressure,weight, ECG, activity levels, sleep features)
- Cognitive, behavioural & daily living assessment (neurophsycological tests like MMSE, NPI, ADL Basic …, questionnaires)
- Medication follow-up and drug adverse events
- Caregiver monitoring
- System components and core functions
- Data Monitoring
- Collect Monitoring Parameters
- Propagate Alarms
- Data Repository
- Data Storage
- Data replication
- Risk Assessment
- Adverse event detection/prediction
- Risk Profile creation
- Notifications
- Information aggregation
- Data representation

- Decision support
- Social Networking Utilities
- Interfaces to existing systems (EHR, HIS,…)
- Security Features
- Visionary results
- Efficient patient follow-up
- Timely detection of decline symptoms
- Adaptive care/ personalised intervention
- Networking/ socialisation/ education/ cognitive stimulation
- Distress relief/ prevention to the carer
- Decision support tools to the therapist

Dates and Facts

Project Cost: 1.980.756,97

Project Funding: 1.480.021

Coordinator: Institute of Communication & Computer Systems, Greece, http://www.iccs.gr/

Duration: 27 months

ALADIN – Ambient Lightning Assistance for an Ageing Population

Goals

Extend knowledge about impact of lighting on wellbeing and comfort of elderly and translate this into a cost-effective open solution. Usage of sensor-based monitoring, combined with adaptive algorithms, to assess people‘s level of functioning in a continuous way and a real-life setting as they go about their routine activities

Functions

Intelligent open-loop control and biofeedback system which can adapt various light parameters (e.g. intensity) in response to psycho-physiological data registered by the system

Control system that can be manually adjusted via GI and allows resetting of light parameters to default values (ageing friendly)

Application that can assist older people in better understanding and regulating their own affective-cognitive states ◊ this helps them accomplish their daily activities

Dates and Facts

Project Website: http://www.ambient-lighting.eu/

Coordinator: FHV (University of Applied Sciences Vorarlberg)

Duration: 24 months

Type of Action: Specific Targeted Research Project

Empowered Living – Helping people to live a more independent life

Goals

Speed up the development of technical assistive devices, which can increase the quality of life for both the users and their relatives.

Functions

Target group is people with cognitive disabilities (they often find it difficult to remember things, to orientate in time and space and to solve problems.

Latest technical solutions will be tested including different assistive devices and communication solutions.

New working and methods and assistive devices will be tried and tested

Dates and Facts

Project Website: http://www.hi.se/en/Swedish-Institute-of-Assistive-Technology-/Current-projects/Ended-projects/Empowered-Living/

Coordinator: Swedish Handicap Institute; Vallingby, Sweden:

Timetable:

Start Date: 2004

End Date: 2007

Duration: 36 months

COGKNOW – Helping people with mild dementia navigate their day

Goals

Develop solutions that help ageing people with early dementia to experience greater autonomy and feelings of empowerment, and to enjoy an enhanced quality of life.

Functions

Develop and evaluate in field tests a user-validated remotely configurable cognitive prosthetic device with associated services for people with mild dementia.

Through cognitive reinforcement clients are assisted to remember, maintain social contact, perform daily life activities, enhance their feelings of safety

Challenges for research: analyze the needs of elderly with mild dementia and create solutions for them, achieve a breakthrough in the development of a cognitive prosthetic device

Develop we-centric service model, in which the client also contributes to own needs being met.

Dates and Facts

Project Website: http://www.cogknow.eu/

Coordinator: Telefónica I+D; Spain

Timetable:

Start Date: 01/09/2006

End Date: 31/08/2009

Duration: 36 months

Type of action: Specific Targeted Research Project (STREP)

Developments for increasing the personal independence at home

Goals

To develop an assistance tool for the elderly and disabled people that will make easier the carrying out of daily activities.

Functions

It is a personal assistance tool based on the use of PDA devices that will help and allow this collective to be able to manage on his own, both in a domestic and urban environment.

A support tool that will facilitate the autonomy of the elderly and other collectives suffering from cognitive dysfunctions, and by extension, will improve the life quality of their relatives and careers.

Technology Applications:

Specific, complementary and integrable software applications will be developed based in a PDA-like mobile platform, which will support the user in the carrying out of the daily activities, promoting his autonomy and independency level.

Users will have a remote assistance call center that will provide them several services by means of the updating, adaptation and programming of the personal devices. In this way, users will have a simple tool to use, adapted to their personal characteristics, as well as always attended and updated.

Industrial Application:

Memory assistance: Management of appointments and tasks, planning of daily life activities..

E-health: Telemedicine, health evaluation at home, remote health monitoring, send information to doctor…

Medication management: Hours, Doses...

Sensorial assistance

Localization and orientation of users

Dates and Facts

Project Website: http://www.fatronik.com/en/proyecto.php?id=45

Coordinator: FATRONIK;

Funding and costs (State/insurance)

In Germany two different forms of health insurances are differed. These are (a) statutory health insurance (GKV) and (b) private health insurances (PKV). In the following the main principles of these insurance metaphors are explained and finally the differences are highlighted[14].

Statutory health insurance

The statutory health insurance is an obligatory insurance for all employees whose wages do not exceed a certain threshold (4.012,50 € per month for 2008). In principle all insurants are entitled to equals benefits that are defined in German laws (5th Code of Social Law, SGB V). Health services have to be sufficient, functional, cost-effective and efficient. Exceeding a degree of necessity is not allowed (according to (§ 12 Abs 1. SGB V). Additional services, such as prevention, home nursing, or rehabilitation are in principle possible as long as they are meant for recovery (e.g. for personal job performance).

The statutory health insurance is following the solidarity principle. The monthly share is independent from age, sex, health status, but according to individual potential (e.g. monthly income). The tasks of the statutory health insurance are executed by compulsory health insurance funds. At the moment there are approximately 230 insurances that split into so-called primary insurances and substitute funds. In principle there are no differences between these two kinds of insurances – insurants do have the option to choose between all health funds on the market. The main insurances are the “Allgemeine Ortskrankenkasse” (AOK), the “Deutsche Angestellten Krankenkasse” (DAK), the different company health insurance funds (Betriebskrankenkassen, BKK), the guild sickness funds (Innungskrankenkassen, IKK) and the Knappschaft. For farmers there are specialized farming health insurance funds. Most of the insurances (about 80 per cent) are company health insurance funds.

Different kinds of insurances are differed:

[14] Sources: Manager-Magazin, Capital, Wirtschaftswoche, Wikipedia

Compulsory insurance: in principle all people that are permanently employed resp. on the payroll of a company or any other employer (and the loan does not exceed a certain threshold – not to be confused with the contribution ceiling)

Voluntarily insurance: people that earn more than 4.012,50 € per month (for 2008) can choose to stay in the statutory health insurance system or to decide for a private company

Dependent insurance: marriage partners (and children) who have no personal income (resp. income that does not exceed 400 Euros a month) are automatically insured if one family member is insured by compulsory.

Of course there are more details, but they should not be in the focus of this overview article.

The services comprise the following:

Efforts for prevention of illnesses (and its worsening), contraception, sterilization and artificial abortion (if other relevant criteria are existing)

Efforts for early diagnosis of illnesses (e.g. cancer)

Efforts for illness therapy

Efforts for medical rehabilitation (for recovery, for averting handicaps, averting need for nursing care, etc.)

For some services the insurants have to pay an own contribution, e.g. for medication, bandages, or therapeutic measures. For hardship cases there are limits set and exemptions possible.

Since 2009 all insurant fees are collected by a central “Gesundheitsfonds” (could be translated as “health fonds”) and then transferred to the individual compulsory health insurance funds of the individual insurants. Consequently since January 1st, 2009 the fees of all funds are unitary.

There is a so-called contribution ceiling (gross pay of 3.675,00 € per month at the moment) till which a percental insurance contribution is charged. At the moment this is 14.9 %, 7 % is paid by the employer and 7,9 per cent has to be paid by the employee. If an employee’s gross pay exceeds this limit of 3.675,00 €, the exceeding amount of money does not influence the insurance contribution that has to be paid (not to be

confused with the limit for compulsory insurance; this limit demands which employees are forced to be member of an compulsory health insurance funds. The contribution ceiling indicates the height of the insurance contribution that has to be paid.

About 85 per cent of the population in Germany are insured by one of the compulsory health insurance funds. In total (numbers from 2006) that was 70,2 million people, from which 28,6 million were employees (and thus compulsory insured), 20,0 million were family members (and thus dependent insured), 16,9 were senior citizens, and 4.8 million were voluntary insured.

Although seniors are only 24 percent of the total, they cause half of the costs of the health system. In 2006 that was more than 111,1 billion euro (or 6910 euro per senior per year).

Private health insurances

Private health insurances are offered by private insurance companies, often companies that are listed in the stock exchange. In 2008 8,6 million (10-11 per cent of German population) people had a completed private health insurance. One can distinguish different kinds of private health insurances:

Complete: all costs are covered, especially stationary and ambulant therapies (also called substitutive health insurance)

Partially: part of the costs are covered, co-payment has to be done individually (or by the employer, e.g. civil servants supported by their principal)

Additional: individual coverage against certain risks, e.g. health insurance for abroad, for dental services, for hospital per diem,…

In general private health insurance companies are considering sex, age, health status, income, or even profession when calculating the individual contributions of their insurants. Private health insurances are open for all persons that are not obliged to stay in the statutory health insurance system (these are: employees who earn more than the limit for compulsory insurance, civil servants, self-employed persons, and freelancers).

Often the insurance contribution is independent from personal income, but depends on a variety of other criteria. These are:

Gender: often contributions for women are more expensive, because of their higher anticipated average life

Age of entry of the insurant

Profession: e.g. civil servants get some benefits; other professions face premium loading for substandard risks

Additional services often lead to higher insurance contributions

Individual health status: e.g. pre-existing conditions lead to higher contributions (or even an exclusion from the insurance itself)

In the past contributions of the private insurances increased, statistically speaking the insurance contributions doubled every 12 years. It is common sense that insurants will face further progression in the future because of the aging society. The insurance contribution includes an active life reserve that is used to decrease the progression. When switching the insurance provider this reserve is often lost (especially when switching to the statutory health insurance system).

After visiting a doctor (or a hospital) patients (that is insurants) gets an invoice that has to be paid in advance. This invoice is then given to the insurance company that settles the account with its insurant. Thus the insurant has to advance money on loan.

The services of a private health insurance are often more extensive compared to statutory health insurance. The service often include for instance:

- En suite bathroom in hospital
- Free choice of doctor and hospital
- Chief physician
- Orthodontia
- Corrective lenses
- Alternative method of treatment and medication (e.g. traditional healers)
- Massage, fitness programmes or even physiotherapy
- Psychotherapy

Main differences between statutory health insurance (GKV) and private health insurances (PKV)

Structural differences:

In GKV insurance contributions are calculated according to personal capability (in general income / loan) of its insurant (up to a certain contribution ceiling). PKVs in general are considering also age, gender, profession, individual health status, etc. to calculate individual health risks as basis for the insurance contribution.

For certain conditions PKV could be cheaper than GKV (e.g. low individual health risks, but high income). Often this advantage disappears when insurants get older.

PKV insurants can only switch to GKV under if they are younger than 55 and their personal income falls below a certain threshold.

Differences in Services

Family members (without own personal income) of insurants are exempted from contribution in GKV while in PKV each family member has to be insured individually.

GKV follows the principle of benefits in kind, which means that each member of a compulsory health insurance fund gets contribution in kind if necessary (e.g. operation, consultation, medication). Accounting is done via the health funds that are the contract partner of hospitals, therapists, or association of statutory health insurance physicians. In general the costs are completely non-transparent for the insurant resp. patient.

Members of PKVs are paying their own bills in advance. After that financial settlement could be done with the PKV of the insurant (principle of refund of expenses).

Some services are not granted by the GKV (in contrast to the PKV). For instance: on-prescription medication, seeing aids, or dental prosthesis). In contrast some services that are guaranteed by the GKV (e.g. some medical supplies, special diets, curative care services) are not standardized in PKVs.

All insurants of the GKV do have equals claim to benefits.

Membership in PKVs is agreed by contract (thus unilateral withdrawal or changes are not permitted), whereas membership (and services) in GKVs is regulated by law (code of social law). Consequently services of GKV and insurance contributions are

dependent from legislative bodies (code of social law); furthermore certain services can be offered by GKVs individually.

Insurance contribution and rates:

Increase of contribution is possible in GKV (in case the contributions of members are not covering costs) or in PKV if individual contributions are not covering individual health risks.

Contributions in GKV are often decreasing, when insurants are retiring (because of lower income in general). In PKV contributions often increase with age (“aging of insurance contributions”).

Insurants of GKVs often do not know which services (and costs) are accounted for, insurants of PKV do their own accounting. Thus transparency of PKVs is often higher than in GKVs.

Members of a compulsory health insurance fund can switch insurance funds easily (funds do not negative membership applications), whereas switching of PKVs is not that easy. First of all membership applications can be dismissed (e.g. individual health risks are too high), furthermore often active life reserves could not be taken from one company to another in the past. Contributions in the new PKV fund would be much higher than in the old one. According to a new law (since 2009) active life reserves can be taken to the new company.

Aging of insurance contributions is one of the main problems of PKVs (counteractions are: active life reserve, reduction of services, etc.). Since 2009 a law demands that PKV has to offer special standard rates comparable with GKV rates (only for seniors). The principle of sharing costs and expenses of the GKV is one of the main bottlenecks because of its structural dependencies.

Current state of assisted living provision in Hungary

An ageing European population is a near certainty, which can be explained with two demographics tendencies, the decreasing rate of fertility and the increase of life expectancy. According to current forecasts, the expected increase of population among the people aged over 65 years old is 6 percent. That is a further 6 percent by 2050 in total in the countries of Europe.

According to the forecasts, by comparing 2050 to 2004 Hungary, there will be a 6 percent increase in the number of people aged 65-80 years old among the total population. This is 19 percent of the total population. There is also an expected 6 percent increase in people above 80 years old which is 9 percent of the total population.

At the same time, nearly half of Hungary's population is suffering from some chronic illness. International research states that 70-75 percent of the health care expenses are going to the care of patients suffering from chronic illnesses. That in Hungary means an annual 7-800 billion Hungary Forint. Despite the amount spent many patients are still not receiving care to a satisfactory level.

Hence the new trend in Hungary is to shift care into the patient's home. This shift in providing care is highly cost effective for the state and also provides individual care for the patients.

Currently the home care attendance is looked after by three state funded service providers:

Home Social Care. The state provides this care through the local governments. This care only provides help to the elderly during working hours. This service includes bringing lunch, essential shopping, bathing, cleaning. The patients pay a fee determined by the local governments.

The doctors (GPs) and their assistances look after the acute and chronic patients and this is financed through the Hungarian National Health Service.

Home Care Services: They provide service as an alternative to hospital care or shorten the time in hospital. This is also financed from the Health Care budget through the Hungarian National Health Service.

Weekend emergency attendance: This is received through the system of doctors in attendance. The outpatient attendance is taken care by specialised doctors on clinics.

Hospital attendance is available for the residents in their local state hospitals

There is a gap in the health and social care that is called „long-term care". In case the patient would be in a need of this kind of help, either they themselves or their family members would have to take care of this. In the past ten years there has been a major migration. The youth have moved to big cities, mainly to the capital of Hungary in the hope of better living. The elderly, their parents have stayed in their birthplace and are alone whilst ill and in a need of help. The apartments in the big cities are not designed to accommodate more generations due to lack of space. Hence there are numerous widowed elderly patients who end up living on their own far from their relatives. They don't feel comfortable changing their living area at this age; they want to stay in their comfortable environment, friends and acquaintances. Many end up not being able to look after themselves adequately. It is likely to see symptoms of polymorbidity amongst them; there can be a changing in their states at any time.

Elderly people find it reassuring and family members find it crucial to be informed if any problems appear.

Recognising this need in Hungary, the pendant alarm systems that are providing security in this field are becoming more and more popular.

Telemedicine

The state financed Telemedicine service doesn't exist in Hungary. There is a service, called help-line for dealing with people's mental health issues.

Otherwise there are patient foundations, trade associations and other private companies who offer consulting for instance in a case of hospice attendance.

On the website of the foundations and associations there is usually a contact number to call with relevant questions.

To describe how these organisations work, a good example is the Inco Club Association.

The Inco Club Association was founded in 2005 and its aim is to provide a service for people suffering from incontinence. The purpose of their organisation is to inform and educate the affected patients and the potential concerned individuals about the route cause of this illness. They also advise of methods of preventing and treating this illness.

The Association uses three different tools to succeed:

Inco Club Consulting Group

One doctor specialised in this field and a specialised nurse pays regular visits to the local nursing and residential homes. They run presentations to inform about and increase understanding of this illness.

Inco Klub website

The most up to date information is always available on their website. The individual will need to go through a free registration process and then they can raise their question via e-mail. The answers will come from doctors specialised in this field.

Inco Klub Newsletter

They publish a quarterly newsletter and circulate it in the relevant areas

Telecare

The Hungarian State through the Local Governments' decree of 1/2000 (I.7) SZCSM, in paragraph 28. disposes of the regulations of the home help line alarm system

28. § (1) A functioning home help line service must have

a telephone centre to receive calls

a vocational centre or centres for the carers to be able to cover their area and arrive as stated in paragraph (4)

(2) Within one vocational centre there must be a minimum of 40 help call system placed in the home of the elderly, disabled or psychiatric patient who must be able to operate the system. The call centre has to provide a 24-hour service.

(3) The following must be provided for a functioning help service

a) at the patient: call system, call connection system and a receiving system with a person on duty with software

b) The carer must be provided with mobile phone, emergency bag and promptly arrive to scene

(4) The help call system must work on ongoing cycle. When calls arrive through dispatch centre – after gathering the caller's name, address and other available information – the nearest carer on duty needs to be informed who will need to attend to caller's home within 30 minutes

(5) The home help call system can only be operated by establishments or provider with operational licence

(6) Technical system has to be suited for documenting the events, for self-check, documenting of the social carer's arrival to the scene and for the bilateral communication

The benefit of the help call system for the patient in need is that it provides connection with the home carers across the dispatcher centre out of official care office hours (8.00-16.00)

The attendance is continuous, 24-hour duty including bank holidays. In addition to offering direct connection with specialised carers in need it also provides connection with out-of-hours general practitioners, emergency paramedic, police and fire service

Because of the limited financial budget the system is unable to look after all elderly people in need. That made it necessary to apply a priority designation system that makes decision using the following information:

- Patient lives alone, in bad state of health, has a chronic illness
- Patient lives with family but is alone the majority of their time and is not self-sufficient
- Patients relatives live far away
- Patient has decreased mobility or physical disability.
- Patient requires assistance with activities of daily living
- Family are unable to provide 24 hour continuous care to their relative
- Poor state of housing and vulnerability
- In a need of continuous care because of state of health
- Has poor social conditions and financial background
- Life in danger

The Hungarian social law orders that any settlement where the number of inhabitants is above ten thousand has to have an alarm call system operated by the local government. But it does not state how many individuals have to be provided for at each settlement. To solve this, the local government compiled a list, which prioritises care to those individuals most in need.

The service can be claimed by those in need whose social background or state of health justifies it, but they must have the cognitive ability to make them capable of using the device and able to operate the alarm call system.

The two most popular alarm call systems in Hungary are the Body Guard and the Vivago System

Body Guard

Home alarm system:

Service both for individuals and groups. The alarm call device is placed at the client's home. It is connected to their land or mobile telephone line and can be operated through a bracelet wore on patient's wrist. They then can push the button on it to send a signal to the dispatcher centre, which operates 24 hours a day. After pushing the button the patient is able to tell their problem to a qualified paramedic. Depending on the situation and the request of the patient the call centre then informs the relative, the doctor or sends an ambulance to the scene. The source of funding depends on whether the service is owned privately or by the local government. When the system is contracted to the local government it is responsibility of the local government to operate the call centre and network system.

Vivagó system

A Vivago operates a dispatcher service across the whole country. It receives the alarm signals and forwards it to the relevant person to receive it. This person can be a relative, a nurse or carer.

This system requires a landline set up at the client's home as the signal travels to the receiver through the landline. The on duty software handles the client's database including the contact information. This can be tailor-made for each client to follow his or her request. The pager centre then forwards the information to the carers' mobile phone. It is checked regularly if the client/patient wears the pager bracelet and informs the carers when/if it is taken off by the patient. Then the Vivago devise switches to function as a phone in loudspeaker mode.

The technological elements of the Vivágo system:

a) Press-button Alarm system: it can be attached to a wristband, clothes or worn around the neck or it comes as a press-button bracelet or watch.

Function: the sensor around the wrist (bracelet or watch) operates to maximise the security of the client/patient as it continuously measures the individual's health parameters and forwards it to an in-house receiver. This records and analyse the rates on an ongoing base including overnight. In case there is a change in the measured actual rate compared to the average rate of that time of day in the past four days, the sensor sends out an automatic alarm signal in cases where physiological parameters

e.g. heart rate, blood pressure suddenly change outside of the normal range (for instance when sensing passivity or stillness)

b)Vivágó sensor bracelet: it is designed to measure activity (for example noticing if patient trips or sustains a fall) It has a function to sense when taken on and off, it is supplied with a panic-button, as well. It also indicates when one leaves the area with coverage. It is water resistant but has to be taken off when bathing. It operates with a battery that needs to be recharged every 6-9 months. The wrist sensor can only forward information within a 30-meter radius (circle). It continuously checks the existence of the radio connection and sends a signal out to warn the individual when they are about to move out of signal range.

c)Vivágo Wristwatch: . Measure activity, state of sleeping, sense stillness, and alarms at when patient feels poorly. It is fully water resistant, can be kept on whilst bathing. It also senses when taken on or off. Works with storage battery

d.Dispatcher Centre's services: Receives and forwards alarm signals. It builds automatic connection between caller for help and the person need to be notified. It provides a low cost telephone communication via the centre. Records the conversation.

Format of forwarding alarm signals:

- voice message
- text message
- e-mail

e.Nurse Calling system

The device functions without a dispatcher centre via the telephone line. It can contact 1-3 telephone numbers. The device supplied with a press-button, which allows starting a call. After pressing the button the device calls the relevant contact person and identifies itself with a recorded message. The receiver person will have to confirm the call. Should this not happen the device would end the call and the number again immediately. The device can identify 3 patients in a room. This system is mostly recommended in residential homes.

Funding and costs

Through the Local Government:

The Alarm Call system device can be rented for an average 1000-1500 HUF by Body Guard and Vivago. (This is approximately 4-6 Euro) Plus cost, as the cost of telephone will have to be paid by the patient/client. In these situations the carer is paid by the local government, too.

Body Guard System privately ordered

Installation fee: 5600 HUF

Renting Fee: 3600 HUF/month

Cost of carer: approx. 1500-2000HUF/occasion

Cost of telephone calls

Vivago System privately ordered

System Installation fee: 19900 HUF (includes administration fee)

Local installation fee: 9600 HUF

Rent/month: 9660 HUF

Cost of carer: 1500-2000 HUF

3.Cost of Nurse Call System Proposal

Cost of device: When 1 patient: 52475 HUF

When 2 patients: 70100 HUF

When 3 patients: 87600 HUF

Renting:

Leasing fee/ month: 4375 HUF

These prices include the installation fee, as well.

The future

The following health care database software and paging devices are under current development in Hungary at the Semmelweis University of Medicine and health Sciences:

1. Alpha Distance monitor and Decision support System

This system is basically an indicator system that measures physiological parameters and is part of a health care decisions support system. The novelty of this new project has two main elements; the in-built physiological measurement detection technology – research of indicator development – and an in-built tailor made medical science expert database in the decision support system.

The target group of users would be individuals considered to be vulnerable or at risk including older people suffering in early stages of neuro-degenerative illness, such as Parkinson, Dementia, Alzheimers, Depression or rehabilitation after stroke.

The system is an integration of an optional and on-demand combination of sensors.

These sensors can monitor several things, body weight, blood pressure, EKG, occurrence recorder, blood sugar, movement in home environment, limb motion and quantum of motion, opening and closing of fridge, room temperature, room lighting, etc.

The software and hardware during the observation episode aggregates a complex score, which describes the measured individual's general state of health. Based on these results the monitor device can evoke alarm signals. Also provides a clear easy to analyse information for the doctor.

The prototype of this system was completed in 2009 and will be activated for trial-observation in three care home facilities in spring 2010.

2. New attendance model and intelligent info-communication system in chronic patient care

Attendance manager System:

This system receives the data arriving from the patients in the care homes, senses the calls prioritises and forwards them to the visit-manager who then decides the needful agenda and delegates the tasks to the relevant carers – doctor, own agenda, nurse, etc. The system is able to automatically run the patients' medical chart, analyse the clinical outcome, pre-book the visits and track the usage of clinical resources.

With the support of the system the patient can check their own state of health on a regular base. This includes rate of blood pressure, blood sugar, and is also able to forward these results to the clinics connected to the system.

Basic contradiction is that there will be no significant need for this system on the market until the new model is accepted in a broad cycle.

An example, the „Diab All" system:

The users can access the service via Internet or mobile telephone. The system also supports the connection of a blood sugar monitoring device and the reading of the results manually or automatically. It is possible to connect the infrared connection supplied D-CONT and ACCU-CHECK devices and the bluetooth connected SMARTLAB type devices. These services above are all available for a patient with computer access. Patients with mobile phone connection can access the most required services, which include the automatic reading of the results saved in the device, optimised easy data transfer, analysis and communication. The essence of the system is that every individual involved in the process is able to connect and transfer information and data regarding any identified problems into one uniformed communication network. This provides various different information and decision support services. The system provides information and education materials for the patient and that helps them remain active in their own management. The system is able to receive self-checked, therapeutic and daily activity information from the sensors.

It filters the actual or preventable problems and informs the patient and the team of doctors on an ongoing basis. The system is able to make suggestions and provide advice on self-management depending on the seriousness of the problem. The suggestion or advice of the computer system is then checked by a doctor on duty before it is being sent to the patient. The above-described system helps the attendance team to be able to continuously track and monitor the patient so they can intervene appropriately and help in a timely manner.

Bibliography

Bognar Attila, GE Healtcare Hungary Zrt, Vassányi István, Végső Balázs, Dulai Tibor, Tarjáni Zsolt, Kozmann György, Pannon University (Veszprém), Kósa István,

Veszprém County Csolnoky Ferenc Hospital: Alpha: Otthoni távmonitorozás és döntéstámogatás.

Deutch T. and Gergely T: An intelligent partner system for improving chronic illnes care, Informatics in Primary Care, 2003. 11.1. 22-26.

Deutsch Tibor, Semmelweis Egyetem, Egészségtudományi Kar, Gergely Tamás, Lévay Ákos Alkalmazott Logikai Labor, Új ellátási modell és intelligens infokommunikációs rendszer a krónikus beteggondozásban. I., IME, 2009. október 7.szám

Deutch Tibor, Semmelweis Egyetem, Egészségtudományi Kar, Gergely Tamás Lévay Ákos, Alkalmazott Logikai Laboratórium, Új ellátási modell és intelligens infokommunikációs rendszer a krónikus beteggondozásban, II. rész., IME, 2009. november 8.szám

Deutsch T, Gergely T, Egy integrált telematikai rendszer a cukorbetegek gondozásában, IME 2004. III. évf. 9. szám.

Gergely T, Deutsch T, Lévay Á, DIAD_ALL –egy intelligens telediabetiológiai rendszer, Diebetilógiai rendszer, Diabetológia Hungarica, XVI.évf. I. Supplement pp. 2008.

Rékássy B., Magyari P., Krónikus betegségek menedzsmentje – ahol az igazi megtakarítás és hatákony növelés rejlik, IME – Az egészségügyi vezetők szaklapja IV. évf, 3.szám 17.old.2005.

Vassányi István, Végső Balázs, Tarjáni Zsolt, Szakolczai Krisztina, Kozmann György, Kósa István: Többparaméteres intelligens távmonitorozás. IME, 2009. Október, 8.szám

Current state of assisted living provision in Netherlands

Telemedicine services are not mainstreamed in Netherlands. There are several pilots on various applications and technologies across the country mainly focusing on patients suffering from diabetes and chronic heart failure patients. Regarding telecare, traditional alarm services have been mainstream for some years. More extensive telecare using videocommunication is since recently being offered by care organizations. Telecare providers are taking a market oriented perspective in offering services directly to families as well, giving informal caretakers the opportunity to get a subscription to use telecare solutions that were previously only trialled by care organizations.

(Prevalence of) Dementia in The Netherlands

The most common form of dementia is Alzheimer's disease (70%), followed by vascular dementia (15%). People with dementia live on average 8 years with the disease. During the disease process both the number and severity of symptoms are increasing. There is no cure for dementia. Finally the patient dies from the effects of dementia.

In the Netherlands more than 230,000 people have dementia. Of these, 12,000 people are young (<65 years). Age is the major risk factor for dementia. The risk of dementia increases markedly with age:

- Over 10% of people over 65 years have dementia
- Over 20% of people over 80 years have dementia
- Over 40% of people over 90 years have dementia

The number of people with dementia (as result of aging): more than half million in 2050.

The health care cost for people with dementia is the second highest in the Netherlands. Dementia in 2003 was already 4.7% of total healthcare costs (€ 3.2 billion).

- Nearly three-quarters of the costs of dementia were made in a nursing home.

- About one quarter of the costs of dementia were made in homes.
- A few percent of the costs of dementia were made for patients living at home.

The strong increase of people with dementia in the near future the cost of care also expected to rise sharply.

Furthermore, 70% of people with dementia live at home and cared for by their immediate families and / or environment, the so-called ‘mantelzorg’. 82% of the ‘mantelzorg’ of someone with dementia is overloaded or is at high risk of overload. If the ‘mantelzorg’ supporting someone with dementia cannot cope anymore, than is that a major reason for inclusion in a nursing or care institution. In 2008 there are 57 potential workers to every dementia patient. In 2050 there are 27 expected. [9]

National research programs and projects

The Dutch subsidy organisation for health research and development includes three subsidy platforms that support research and development on dementia. [8]

RIDE

RIDE is the acronym for Research Institute of Diseases in the Elderly. The program started in 2004, with the final project being completed in 2010. The focus is on biomedical research into the causes of old age diseases like dementia.

Nationaal Programma Ouderenzorg

Translated this is the National Program Elderly Care. The programme started in 2009 and will be running until 2014. Projects within the program focus on self-help, retaining function, decreasing the need for care and limiting the risk of unnecessarily burdening care by tailoring the care provision. The following projects target people with dementia:

Evaluation of casemanagement dementia

Monitoring of physical activity to inform patients and their informal caretakers. Monitoring systems are developed followed by a system to provide feedback and advice about (possible) physical activity.

Chain of care for people with dementia

Aims at improving communication between patients, informal and formal caretakers.

Ambient Assistive Living

This program revolves around the European program of Ambient Assistive Living (AAL). The first projects started in 2009, projects within the program will end in 2016.

AAL projects that include Dutch involvement ROSETTA, IS-ACTIVE, A2E2, Happy Ageing and CCE. Of which ROSETTA and CCE are specifically focusing on dementia. ROSETTA has been described before in the 'Current state of assisted living provision in Germany'.

IS-ACTIVE

The project aims at supporting patients to monitor, self-manage and improve their physical condition according to their specific situation, by providing real-time support. The project started in 2009 and will end in 2012.

A2E2

In the full the project name is Adaptive Ambient Empowerment of the Elderly. The project focuses on stimulating beneficial levels of physical exercise in a smart environment for elderly with chronic diseases such as cardiovascular disease and diabetes. Emphasized is the use of state-of-the art psychological knowledge on motivation.

Happy Ageing

This project (A Home Based Approach to the Years of Ageing) focuses on managing individual needs of dietary control, safety and well-being. The aim is to develop and validate simple accessible and usable devices to improve the prevention and management of common chronic illnesses.

Involvement in other EU-funded projects

Aside from the EU-projects mentioned above, Dutch companies and institutions are involved in other EU projects that are not funded through the National Research Programs, but directly through EU framework programs.

Companionable

This project combines Ambient Intelligence and robotics to provide a care-giver's assistive environment for elderly with dementia and/or depression. This will support the cognitive stimulation and therapy management of the care-recipient. The environment is mediated by a robotic companion (mobile

facilitation) working collaboratively with a smart home environment (stationary facilitation). The project started in January 2008 and runs for 48 months under the 7th Framework Programme. [1]

Implementation projects

Most extensively developed projects have to do with telehealth and video conferencing more than patient or client monitoring. In this sense, telecare is relatively common. Telehealth and telemedicine are mainly in a research and development phase. Next to communication solutions a variety of domotica or smart homes projects exist, where available technology is applied to support longer independent living at home. [3]

Telecare

PAL4

PAL4 is the acronym of Personal Assistant for Life. It is a web platform that supports communication between client and (informal) caretaker, mainly through videocalling. PAL4 is a commercially available product that is offered following different all-in-one packages (PAL4-Family, PAL4 Care, PAL4 COPD, PAL4 Diabetes). Users can rent equipment at a designated care agency and get a subscription to use the equipment. The webapplication can be used through a desktop PC, a television or touchscreen device. Existing modules that care providers can add to the system include PAL4 Alarm, PAL4 Access, PAL4 telemedicine, PAL4 dementia. [5]

Vivago by IST

Similarly to Germany and Hungary the Vivago wristwatch is used in The Netherlands. While other pendent alarms are used widely in all carecenters and at home, the Vivago is mainly used in pilot settings (about 10.000 to 20.000 users). The functionality to measure sleep/wake rhythms are the main topic in these pilots. Usually the alarm communicates with an UMO alarm centre of the Dutch company Verklizan. [2]

Verklizan

Verklizan is a company that provides the alarm centre backend and the communication platform for telecare and telehealth systems, this infrastructure is called UMO (Universal Alarm Receiver). Besides the Vivago, systems and

services that use that use UMO on a telemedicine level are: Life Signal, Innospense, and DynaPort MoveMonitor. Basically, the open communication platform can be used with any service or device, offered by any provider or manufacturer. [10]

Telehealth

Telecommunication and telecare systems as described above are moving on to third generation, autonomous monitoring systems. These telehealth systems are described here.

UAS (Unattended Autonomous Surveillance)

The UAS system was originally developed for people with dementia and was to be implemented in the first quarter of 2010 by care organisation Zorgpalet Baarn/Soest, independent research organisation TNO Defensie en Veiligheid and public knowledge organization Vilans. The UAS system uses sensor based activity monitoring and sends automatic alarms to an emergency centre when activity behaviour is out of the ordinary. In parallel cameras are activated allowing the caretaker at the emergency centre to assess what is going on in the home. Furthermore, wandering behaviour is detected without the user having to wear a device. [3]

Quiet Care

Similar to UAS, the Quiet Care system uses infrared sensors to monitor activity in the home, this activity is analyzed by a computer and consequently send to a alarm centre for further interpretation. Quiet Care-systeem is on the market in the US and the UK, in The Netherlands care organization Proteion and Vilans are currently executing a pilot study. Main difference between Quiet Care and UAS is that the algorithms to assess deviations in activity pattern are performed by an external computer, while UAS uses a small in house PC for these calculations. [4]

Philips Motiva

Philips Motiva is an interactive healthcare platform that connects patients with chronic conditions to their healthcare providers – via the home television and a broadband internet connection. Chronic conditions that the system monitors for are mainly physically affecting conditions, such as COPD or heart conditions.

Motiva automates disease management activities, and engages patients with personalized daily interactions and education delivered through the home television. The system enables healthcare providers to motivate behaviour change through user-friendly technology, helping them meet goals for improved patient compliance, telehealth program efficiency, and lower healthcare costs. [4]

Other services

Out of Memory: an application developerd for people with dementia that is free to download. The application provides a calendar, and an picture area showing a new photo from the past or present every hour. [9]

'Care farms' and daycare: often people with dementia are advised to visit care centres for long term or part-time stay. These services are elligable for spending of the personal budget diagnosed people with dementia receive from the government. Daily activities are aimed at people with dementia and include recreational activities, outings and meals.

Alzheimer cafés: The Dutch Alzheimer association organises monthly informal meetings for people with dementia, their caretakers, partners and other interested parties. Currently there are about 70 Alzheimer cafes spread over The Netherlands.[9]

Domotica/smart home projects

The main initiator of domotica projects is the knowledge centre Smart Homes. One of the projects that focussed on people with dementia revolved around a customized set of technology solutions that was implemented in the homes of people with dementia. Every situation was assessed individually and customized solutions using existing technology was implemented.

Starting the late 90' until 2004/2005 around 50 to 60 domotica, or smart homes projects have been initiated, mainly in newly build elderly homes. More recently some homes have been delivered with an established infrastructure for video communication. However, after 2005 subsidy arrangements have changed. This has led to the fact that social housing organizations have not been involved in realizing more 'smart homes'. Care organizations have taken over the initiative and are delivering more communication services. [3]

Bibliograpy

1. CompanionAble. http://www.companionable.net/.

2. Domotica - Vivago syteem van IST. http://www.domoticawonenzorg.nl/smartsite.dws?ch=def&id=132661.

3. Domoticawonenenzorg. http://www.domoticawonenzorg.nl/.

4. Motiva. http://www.healthcare.philips.com/main/products/telehealth/products/motiva.wpd.

5. PAL4 -. http://www.pal4.nl/website/site.php?s=uk_home&p=1.

6. Pilot met Unattended Autonomous Surveillance (UAS) van TNO. http://www.vilans.nl/Site_Domotica/docs/Handout UAS4juni2008.pdf.

7. Verandering zien | Zorg op maat door leefstijlmonitoring. http://www.veranderingzien.nl.

8. ZonMw Jaarverslag 2009. http://www.zonmw.nl/uploads/tx_vipublicaties/jaarverslag_2009_zakelijk_deel.pdf.

9. Alzheimer Nederland. 2009. http://www.alzheimer-nederland.nl/.

10. Verklizan. 2010. http://www.verklizan.org/.

Current state of assisted living provision in UK

Overview

Assistive technology has the potential to deliver significant benefits to people with long term conditions by enabling them to remain in their homes and by providing support in managing their conditions. The facts and predictions listed below provide the demographic, costs and isolation of the elderly in the UK, which includes elderly suffers of dementia.

Demographics

In 2007 there were 9.8 million people aged 65 and over in the UK and by 2032 it is predicted that there will be 16.1 million. In 2007 there were 1.3 million people aged 85 and over and by 2032 this number will be 3.1 million[15].

There is a strong correlation between ageing and care requirements, and also with long term conditions (2/3 men and 3/4 of women over 85 have long term conditions, there were 1.6M hospital admissions for 65 and overs in 2003/04).

17.5 million people in the UK suffer from chronic medical conditions. E.g. there are 1.3 million people with diabetes and 700,000 with dementia.

In all age groups, over 10% of people have at least one long term condition (NHS).

17.5M people in the UK have chronic conditions (predicted to double over the next 25 years; ref. DAP). For example, there are 1.8 million people with diabetes, 3.5 million being treated for asthsma, 8-10 million with arthritis and 700,000 with dementia.

Only 65% of UK households have Internet access (56% have broadband and 9% have dial-up; Office of National Statistics 2008). However, this figure varies geographically (e.g. 74% in the South east and 54% in the North East), by educational qualification (93% for graduates; 56% for people with no formal qualification) and age and gender (e.g. 70% of the over 65's, and 29% of women have never used the internet). The majority of those who do not have a connection either do not want, or feel that they

---

[15] Source: Ageing and Mortality in the UK: National Statistician's annual article on the population, Office for National Statistics, 2008, p1 **tinyurl.com/6kysl3**

need one. Even within inner city areas there are areas that have no fibre delivered broadband. Only 23% of internet users used mobile devices to access the internet.

Cost

The number of people in the UK with dementia is set to double to 1.4 million over the next 30 years and the costs to the UK economy will go from £17 billion to £50 billion[16].

The financial cost of dementia in the UK is estimated to exceed £17 billion each year.

80% of the NHS budget is spent on chronic conditions.

There are ~6 million carers in the UK (rising to over 9 million over 30 years); 80% of whom are of working age. Carers save the UK £87 billion a year. family carers of people with dementia are estimated to save the UK over £6 billion per annum.

Isolation

11 per cent of those aged 65 or over are often or always lonely 48 per cent of those aged 65 or over say the television is their main company.

12 per cent of those aged 65 or over say they are trapped in their own home.

The number of people aged 75 and over living alone will increase by over 40 per cent in the next 20 years[17]

Current UK Government Initiatives on dementia and care of the elderly

The future UK health policy is to provide care for the elderly within their home.

The UK government has pledged to invest £130m in initiatives such as telecare and home adaptations as part of its free personal care measures, which will be implemented through the Personal Care at Home Bill to be passed in 2010 (ref). It is estimated this will help 130,000 people needing home care for the first time to regain

---

[16] Source: Mental Capital and Well Being: Makingthe most of ourselves in the 21st century: executivesummary, Foresight, part of the GovernmentOffice for Science, p32, see **tinyurl.com/musgnr**

[17] Source: One Voice: Shaping our ageing society, Help the Aged and Age Concern, April 2009, p47-48, tinyurl.com/d5sttj

their independence. The Bill also pledges to guarantee free personal care for 280,000 elderly and disabled people with the greatest needs.

The UK department of health has established housing dementia research consortium (h-d-r-c) to develop and establish design standards for dementia housing. It is comprised of over 200 members including local authorities, hospitals and 3rd sector bodies. Bournemouth council is leading the initiative and are in the process of developing the first dementia resident in the UK this scheme is known as Draper Road dementia extra care scheme. The scheme comprises of 20 flats with the latest technology to aid suffers from dementia to live independently. The website http://www.h-d-r-c.info/Bournemouth.html gives more information on the scheme.

Telecare

Telecare in the UK is a service that supports mainly the elderly and vulnerable people, to live independently in their own home through the use of sensors. Telecare provides 24 hour monitoring of an individual, ensuring an alert is raised if the sensor detects any problems.

If a Telecare sensor activates in an individuals home an alert is automatically raised to a 24 hour response centre who will maintain contact with the user to check on their safety and arrange the appropriate support by contacting a family member, mobile warden or emergency service. The response centre has access to information on the service user and can identify what sensor in the home has activated to ensure the appropriate responses are arranged promptly. Service is currently paid for by social services department in the UK

There are three types of Telecare alert systems provide by local authorities in the UK and are described below.

Stand alone systems alert. Alerts the user in their house to an event and there is no connection to a response centre. This service is for users who are able to deal with the alert themselves, such as pill dispensers and memo minders.

The Carer alert system. In this type of service an alert is sent to someone in the same property that a response is required. These are for people who reside with carers in the same property and would always have someone with them, such as pendants, bed/chair sensors, flood detectors and door contacts.

The Telecare alarm services. A telecare alaram unit system notify a central response centre that a detector in the house of a user has been activated. This service for people who require an outside response to deal with the situation. Typcial sensors that are used in this service are smoke detectors, gas detectors, pill dispensers, flood detectors, bed/chair sensors, pendants, fall detectors, door contacts, heat sensors, low temperature sensors.

Size of telecare market

The estimate for the telecare market varies from £200 million to £1 billion per year. This variation is due to different organizations having different definitions of telecare and including different costs.

The London Borough of Newham estimated that a typical borough London provides telecare services to 2500 people and as there are 30 boroughs in London this equates to 75,000 users in London alone.

The UK Remote Patient Monitoring market was estimated at $31.8M in 2006 and is expected to reach $79.5M by 2010, growing at 25.6% pa (2006-2010). The UK social alarms market was estimated to be $158M in 2006 and is expected to reach $200M by 2010 (6.2% pa).

Typical costs of providing telecare by a local authority

The costs of running a 24 hour a day telcare service by a local authority is costly due to the cost of having staff on duty 24 hours a day. The real cost of an alarm unit type telecare service is probably be £5 to £6 per week per user. A typical telecare call centre will monitor between 2000-5,000 users and derive their income from end users and various government grants.

The potential market for the assistive living solutions is enormous according to the London Borough of Redbridge. LB of Redbridge increased the use of telecare services for new clients by 19.7% in 2008-09 just by attending faith groups, engaging with community leaders and handing out leaflets in the local shopping centre.

Telecare in Wales

The Welsh Assembly Government has made £9.82 million of funding available over two years to local authorities to promote the development of telecare service delivery. They are now in the third year of that funding:

All 22 local authorities are now delivering telecare services.

All 22 authorities in Wales have a named lead officer for telecare and

All 22 have produced strategies for the development of local telecare services in partnership with LHBs and others.

Under the terms of the funding all Local Authorities are required to commit to evaluating their telecare service delivery and communicating learning across Wales through the Telecare Learning and Improvement Network (LIN) which is an all-Wales body created and facilitated by the Welsh Assembly Government. An All- Wales Telecare Learning & Improvement Network (LIN) has been established with representation from all 22 local authorities and Wales. The LIN meets bi-monthly and operates as an email community for the dissemination of learning and information. A website for all matters relating to the development of telecare in Wales has been established at www.ssiacymru.org.uk/telecare.

An independent evaluation of the impact of the telecare funding on the social care, health and housing economies in Wales has been commissioned from Imperial College, London (due to report in September 2009). The evaluation of the grant in Wales will be firmly based on the extent to which it achieves outcomes such as later admissions to residential care, reduced hospital admissions etc.

The Welsh Assembly Government sees Telecare as a platform for the operation of existing community-based services aimed at supporting people and controlling the risks of living at home and to that extent it supports the re-modelling of existing services to meet the demands placed on social care service delivery.

The Strategy for Social Services in Wales over the next decade: “Fulfilled Lives, Supportive Communities” highlights the opportunities presented by care technologies that allow remote monitoring of people’s well-being linked to response services that provide greater security for the service user, allow help to be better targeted, and support more people to live at home.

The strategy notes that Telecare (the remote monitoring of a citizen's well-being, with early identification of needs) can offer more effective services that help users to keep control of their lives, and commits the Welsh Assembly Government to working with partners in local government, health, and the housing sectors to exploit the opportunities for technology and develop new care models to support people in their own homes.

Current Telecare devices

The current devices being used in the telcare services in the UK are described below.

Pendant	The pendant can be worn on the wrist, around the neck or on a clothing clip and when pressed will raise an alarm.
Smoke Detector	An alarm is raised when fire or excessive smoke is detected.
Heat Sensor	The device will raise an alarm if the temperature in a property exceeds a set limit. It will alert if there is a rapid rise in temperature over a short space of time.
Natural Gas/CO Detector	The device detects both carbon monoxide and natural gas. If a gas appliance is turned on, but not lit, an alarm will be raised. There is also a separate carbon monoxide detector.
Flood Detector	An alarm will be raised if water is detected on the floor
Low Temperature Sensor	An alarm will be raised if the temperature falls to an unacceptable level, which may lead to the on-set of hypothermia.
Fall Detector	The Fall Detector is worn on a belt around the waist and will notify a carer or monitoring centre immediately that a service user has had a fall. It works on a combination of orientation and impact.
Bed Sensor	The bed sensor will detect when a user has left the bed and not returned within a pre-set time. The times can be pre-programmed to ensure the sensor will work during the hours they go to bed. There is also an option to link this to a bedside light.
Door Contacts	Wandering can be detected using door contacts on internal and external doors. When the door is opened, an alarm is sent to the

	response centre or carer to alert them of the potential risk.
Medication Reminder	An automatic medication reminder with up to 4 alarm times per day. It spins and beeps to remind users to take their medication and lets them gain access to it. This reduces the risk of double-dosing. If the prompt is not accepted, an alarm can be sent to the response centre. It is lockable and portable. The medication must be checked that it is suitable for a dispenser.
Epilepsy Sensor	The Epilepsy Sensor will raise an alarm to a monitoring centre or other alarm recipient when a seizure is detected. The sensor is designed to detect Tonic-Clonic (Grand Mal) seizure types only. That is, during the seizure there must be convulsions (shaking or jerking movements). Any other seizure types such as partial or absence seizures without movement would not be detected.
Bogus Caller Button	The button is placed by the door for the service user to press when an unwanted visitor tries to enter someone's home.

Telehealth

Telehealth is a form of Telecare that is designed to complement health care through the remote monitoring of vital signs in the patient's own home. Diagnosis, assessment and management of a patient's conditions can be supported by monitoring vital signs, such as blood pressure, weight, glucose levels or pulse, without requiring the patient to leave their front room.

These measurements are relayed via a telephone line to a database where the information is automatically checked to ensure that it falls within set parameters. The patient's healthcare team can access this database at anytime to review treatment or change settings.

If data is received which is outside the parameters, an alarm is triggered which can be immediately responded to by either the centre or by designated health carers.

The fact that telehealth enables the patients to remain in their own home, results in a wide ranging benefits for patients, clinicians and health care providers (see below). The government itself has already placed technology at the heart of its modernisation

programme and is already supporting the implementation of telehealth to improve NHS services and deliver cost savings.

Telehealth covers the electronic exchange of personal health data from a patient at home to medical staff at hospital or similar site to assist in diagnosis and monitoring. Examples include monitoring and support for people with a heart condition, lung function problems or diabetes. This range of telehealth devices includes systems which monitor health. For example with the appropriate equipment a system can monitor blood pressure, blood glucose or oxygen saturation. These monitoring telehealth devices allow remote monitoring of vital signs as and when required. This can reduce the need for travel by both the patient and care provider.

Telemedicine

Telemedicine Monitors are devices that remotely monitor a patient's vital signs within parameters set by the patient's own doctor or clinician. The measurements are transmitted over a telephone line to a database where they can be accessed remotely by a clinician.

Telemedicine can bring advantages to a range of patients, particularly those with long tern conditons who are frequent occupiers of unplanned hospital beds: conditions such as Chronic Obstructive Pulmonary Disease (COPD), sleep apnoea, heart failure and coronary heart disease (CHD).

Telehealth and Telemedicine devices

A range of health monitors are available for connection to compatible telehealth control boxes, these can monitor a range of your vital signs. These may include:

- blood pressure,
- heart rate,
- weight,
- oxygen saturation,
- blood glucose levels,
- ECG or peak flow

- Body temperature

Summary of assisted living provision in other EU countries

Social alarms are the most common application of telecare and are used in most countries in Europe. More advanced telecare applications involving the provision of additional sensors to enhance basic social alarms are not widely used (although the UK offers some services to tenants via its social services).

More advanced telecare solutions, involving activity monitoring, data gathering and analysis, these have been utilized in pilot settings in many countries in Europe. Similarly telehealth applications have been piloted in Europe. However, neither has yet been mainstreamed in any country in Europe. The table below summaries the state of telecare and telehealth in various countries in Europe based on the results of the EU ICT & Ageing project (www.ict-ageing.eu).

The main barriers to the development of the telhelath and telecare markets across Europe are listed below.

- Lack of business case i.e. lack of recognized cost benefit
- Lack of incentives for healthcare providers under existing national reimbursement systems
- Structure of national health services act as blocks to the development of this market
- Regional fragmentation
- Medical and legal risks to new services
- Lack of infrastructural capacity
- Professional and social resistance

Country	Telecare Provision	Telehealth Provision	National developments
Slovenia	Underdevelopment	Underdevelopment	Some services are being developed but are only at demonstration stage. Telephone consultations are common. Compulsory health care does not cover telecare or telehealth.
United Kingdom	Telcare is provided for the elderly and others with chronic conditions	Mainly pilots and	Government is aware that they need to provide alternative to way is delivered in the UK due to the current health provision not being sustainable. Government is funding large pilots of telecare and research projects. Several regions such as Yorkshire are developing regional strategies to implement aspects of more advanced telecare and telehealth services. Standards for dementia are being developed by the national health services, which is being led by Bournemouth Council.
Poland	In development and pilots	In development and pilots	There is no strategic policy activity in this area.
Sweden	On going development of services	Some telehealth services are available such as online patent journal and digital description	Large number of current and future research is being planned in this area. However, there is no overall policy on telehealth.
Italy	Underdevelopment	Pilots	

The Netherlands	Telecare solutions are offered mostly on a commercial level through care organizations	Pilots	National policy to introduce home telehealth in the medium term.
Hungary	Underdevelopment	Pilots	No national policy on telehealth
Ireland	Underdevelopment	none	No national policy on telehealth
Finland	Underdevelopment	In development	No developed policy om home telehealth. Howeevr use of telehealth is being to expand in a limited manners across the country.
France	Underdevelopment	Pilots	No national policy on telehealth
Denmark	Underdevelopment	Pilots	No national policy on telehealth
Spain	Underdevelopment	Pilots	Development of astratgey to implement teleheath in a regional bases
Bulgira	Underdevelopment	Pilots	No national policy on telehealth
Germany	Underdevelopment	Pilots	No national policy on telehealth