ELF@Home

Elderly sELF-care based on sELF-check of health conditions and sELF-fitness at home

D1.1 Project HandBook

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Executive Summary

The ELF@Home Project is a research and innovation project co-funded by the Ambient Assisted Living Joint Programme (AAL JP) and National Authorities in Spain (Ministerio de Industria Energía y Turismo - MINETUR), Germany (Federal Ministry of Education and Research - BMBF) and Sweden (Vinnova). The AAL JP is a funding activity running from 2008 to 2013 that aims to create better condition of life for the older adults and to strengthen the industrial opportunities in Europe through the use of information and communication technology (ICT). ELF@Home is funded under Call 5: "ICT-based Solutions for (Self-) Management of Daily Life Activities of Older Adults at Home". The aim of the Call 5 is the development of ICT-based solutions which enable and sustain older adults to continue managing their daily activities in their home.

The ELF@Home project idea is to use the proven advantages of elderly fitness to develop a self-care solution based on self-check of health conditions and fitness at home. The solution will use an autonomous fitness system targeting not frailty or pre-frailty elder people aged over 65 years and living independently at home. A personalized fitness exercises programme will be offered to each user based on its health status and its activity level. The health status will be monitored using biomedical sensors and the activity level will be monitored by a wearable activity sensor specially designed for elderly needs during the project execution. The system will work autonomously as a personal trainer generating a personalized fitness plan and verifying the right execution of this plan.

This document describes the ELF@Home project focusing on the motivation of the project and providing a general overview of the expected outcome. An example scenario is used to explain the use case of the project and the proposed technologies. The work plan is presented explaining the main four phases: (a) management and dissemination, (b) requirements gathering, (c) research and development and (d) field trials.

Document Information

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Abstract (for dissemination)	The ELF@Home Project is a research and innovation project co-funded by the Ambient Assisted Living Joint Programme (AAL JP) and National Authorities in Spain, Germany and Sweden. The AAL JP is a funding activity running from 2008 to 2013 that aims to create better condition of life for the older adults and to strengthen the industrial opportunities in Europe through the use of information and communication technology (ICT). The ELF@Home project idea is to use the proven advantages of elderly fitness to develop a self-care solution based on self-check of health conditions and fitness at home. The project will use ICT to build an autonomous fitness system targeting not frailty or pre-frailty elder people aged over 65 years and living independently at home.
Keywords	elderly, health, activity, fitness

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Abbreviations

AAL: Ambient Assisted Living.

ADL: Activities of Daily Living.

COPD: Chronic obstructive pulmonary disease.

ICT: Information and Communication Technologies.

IT: Information Technology.

R&D: Research and Development.

WP: Work Package.

Definitions

ELF@Home: Elderly sELF-care based on sELF-check of health conditions and sELF-fitness at home.

Exergame*:* Computer game that requires physical activity.

1 Introduction

1.1 Motivation

The demographic change expected in Europe will lead to an older population within next years. The European population projection for 2008-2060 shows an "ageing society" according to the reports published by the European Office for Statistics. These changes will lead to an increase in social costs. Technologies and services in the area of Ambient Assisted Living (AAL) play an important role in solving some of the problems of an "ageing society". Information and communication technology (ICT) should help older individuals to live an independent life in the privacy of one's home as long as possible. Following this objective, AAL technologies integrate intelligent assistance systems in people's homes.

Frailty syndrome [1] has been emerging in recent years as an explanation for age disability when no relevant pathology exists. Frailty is an important cause for the loss of autonomy conferring high risk for falls, disability for activities of daily living (ADL disability), cognitive disease, hospitalization and mortality. Frailty is considered highly prevalent in old age and according to the SHARE study [2] in ten European countries, more than 42% of the elderly aged over 65 years is pre-frailty and 17% is frailty.

Obesity and inactivity are two of the forerunners of frailty [3]. Some studies have shown that it is possible to prevent the functional decline of frailty with physical treatment. The physical treatment targets the improvement of physical abilities, highlighting balance and muscle strength. These interventions have demonstrated their feasibility both at home [4] and in care facilities [5].

Elderly fitness programs are a good approach to prevent frailty. There is an elderly demand to facilitate access to personalized elderly fitness independently of their life context. A Spanish study [6] shows that 17% of the elderly participate in elderly fitness programmes and 13% would be interested but they have no possibility. A higher figure (23%) is shown in a German study [7] analysing the elderly barriers to physical activity. Although elderly fitness programs are available in some public and private facilities around Europe, not every elderly can gain access to them. Several studies [6] show that the barriers for the elderly to access physical activity are mainly related to health conditions (exercises do not adjust to personal characteristics as overweight or shortness of breath), transport problems (lack of means, afraid of public transports), lack of opportunities and lack of interest. As a consequence, social, financial and geographical restrictions combined with the lack of motivation [8] are the main barriers in the elderly fitness programs adherence. It is necessary to work on motivating the elderly to keep them healthy with an enjoyment perspective and supporting them taking into account their individual characteristics and preferences.

1.2 State of the Art

Several public and private sports facilities in big cities around Europe are offering fitness classes and programs to the elderly. For example in Spain, most of these programs offer two or three classes per week at prices between 25€ to 50€ per month. This kind of activity is also offered by social centres and in some cases by healthcare centres as part of rehabilitation therapies. In all of these cases the user has to get to the care or sport facility in order to have access to the program. In some places transportation means specially adapted to elderly people are neither available nor convenient.

Regarding the use of technology to assist elderly people in doing sports, one of the most important trends is the use of serious videogames to do some exercise activities [9]. Exergames (computer games that require physical activity) have proven to be good for improving the emotional and physical well-being, and for motivating the maintenance of a basic level of activity [10]. Although this solution has proven to be suitable for elderly people in recent years, the main problem is that the proposed exercises do not take into account specific user conditions. In most cases, physical games are not designed to consider the problems of elderly users [11]; too complex and demanding games will cause rejection. The cost of the equipment necessary for this approach is about 250€ in commercial products such as video game consoles.

Concerning state-of-the-art solutions related to elderly fitness, some research projects (IS-ACTIVE [12], PAMAP [13], RGS [14]) have focused on specified chronic conditions and rehabilitation. IS-ACTIVE is

focused on COPD patients with a physical rehabilitation perspective [15]; PAMAP integrates a personalised TV trainer [16] using wearable sensors and RGS proposes a training platform with adaptive game levels [17]. Integrated platforms such as Microsoft HealthVault [18] have also to been proposed. These platforms log health status by health and fitness sensors and allow patients, formal and informal caregivers to supervise patient status.

Most of the research initiatives in the state of the art and solutions in the market are focused on specified chronic diseases, they do not take into account the daily activity level of the elderly to plan exercises and they do not have a preventive approach. Although some personalization is done using exercise performance, the health status is not used to personalise the exercises plan, and in all cases this personalization relays on professional caregivers. Moreover, in most technological solutions the elderly have to wear intrusive sensors to acquire movements during fitness sessions.

2 Project Overview

According to the motivation and state-of-the-art described in section 1, this section is focused on the objective, the general description and the expected results of the project.

2.1 Objective

The main objective of the project is to use the proven advantages of elderly fitness to develop a self-care solution based on self-check of health conditions and fitness at home.

The solution will use an autonomous fitness system targeting not frailty or pre-frailty elder people aged over 65 years and living independently at home. The system will empower end-users by allowing them to prevent frailty, dependency and functional decline by doing fitness at home. As a result, the use of this solution will help the elderly to stay independently at home dealing autonomously with the activities of daily living (ADL) (see Figure 1).

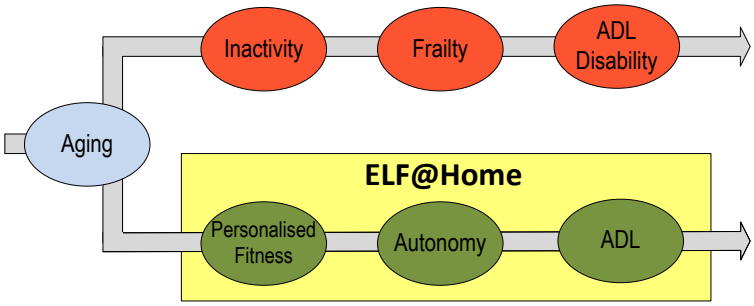

Figure 1: ELF@Home concept

The project will develop and test the technology needed to launch a new home-based fitness service to the market by addressing technology development, validation of the solution with users as well as business plan development.

2.2 Proposed Solution

ELF@Home proposes an ICT-based system to enable elderly people access to personalized elderly fitness at home at any time. The system will provide a personalized fitness plan to persuade and motivate users by facilitating and simplifying the access to fitness programs at home. The proposed solution will also create awareness of the importance of self-care and daily activity. It will monitor the activity lifestyle and propose necessary changes.

The personalization of the fitness program offered to users will be based on health status monitoring and the daily activity level of the user. The health status will be monitored using commercially available biomedical sensors. The continuous monitoring of activity level will be accomplished by the development of a new wearable activity sensor specially designed for elderly needs. Therefore, the system will work as a personal trainer monitoring the physical activity of the user, generating a personalized fitness plan based on activity and health status, and verifying the right execution of this plan.

To achieve these goals the system will be composed of biomedical sensors, a wearable physical activity sensor, a simple TV interface for fitness sessions and a computer vision system to analyse fitness exercises execution. All these components will be connected to a service platform implementing the intelligence needed. Figure 2 shows the main components and the general idea of the ELF@Home system.

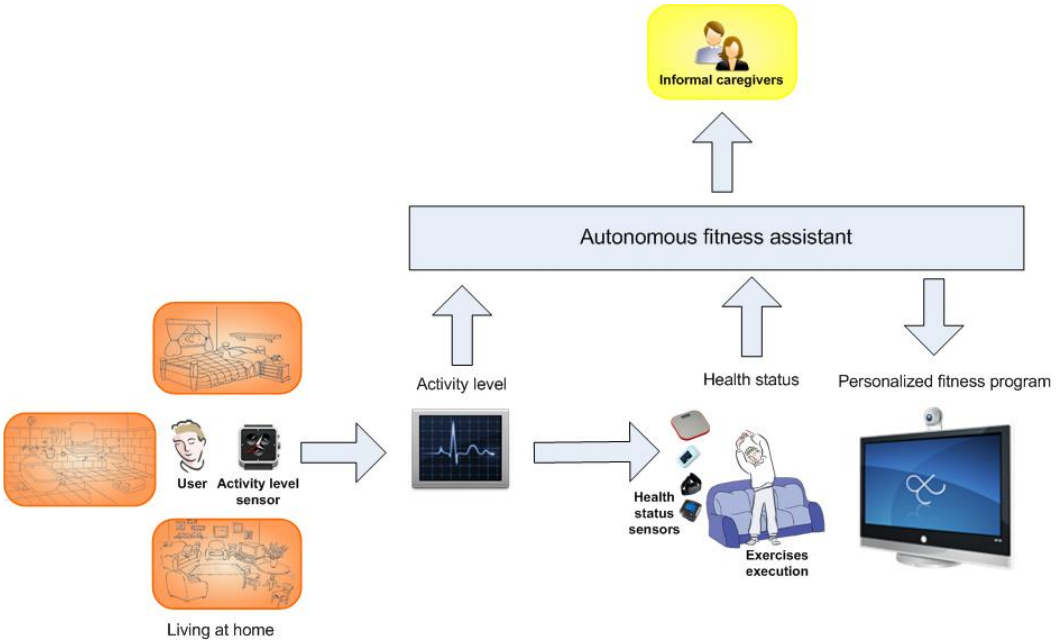

Figure 2: ELF@Home use case

2.3 Example Scenario

Sophie is a 63 year old woman retired and living independently in a small village of a rural area. She would like to be physical active and she tries to walk as much as possible but the weather is not always suitable for outdoor activities. As an alternative to outdoor activities she would like to attend elderly fitness classes but the nearest city in which a facility with elderly fitness classes is available is 35 km away and transportation facilities are not always convenient.

Using her internet connection she has decided to hire the ELF@Home solution to do exercising. After hiring the solution, Sophie follows her normally routine and relays on the virtual trainer to do some fitness exercises three times per week. The system monitors her daily activity to calculate the activity level that Sophie has achieved in the last days and to propose a set of activities accordingly. She starts the virtual trainer on her TV in the living room when the wearable device warns her according to her daily routines. The virtual trainer presents some exercises to Sophie and she executes them in front of the TV, which has a camera above it. The signal of the camera is used by the virtual trainer to check the exercise execution and to propose the necessary improvements to Sophie. For example, the virtual trainer asks Sophie to hold her arms open for a longer time to increase exercise effectiveness.

After exercising, the virtual trainer asks Sophie to use some biomedical sensors to collect relevant information about her health status. It also asks some questions about her to send some reports to her family and care professionals. Her family can supervise Sophie's exercises and encourage her when she was not active enough for a long time.

2.4 Expected Results

A successful implementation of the aimed service will benefit different actors:

- End users will have a new home-based service to sustain their autonomy and prevent ADL disability. Access to this service will be possible in equal conditions independently of user's contexts.
- Autonomous and healthy elderly people will contribute to reduce care and social costs.
- Companies will have new product opportunities related to home-based fitness and self-care at home.

The main innovations of the service are related to the design of a solution specifically adapted to elderly people. The system will be designed minimizing end user intervention and maximizing usability. Taken this into account, from the scientific point of view, the most important contributions of ELF@Home to improve the state-of-the-art will be:

- The continuous monitoring of user's activity level and the automatic personalization of fitness exercises according to the monitored life style. Bio-signal processing algorithms and artificial intelligence techniques will be studied during the project.
- User interfaces and fitness exercises designed according to elderly needs and abilities. Although the design of exergames for the elderly has been previously explored in the state of art, the scientific community agrees that more studies are needed regarding the interaction design, some aspects related to suitable gestures for game input [19] and accessible motion-controlled video games [20].

In contrast to the contemporary service models presented in section 1.2, the new service proposed in ELF@Home is based on four functional innovations:

- Elderly people do fitness at home at any time independently of where they live.
- Although the exercising is done without a direct human supervision, the system is able to monitor the exercises and give feedback to the user about its execution.
- The fitness program is personalized according to the user profile and the physical activity level without direct human intervention. The exercise plan is generated automatically according to the user life style and profile. Personalization of the fitness program will include exercise selection, difficulty level adjustment and content adaptation. The content adaptation will be mainly focused in the personalization of the user interface concerning user preferences and cultural issues.
- The impact of the fitness program is evaluated by using medical sensors in order to adjust the program.

The results of this project will be an interesting starting point for companies or communities interested in the elderly exercise promotion as a way of maintaining activities of daily living.

3 Work Plan

As shown in Figure 3 the project work plan is divided in four main phases taking into account the work's nature:

- Project Management, Dissemination and Exploitation (WP1, WP7).
- Requirements Gathering and User Involvement (WP2)
- Research and Development (WP3, WP4, WP5).
- Field Trials (WP6).

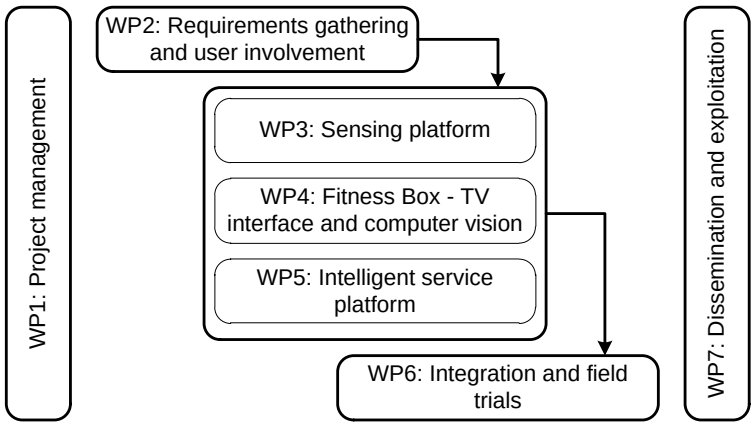

Figure 3: Work packages organization

The research and development phase is organized according to the technological components of the system:

- Sensing platform – Wearable activity sensor and bio-medical sensors (WP3)
- Fitness Box –TV interface and computer vision (WP4)
- Intelligent service platform (WP5)

The project starts on the 1st of June 2013 and will finish on the 31st of May 2016 (36 months).

3.1 Work Packages Overview

3.1.1 WP1 – Project Management

This work package is related to the management and coordination activities of the project. It will run along the whole project lifetime (from month 1 to month 36) ensuring a successful completion of the project goals on time, within budget and with the adequate quality standards for European research projects.

3.1.2 WP2 – Requirements Gathering and User Involvement

The functionalities and technical characteristics of the service will be defined in this work package by studying user and service exploitation requirements. The involvement of end users in the specification, design and development of the service will be crucial during this work package scheduled from month one to month nine. The design of the general architecture according to user and technical requirements is the main output expected.

3.1.3 WP3 – Sensing Platform

The objective of this work package (from month 10 to month 24) is the study, design and development of the health related sensors needed to acquire a health profile of the end users. Two types of sensors are needed:

- Bio-medical sensors (weight scales, blood pressure sensors, pulse-oximeters, heart rate sensors, etc.). State-of-the-art commercial devices will be integrated or adapted in the proposed service.
- Wearable activity sensor. This sensor will be completely designed and developed from scratch.

3.1.4 WP4 – Fitness Box – TV Interface and Computer Vision

The main interface to the end user will be a TV-based application that will be controlled by using natural interaction modes (speech and gestures). The interface will guide end users through the use of biomedical sensors and will also work as a fitness assistant. The fitness assistant will show the exercises to be performed and it will supervise the user during fitness sessions. This component will be based on computer vision techniques and special attention will be paid to elderly requirements. Work package four is scheduled from month 10 to month 24.

3.1.5 WP5 – Intelligent Service Platform

In this work package, planned from month 10 to month 24, a service platform able to receive and evaluate the information coming from the sensor devices will be designed and implemented. Both sensor types (bio-medical sensors and the wearable activity sensor explained in WP3) will be integrated via a communication interface in order to send the data to the intelligent service platform.

Based on the gathered sensor data, sophisticated knowledge-based methods will be developed allowing the generation of personalized fitness plans according to end user's health status. An essential component of the fitness plan is the activity profile which will be calculated from the data of the wearable activity sensor. The overall system will have to select an individual fitness program based on a set of specific exercises and programs according to the health status and activity profile of the user.

3.1.6 WP6 – Integration and Field Trials

The proposed solution will be validated from month 25 to month 36 in a real scenario. The technology-enabled service presented in previous paragraphs will be tested in a main pilot application in Spain. Other two minor tests involving a small number of users are planned in Sweden and in Spain too. Therefore, pilots will target different groups of users in order to ensure a sound verification of the proposed solution.

3.1.7 WP7 – Dissemination and Exploitation

This work package planned along all the project lifetime has two main objectives:

- To coordinate and carry out the dissemination of the project results. The aim is to promote and empower the dissemination, transfer, assessment and adoption of the project results to the target audience and stakeholders.
- Development of the business plan: The plan will cover key product achievements as well as the identification of target markets and potential target customers for the partners. Its aim is to maximise the project impact and exploitation opportunities.

3.2 Public Deliverables

Table 1 shows the list of public deliverables according to the proposed work plan. These deliverables will show the progress of the project and will allow the scientific community to take advantage of the project results.

Table 1: List of public deliverables

Del. no.	Deliverable name	WP	Nature/Type	Date (project month)
D1.1	*Project handbook*	WP1	Report	M3
D1.2	*Yearly project report*	WP1	Report	M12 M24 M36
D2.1	*Service requirements report*	WP2	Report	M6
D2.2	*Methodological process design*	WP2	Report	M9
D2.3	*General architecture design*	WP2	Design	M9
D6.2	*Trial definition report*	WP6	Report	M29
D6.3	*Trial result report*	WP6	Report	M36
D7.1	*Web page of the project*	WP7	Web page	M3
D7.2	*Scientific and technical contributions in conferences and seminars*	WP7	Report	M12 M24 M36
D7.4	*Final project meeting involving all the stakeholders*	WP7	Report	M36

4 Consortium

Table 2 shows the list of project partners and their general information. The ELF@Home consortium is composed by partners from three European countries (Spain, Sweden and Germany) and from different kind of organisations (universities, research organisations, industry partners and user organisations). The role of research and industry partners is important in order to develop the proposed service and the participation of end user associations guarantees end user involvement during the whole service development process. This end user perspective is not only indispensable in the field trials but in the requirements study, design and implementation phases. The role of the SMEs is also crucial due to their technological specialization.

In addition to the entities included in the project consortium the project will also be supported by the *MANCOSI – Mancomunidad Comarca de la Sidra* (The Cider Shire Commonwealth) [21] as a collaborator. This entity is a public administration constituted as an association of six municipalities in Asturias (Spain) that will collaborate in the project as a primary and tertiary end user and will take part in the pilot phase.

The knowledge and resources of the companies in the consortium (IZER, EXP, INNO, 2DD) is complemented with the specific expertise of universities (UMU), research centres (CTIC, IIS) and end users (SGGPA, SKO, MANCOSI).

Taking into account the ethnical, cultural and social differences between the regions in Europe, the design and validation of the proposed service will be addressed with users among different regions in Europe: southern region (Spain) and northern region (Sweden).

Table 2: ELF@Home partners

Name	Short name	Type	Country	Web address
Fundación CTIC - Centro Tecnológico	CTIC	Research Org.	Spain	http://www.fundacionctic.org
Izertis	IZER	SME	Spain	http://www.izertis.com
Sociedad Gerontológica y Geriátrica del Principado de Asturias	SGGPA	User Org.	Spain	-
Umeå University	UMU	University	Sweden	http://www.informatik.umu.se
Explizit AB	EXP	SME	Sweden	http://www.explizit.se
Skellefteå Kommun	SKO	User Org.	Sweden	http://www.skelleftea.se
Fraunhofer Institute of Integrated Circuits	IIS	Research Org.	Germany	http://www.iis.fraunhofer.de/med
Innovationsmanufaktur GmbH	INNO	SME	Germany	http://www.innovationsmanufaktur.com
2D Debus & Diebold Meßsysteme GmbH	2DD	SME	Germany	http://2d-datarecording.com

4.1 Fundación CTIC - Centro Tecnológico

CTIC – **Fundación CTIC** – **Centro Tecnológico** (Center for the Development of Information and Communication Technologies in Asturias) is a non-profit private organization, constituted by a group of firms from the Information and Communication Technologies field, and the Government of the Principality of Asturias. CTIC – CT is specialised in the research and development of cutting-edge technologies. It is a technical and neutral organisation, which is committed to the territorial development and also to the economic and social progress. CTIC R&D organizes its core activities in four research units: Semantic Technologies, Mobility and Device Independency, 4U (User, Universal, Useful, Usable) and Emergent technologies / industrial solutions. The R&D area with 28 researches has taken part in more than 50 R&D Spanish projects in collaboration with a wide set of business entities, most of them SMEs. At European level the R&D department has been involved in 2 European projects in the INTERREG program, 1 project in the FP6 program and 4 projects in the FP7 program during the last 5 years. CTIC - CT researches for and in collaboration with companies of various sizes and sectors (BMT, Audi, SAP, Atos Origin, Telefónica R&D, ArcelorMittal, Indra, etc.). CTIC – CT also takes part in several Spanish and European Technology Platforms through several working groups or by being part of their managing committees, thus contributing to their strategic and research agendas. In the ELF@Home project CTIC will be the coordinator due to its experience in other European Projects. At technical level CTIC will be responsible for the Fitness Box component. This component will allow CTIC to continue the lines of research about user interfaces and interaction modes (gestures, voice, etc.).

4.2 Izertis

IZER – **Izertis** is an SME founded in 1987 with focus on engineering and IT services. The head office is located in Asturias (Spain) and the company has several branch offices in the Northern Spain. Izertis is a consolidated engineering company providing IT-infrastructure services and also developing technology-based products for public administrations and private companies, mainly web-based platforms and virtual assistants based on semantic technologies. During the last three years the company has strongly reinforced its innovation strategy, going for investing own resources and also participating in regional and national R&D projects. Izertis will act as business partner in the ELF@Home project, providing IT infrastructure for the pilot and also working on R&D tasks related to virtual monitoring and the intelligent service platform development. They will also be involved in dissemination and exploitation issues.

4.3 Sociedad de Geriatría y Gerontología del Principado de Asturias

SGGPA – **Sociedad de Geriatría y Gerontología del Principado de Asturias** (Geriatrics and Gerontology Association of Asturias) is a non-profit legal entity with the mission of improving the health status of the Asturian population by promoting health care and psycho-social intervention programs. SGGPA was founded in 1999 by healthcare professionals and lawyers. Nowadays it has five employees and 96 associated members. SGGPA works closely with public and private entities devoted to eldercare in Asturias, such as the Clinic management and Geriatric area of the Hospital Monte Naranco. They have also direct access to hundreds of primary end users over 65 years old living independently at home. SGGPA will take part in the project as end user, contributing the vision of the care professionals, assuring ethical issues and recruiting citizens for the pilot (primary end users). In addition, eldercare professionals of SGGPA will be in charge of evaluating project outcomes not only from the primary end user but also from the secondary end users' point of view, analyzing socio-demographic, suitable fitness exercises, nutritional and health-related variables.

4.4 Umeå University

UMU – **Umeå University**. Umeå University is the principal university for the northern part of Sweden, with about 37,000 students, 4,300 staff, 1,700 courses and 120 major study programmes. In the Department of Informatics at Umeå University, they attempt to explain the design and production of new information and communication technology and media. A central concern is with how technology and media are used, experienced and evaluated. The Q-life research group focuses on the potential of ICT in promoting wellbeing and mental and physical health. They work closely with many local organisations, including those representing the elderly and the disabled. Q-life members have considerable expertise and experience in the

design, development and testing of novel forms of human-computer interaction, new digital media, virtual and augmented reality. Q-life is involved in several international projects and are the coordinators of *AGNES: User-sensitive home-based systems for successful ageing in a networked society*, a project funded by the Ambient Assisted Living (AAL) Joint Programme. Q-life is currently also a partner in several other international projects, including *RICHARD: Regional ICT based Clusters for Healthcare Applications and R&D Integration* (funded by EU FP7 Regions of Knowledge Health), and *SILHOUETTE: uSIng noveL information and communication tecHnologies fOr the sUpport of Elderly's acTive parTicipation in the information society* (funded by Interreg IVC). Q-life activities focus on producing and testing prototypes and applications with users. In the current project, Umeå University will continue and expand on this line of research, drawing on our experience of user involvement and testing.

4.5 Explizit AB

EXP – Explizit AB. Explizit AB is an SME R&D Company with a focus on sensors, wireless communication technology and transactions. The head office is located in Skellefteå, Sweden and currently there are 45 employees. The company is owned by Argentum Group, an experienced and motivated IT Consultancy Company. Explizit has experience of developing remote medical monitoring and wireless and mobile devices for healthcare applications. Explizit will be in charge for the exploitation of the projects results and will contribute to the analysis and design of the ICT related technological and business aspects.

4.6 Skellefteå Kommun

SKO – Skellefteå Kommun. Skellefteå Kommun, in Northern Sweden, is a municipality with a population of 72,000. The Social Welfare Office (with a staff of 2,100) is responsible for care of the older adult, which includes 700 accommodations for the older adult, 300 communal living establishments, 60 short-term stay homes and 13,000 home-help hours per year. The Kommun`s role in the project will be that of a care provider recruiting citizens for the design and testing of systems developed in the project.

4.7 Fraunhofer Institute for Integrated Circuits

IIS – Fraunhofer Institute for Integrated Circuits established 1985 in Erlangen, Germany and ranked first among the Fraunhofer Institutes concerning headcount and revenues, performs contract research and development for industry and public authorities. As part of the business field medical technology the Medical Communication and Biosignal Processing group develops and implements standardized medical communication protocols, telemedical infrastructures and platforms, signal processing algorithms based on medical sensor systems as well as motion analysis based on commercial acceleration sensors. With this respect, our solutions vary from algorithms for the automatic recognition of elementary movements like e. g. walking, running, cycling with one single sensor, the transmission of these algorithms onto mobile devices to the reconstruction of complex motions by means of networks of various sensors. In cooperation with our partners IIS will develope sustainable methods and concepts to motivate especially elderly people to be more active in order to give them the opportunity to live a self-determined and healthy life.

4.8 Innovationsmanufaktur GmbH

INNO – Innovationsmanufaktur GmbH. The core competences of the Innovationsmanufaktur GmbH are the development and application of methods for the stimulation and organization of innovation, the innovation management in complex settings, the integration of user requirements and motivation into innovative projects, and the usage of extensive and thorough context analysis. This can be achieved by the dynamic utilization and constant further development of INNO's own innovation methodology (Holistische Innovation, Springer-Verlag 2009, see also www.holistic-innovation.org) and the application and integration of theoretical and applied knowledge in user motivation and requirements, contextual analysis and embedding, system visioning, and determination of technological opportunities. The team of INNO is experienced in the management of interdisciplinary, complex and multinational innovation projects. Over the last decade they have initiated, coordinated and managed a large number of innovation ventures with partners from industry (see references below), and academia around the globe, several of them funded by regional, national and international institutions. Since its founding in 2000, INNO has been working on

systematic and holistic innovations in the fields of sports, wellness, health and lifestyle. In regard to the AAL Call, the most relevant project references are:

- Conception, establishment and coordination of the first editions of the ispo Best Ager initiative (2006/2007), www.ispo-bestager.com
- Formation of the action alliance Best Ager, in cooperation with several regional and national partners
- Participation in the project “Dynamic Garden" – Fitness, Movement, and Health for all Ages in Public Space – EUREKA
- Successful application in the German AAL programme, “GEWOS – Gesund Wohnen mit Stil”.

4.9 2D Debus & Diebold Meßsysteme GmbH

2DD – 2D Debus & Diebold Meßsysteme GmbH was founded in 1993 and has worked since its foundation in the development, production and sales of measuring systems for motorcycle racing. Over the course of 18 years 2DD grew from a 2 man show to a well know industry leader and supplier with more than 20 employees. The USPs of the company are functionality, size, weight and reliability of their products. The main achievements of the company are data collection, recording and evaluation for racing. The company has a large experience in the collection and analysis of data on humans and machines. Leading teams and companies in Moto-GP, Formula 1, sailing, soccer, vehicle manufacturing and aeronautics trust the reliability and superior quality of 2DD’s products. The staff of the company has a high proportion of developers. With this resource, the company consistently develops new and innovative products. 2D Debus & Diebold Meßsysteme GmbH is a supplier and developer for complete measurement systems (plug & play systems), custom made solutions (hardware and software) and customer needs (service and custom developments). Key factors for the development are simple and fast signal processing. 2D Debus & Diebold will integrate the results of the project directly into its product range and enhanced with this project, the division of medical technology products.

4.10 Mancomunidad Comarca de la Sidra

In addition to the entities in the project consortium, the project has a collaborator entity: **MANCOSI** – **Mancomunidad Comarca de la Sidra (The Cider Shire Commonwealth).** MANCOSI is a public authority constituted as an association of six municipalities in the center of Asturias. MANCOSI’s Welfare office is providing care services for a population of 28,000 inhabitants (7,800 people aged over 65). Care services currently being provided to elderly people include home-care services, accessible transport, food on wheels, support to the relatives, etc. At this moment more than 650 users are using these services. In addition, MANCOSI is involved in a long-term research project focused on the use of ICT technology to support elderly people living independently in rural areas. In the RETEMANCOSI/TELEGA project MANCOSI has researched the use of videoconferencing for social support and cognitive training. There are 35 users currently testing these types of services as part of the research validation. MANCOSI will contribute to ELF@Home recruiting end-users for the design and testing of the proposed solution as well as to the development of the business model from the point of view of a public administration. The participation of elderly people already involve in research studies will facilitate the pilot application of the ELF@Home project.

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