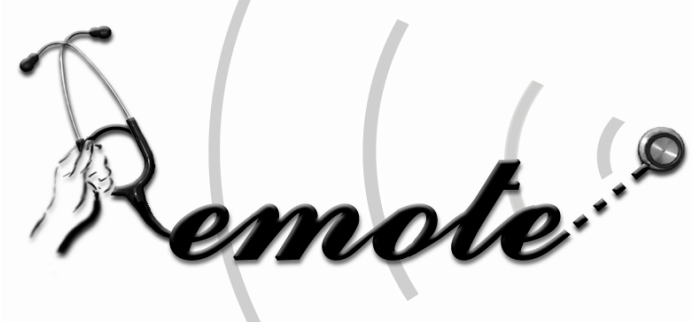
# AMBIENT ASSISTED LIVING (AAL) JOINT PROGRAMME

**Project**

ICT based solutions for Prevention and Management of Chronic Conditions of Elderly People
(REMOTE, AAL-2008-1-147)




**Deliverable**

## D8.2: REMOTE R&D roadmap, guidelines, and contribution to standards.

| | | | |
|---|---|---|---|
| **Work package No** | WP8 | **Work package Title** | Ethical issues, dissemination and standardization |
| **Task number** | T8.3 | **Task Title** | Lessons learned, R&D roadmap, guidelines, and standardisation actions. |
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## EXECUTIVE SUMMARY

The aim of this deliverable is to identify and describe a set of guidelines for applications as a result of the experience and knowledge acquired during the execution of the project, with specific reference to the outcomes of the experimental phase.

This document deals with the Lessons learned during the execution of the project and R & D roadmap, and also with the standardisation plans and actions.

In particular, this report provides in Section 2 an analysis of the relationship among the use cases and the Remote applications. In Section 3 there is a detailed description of the lessons learned in Remote project. The R&D roadmap is described in Section 4 and Section 5 provides a detailed description about the Standardisation plans and actions, while Section 6 presents the conclusions about this Deliverable.

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## HISTORY OF THE DOCUMENT

| Revision History | | | | |
|---|---|---|---|---|
| ***Revision No.*** | ***Author*** | ***Date*** | ***Reason for Change*** | ***The changes*** |
| 0,1 | Rocío Paniagua Fernández | 29/05/2012 | First draft | -- |
| 0,2 | Rocío Paniagua Fernández | 12/06/2012 | Update | **1**.- Introduction. |
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| 1.3 | Federico Villagra | 28/09/2012 | Contribution | **4**.- R&D Roadmap |
| 1.4 | Rocío Panigua Fernández | 02/10/2012 | Contribution | **3**.- Lessons Learned. |
| 1.5 | Alejandro Aracil Ramón | 17/10/2012 | Contribution | **5.5** And Conclusion |
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## LIST OF ABBREVIATIONS AND DEFINITIONS

| | |
|---|---|
| **AmI** | Ambient Intelligence |
| **UC** | Use Case |
| **SOA** | Service-Oriented Architecture |
| **R & D** | Research and Development |
| **WP** | Work Package |
| | |

# 1 INTRODUCTION

## 1.1 GENERAL OVERVIEW OF THE REMOTE PROJECT

The REMOTE project aims at the definition and implementation of an ICT-based integration approach for addressing identified needs of elderly users, especially of citizens at risk due to geographic and social isolation in combination with chronic conditions , such as hypertension, arthritis, asthma, stroke, Alzheimer's disease, and Parkinson's disease , and the coexistence of lifestyle risk factors, such as obesity, blood pressure, smoking, alcohol abuse, poor eating / drinking habits, stress, and low levels of physical activity.

In order to achieve its main goal the REMOTE project proposes a number of technologies that encompass both software and hardware elements that are integrated into the overall REMOTE platform in such a way to adhere to the main principled of the service-oriented architecture (SOA) paradigm. More specifically, the project advances the state-of-the-art in fields of tele-healthcare and ambient intelligence (Aml) and target the enhancement of user personal environment with audio-visual, sensor / motoric monitoring, and automation abilities for tracing vital signs, activity, behaviour and health condition, and detecting risks and critical situations as well as providing, proactively and reactively, effective and efficient support at home.

The overall REMOTE platform will be the result of a combined effort that addresses the integration of existing research prototypes and the development of new systems for collecting, recording and analysing health- and context-related data tailored to the specific requirement of the REMOTE project. A number of hardware devices are taken into consideration to be included in the working prototypes that are foreseen for development. These include wearable devices and sensors for detecting intra-oral miniature wetness and jaw movements, body temperature, blood pressure, heart rate, human posture and motion / acceleration recognition, etc., as well as sensors and actuators to be installed in premises (and vehicles) for providing context information, e.g., air temperature, luminance, humidity, human location and motion, etc.

## 1.2 WORK IN WP8

The REMOTE project is structured in ten work packages. Among these, WP8 "Ethical issues, dissemination and standardization" is dedicated to the proper management of the Ethical issues, and the realization of the activities such as the dissemination and the standardisation plans.

Specific objectives of WP8 include:

- To facilitate the sharing of knowledge inside the Consortium and raise the awareness of the ethical issues involved in the developed technologies and ensure that the projects proceeds and comes to an ethical and legal conclusion.

- To follow a multi-dimensional dissemination approach, in order to disseminate the project concept and results, attract the interest and stimulate the necessary feedback / involvement from all key parties (the scientific / technological community, the relevant industrial sectors and the potential customers, the target user groups and their associations, the International Standardisation bodies and any other stakeholders).

This deliverable presents the work that relates to the task T8.3 which contributes with the definition of policies and standards as a key condition of the growth of the market, through interoperability and availability of plug & play solutions. In this respect, the REMOTE takes into account standards, such as standardization developments in the field of knowledge representation and semantic web ontology specifications, and also the services that contribute to the independence of elderly.

## 1.3 THE PURPOSE OF THE REMOTE LESSONS LEARNED, R&D ROADMAP, GUIDELINES, AND STANDARDISATION ACTIONS

The purpose of the "REMOTE Lessons learned, R&D Roadmap, guidelines, and standardisation actions", and therefore the purpose of this document, is to identify and describe a set of guidelines for applications as a result of the experience and knowledge acquired during the execution of the project, with specific reference to the outcomes of the experimental phase.

This document describes what are the lessons learned during project implementation, and also describes the roadmap and the standardisation plans and actions.

## 1.4 DOCUMENT STRUCTURE

This document is structured as follows:

- Section 2 is an analysis among the Uses Cases and the Remote Applications.
- Section 3 provides a detailed description of the Lessons Learned.
- Section 4 describes the R&D Roadmap with the management of chronic diseases
- Section 5 provides a detailed description about the Standardisation plans and actions.
- Section 6 is the conclusions obtained from the analysis of the Lessons Learned, R&D roadmap, standardisation plans and actions.

# 2 USE CASES & REMOTE APPLICATIONS

## 2.1 INTRODUCTION

In this part of the Deliverable are described the relationship between the Use Cases and the Remote Applications, what is done in REMOTE and what remains as a future task.

The uses cases are defined in the deliverable *D1.1 User Requirements Definition of REMOTE and Use Cases*.

The Remote PC Applications are described in detail in D4.1, and Remote Mobile Applications are described in detail in D4.2

## 2.2 USE CASES AND APPLICATIONS TABLE

In the following table is described the relationship between the use cases and the REMOTE applications. To find out what are the future tasks after REMOTE is necessary to analyze what is done and what remains to be done in REMOTE project.

There are two use cases that don't have any application in REMOTE:

- UC7.4 Cognitive problem prognosis
- UC10.5 Statistical and help tools

Thus, these two Use Cases will be future tasks after REMOTE is completed.

The components that make up the use cases and applications table are:

- **Service:** Name of the Service.
- **Use case associated:** Number of the Use Case.
- **Use case name:** Name of the Use Case.
- **DONE:** if the Use Case is done as application in REMOTE.
- **REMOTE APPLICATION:** Name of the application in REMOTE.

The relationship between the use cases and the Remote applications is described in the table below:

| Service | User Case Associated | User Case Name | DONE | REMOTE APPLICATION |
|---|---|---|---|---|
| Monitoring services | UC1.1 | Vital signs monitoring | YES | Guardian Angel |
| | UC1.2 | User activity recognition and characterization | YES | Environmental Control |
| | UC1.3 | User profile building | YES | User Apps |
| Personal self-care services | UC1.4 | Personal calendar construction and maintenance | YES | Personal Calendar |
| | UC2.1 | Activity advisor | YES | Activity advisor |
| | UC2.2 | Medical advisor | YES | Activity Advisor, Nutritional Advisor, Health Advisor |
| | UC2.3 | Nutritional advisor | YES | Nutritional Advisor |
| | UC2.4 | Monitoring of user compliance to activity plans | YES | Activity Advisor |
| | UC2.5 | Monitoring of user compliance to medical treatment | YES | Activity Advisor, Nutritional Advisor, Health Advisor |
| | UC2.6 | Monitoring of user compliance to nutritional plans | YES | Nutritional Advisor |
| | UC3.1 | Brain skills trainer for memory support | YES | Brain Skills Trainer |
| | UC3.2 | Brain skills trainer for memory assessment | YES | Brain Skills Trainer |
| | UC3.3 | Cooperative brain and skills trainer | YES | Brain Skills Trainer |
| | UC3.4 | Social gaming | YES | Brain Skills Trainer |
| | UC3.5 | Social networking | YES | Brain Skills Trainer |
| | UC4.1 | Health based trip advisor | YES | Trip Advisor |
| | UC6.1 | Guarding angel | YES | Guardian Angel |
| | UC6.2 | On the move health care | YES | Health Advisor |
| | UC6.3 | Virtual trip assistant | YES | Trip Advisor |
| Augmented autonomy services | UC5.1 | Environmental control at home | YES | Environmental Control |
| | UC5.2 | In home user localization | YES | Environmental Control |
| | UC5.3 | Fall detection | YES | Guardian Angel |

| | | | | |
|---|---|---|---|---|
| | UC5.4 | Home gateway for services | YES | Environmental Control |
| Professional healthcare services | UC7.1 | Patients record monitoring | YES | Guardian Angel |
| | UC7.2 | Patient activity monitoring | YES | Guardian Angel, Activity Advisor |
| | UC7.3 | Patient nutrition monitoring | YES | Nutrition Advisor |
| | UC7.4 | Cognitive problem prognosis | **NO** | The use of the applications will help the professional the detection of cognitive problems |
| | UC7.5 | Decision support tool for patient and treatment administration | YES | Health Advisor |
| | UC7.6 | Treatment planning assistant | YES | Health Advisor |
| | UC7.7 | Carer – patient dialogue support tool | YES | Dialog Support Tool |
| Informal tele-assistance services | UC8.1 | Informal assistant – patient and formal carer dialogue support | YES | Dialog Support Tool |
| | UC8.2 | Care planning assistant | YES | Health Advisor |
| | UC8.3 | Automated alerts and periodic health status reporting | YES | Status report for carers |
| Medical Contact Centre service | UC9.1 | Medical Centre Administration tool | YES | Medical Center |
| | UC9.2 | Emergency management service | YES | Emergency Center |
| Others | UC10.1 | System Administration | YES | Medical Center |
| | UC10.2 | Patient subscription | YES | Medical Center |
| | UC10.3 | Professional carer subscription | YES | Medical Center |
| | UC10.4 | Informal carer subscription | YES | Medical Center |
| | UC10.5 | Statistical and help tools | **NO** | Users manual is published in the most part of the applications. |

**Table 2-1. Use Cases & Applicatons from REMOTE.**

# 3 LESSONS LEARNED

## 3.1 INTRODUCTION

In the field of the project management, the lessons learned are all the knowledge gained through experience, successful or not, in the process of carrying out a project to improve future performance.

The objective of this part of the document is gathering all relevant information for better planning of later project stages and future projects, improving implementation of new projects, and preventing or minimizing risks for future projects.

## 3.2 DESCRIPTION

The lessons learned are a set of errors and successes that the leader and the project team have been able to manage and overcome during the project.

Documenting the lessons learned is a very important part of the continuous improvement process. It helps the project team to know the causes of the problems that have occurred in the project, and avoid those problems in later project stages or future projects.

Collecting lessons learned is an integral part of each project and it serves many purposes. Not generating lessons learned and / or not to use this valuable tool in crisis situations could result in future projects that lead to failure, and thus endanger the success in achieving the strategic objectives of the organization.

The advantages of using the lessons learned are the following:

- It is a valuable tool to use and support other project leaders within the organization who have been assigned to similar projects.
- It improves the planning of future projects, avoiding previous errors and reducing risks.
- It helps identifying opportunities for improvement and train future managers and project team members based on them.
- It forms the basis for improving organizational practices of project management.
- It helps to develop new and better procedures for working.
- It provides information to support better decision-making, reduces uncertainty and improves the response time to situations similar to those that have to deal with the project team.

## 3.3 LESSONS LEARNED TEMPLATE

The lessons learned template must describe what was wrong during the project and also should suggest what actions were correct to avoid repeating the same situations in the future.

The purpose of the lessons learned template is helping the team project sharing the knowledge gained during the execution of the project through the experience.

The components that make up the lessons learned template are:

- **Project**: Name of the project.
- **Start Date**: Project start date.
- **End Date:** Project end date.
- **Project Coordinator:** Name of project coordinator.
- **Partners**: Names of project team members.
- **#**: Number of consecutive record.
- **Topic**: Name which quickly identifies the subject that is the lesson learned.
- **Description**: Describes in detail the situation that faced the project team.
- **Project Phase**: Phase of the project life cycle where the lesson emerged: Initiation, Planning, Executing, Controlling and Closing.
- **Category**: Areas of Expertise: Scope Management, Time Management, Cost Management, Quality Management, Human Resources Management, Communication Management, Risk Management and Procurement Management.
- **Actions**: Describes in detail the decisions / actions taken to face the situation.
- **Results**: Describes in detail the results obtained by such procedures. What went well? What went wrong?
- **Recommendation**: Describe what actions must be repeated, what to avoid and / or others could be implemented for future projects.

The following is the Lesson Learned Template used in REMOTE project:

| Lessons Learned | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project:** | Name of the project. | | | | | | |
| **Start Date:** | Project start date. | | | **End Date:** | Project end date. | | |
| **Project Coordinator:** | Name of project coordinator. | | | | | | |
| **Partners:** | Names of project team members. | | | | | | |
| **#** | **Topic** | **Description** | **Project Phase** | **Category** | **Actions** | **Results** | **Recommendation** |
| Number of consecutive record. | Name which quickly identifies the subject that is the lesson learned. | Describes in detail the situation that faced the project team. | Phase of the project life cycle where emerged the lesson: Initiation, Planning, Executing, Controlling and Closing. | Areas of Expertise: Scope Management, Time Management, Cost Management,Quality Management, Human Resources Management, Communication Management, Risk Management and Procurement Management. | Describes in detail the decisions / actions taken to face the situation. | Describes in detail the results obtained by such procedures. What went well? What went wrong? | Describe what actions must be repeated, what to avoid and / or others could be implemented for future projects. |

**Figure 1.- Lessons learned template**

## 3.4 LESSONS LEARNED FROM REMOTE

All the lessons learned that are described in this part of the document have been written with the contributions of the REMOTE partners, and describing the successes and errors that the team project has managed and overcome during the project.

This is a summary of the Lessons learned during the execution of the REMOTE Project:

| # | Topic | Description | Project Phase | Category | Actions | Results | Recommendation |
|---|---|---|---|---|---|---|---|
| 1 | UI Adaptation Framework | How is the user interface adaptation going to work for REMOTE? | Planning | Software development (Technical) | An adaptation framework was implemented and used by all application developers. | A common user interface look and feel was used among all integrated applications. | Decide early on the look and feel of the applications and any user adaptation issues, before starting application development. |
| 2 | Multiple Users | How many users sould the system support and how would the user management take place? | Planning | Software development (Technical) | Early decision taken about having multiple REMOTE users and the Medical Contact Centre in order to create/manage them, authentication service and login screen was added | The multi-user support and management was very well designed and realised | Deciding in an early stage of the project the multi-user support contributed in better design of automatic UI adaptation issues and more efficient user profile use |
| 3 | Time zones | REMOTE users are located in different time zones | Planning | Risk Management | Time zone standardization | All the system should use UCT | Hard tests implementation regarding this issue in order to avoid critical problems |
| 4 | Multiplatfo rm UI design | UI design taking into account different platforms: Tablet, Laptop, PC, Smartphone | Planning | Quality Management | UI standardization | Most part of the application are ready to be successfully shown through several platforms | To retrieve the most common platforms that you can find in the market |

| # | Topic | Description | Project Phase | Category | Actions | Results | Recommendation |
|---|---|---|---|---|---|---|---|
| 5 | Anonymous information | DDBB are informed with Anonymous information | Planning | Quality Management | Anonymous ID | Data stored in REMOTE DDBB is not explicitly linked with the real owner of this data | To check national laws of each country |
| 6 | Equipment availability and paperwork | How to obtain the required equipment and deal with the paperwork necessary for the purchase. | Planning | Cost Management | After deciding on the required equipment, the partners begun procedures to purchase the sensors and devices. | Two problems arose. Some partners had difficulties finding the correct model of the equipment, while others were stuck with paperwork problems and delays. | Even though every piece of equipment was available without significant delays, it should be advisable to deal with these matters a little bit earlier. In addition, to deal with model availability problems, market research should be up to date, before deciding what to buy. |
| 7 | Pilot plans | Planifications of project Pilots | Planning | Scope management | A detailed evaluation plan was created for the pilots realisation, including clear instructions and steps to be followed in each phase, as well as reporting templates for results gathering | The evaluation plan resulted in clear and detailed reported results for each pilot phase which facilitated the analysis and consolidation. | Exhaustive analysis of the results that need to be extracted from the pilots phase in order to create specific templates for information gathering. |
| 8 | Software requirements | Definition of communication among system modules | Planning | Software development | Iterative system designed was performed in order to cover all functionality requirements by all system modules. | Iterative system design helped to successfully cover all functionality requirements by all system modules. However, due to the decentralization of the system in different | Exhaustive definition of software requirements and study of possible incompatibilities among technologies used by all partners. |

| # | Topic | Description | Project Phase | Category | Actions | Results | Recommendation |
|---|---|---|---|---|---|---|---|
| | | | | | | countries, the use of different technologies difficulted in some cases the interfaces among system modules. | |
| 9 | UI standardization | Unified look and feel for application User interfaces | Executing | Software development | A common look and feel was created for all end users applications. Furthermore, a UI design platform was provided to developers. | The UI design platform helped to substantially speed up the UI creation process. This was done for all PC applications for end users (elderly). A common L&F for the rest of the applications would have been really useful and productive not only for developers but also for users during pilots. | Definition of standardized look and feel for each user group of the project, including also secondary users (formal and informal caregivers). |
| 10 | Multilingual support | Is the system going to be multilingual? | Executing | Software development (Technical) | In some applications extra translations have been added during the development phase because of the fact that some pilot tests were decided to take place in more pilot sites | Testing the applications to extra pilot sites has given more accurate results of the applications' usability by the elderly | The use of LWUIT Resource Tool facilitated the addition of extra translations to the already developed applications. LWUIT framework was in general very helpful for Java ME development |
| 11 | Bug reporting | Issues solving during technical | Executing | Software development (Technical) / | Mantis tool was selected for bug reporting. | Direct e-mail notification of system bugs, | All developers should complete the loop of bug reporting and |

| # | Topic | Description | Project Phase | Category | Actions | Results | Recommendation |
|---|---|---|---|---|---|---|---|
| | | validation | | Communication management | Developers tracked the issues from creation to closing after the issue was solved. | the appropriate developer was notified each time a bug was identified, detailed description of steps in order to reproduce them, bug resolved status. Bug reporting through mantis tool improved the quality of issues tracking during technical validation. | close issues when finished in order to facilitate the tracking of pending issues. Mantis tool was found out to be extremely helpful to the debugging process |
| 12 | Communication with remote pilot site partners | Pilot testing site situated away from the responsible partner. | Executing | Communication Management | Travel between the responsible partners and the pilot site was necessary in the beginning to organize everything. Then, frequent communication via e-mail or telephone was needed. | The pilot was organized successfully, but there were some events postponed due to lack of proper communication. Even with the delays and problems, the work was executed correctly. | If it's possible, it would be better to conduct pilot tests in an area close to the responsible pilot partner, so as to avoid communication and organization problems. |
| 13 | Multiple-Location System | REMOTE servers are distributed across several locations | Executing | Risk Management | Close coordination between different subsystem responsible | Due the whole system is managed by different partners from different countries it causes some problems to restore the system is some periods (bank | To try to centralize the system as much as possible |

| # | Topic | Description | Project Phase | Category | Actions | Results | Recommendation |
|---|---|---|---|---|---|---|---|
| | | | | | | holidays, local technical problems) | |
| 14 | Usability Evaluation | How to evaluate the usability of all REMOTE applications and systems. | Initiation, Planning, Executing | Quality Management | A complete evaluation plan was devised, consisting of three evaluation phases, including both expert and user based evaluations. | The evaluation plan was successfully executed and resulted in many bug fixes and usability improvements, as well as pilot results from users. | The evaluation procedure proved to be one of the most important aspects of the project, providing improvements and results for analysis. It is highly recommended for use in future projects. |
| 15 | Communication | How would the partners communicate between each other? | Initiation, Planning, Executing Controlling | Communication Management | There were Teleconference groups created (White, Yellow< Purple, etc.), each partner joined the appropriate group depending on its role in the project and teleconference sessions have been taking place every week | Partners had a detailed overview of the issues that other partners have been working on and cooperation has been much improved | Teleconference sessions assisted a lot in the development of the project however sometimes they should not have lasted so long |

**Table 3-1. Lessons Learned from REMOTE.**

# 4 R & D ROADMAP: TELEMEDICINE AND CHRONIC DISEASES

## *4.1 INTRODUCTION*

The management of chronic diseases implies the oversight and education activities conducted by health professionals to help patients learning and understanding more about their conditions and thus live successfully with it.

The work involves motivating patients to persevere with necessary therapies and interventions and helping them to achieve an ongoing, reasonable quality of life.

Telemedicine can be used to continuously educate and motivate patients (e.g., e-learning). Technology can help to monitor patients and make sure they follow therapies and interventions:

**A)** Chronic management helps patients systematically monitor their progress and coordinate with experts to identify and solve any problems they encounter in their treatment. Technology can empower user in systematically monitoring their progress and identifying risks (e.g., risks of not properly following their treatment regimen) on their own:

- Monitor user activity and detect improper habits in lifestyle

**B)** Managing chronic conditions requires ongoing adjustments and long lasting interactions with the care system (lots of visits, lots of paper work). Fragmentation of care is a risk for patients:

- Use technology to establish sustainable links with healthcare systems replacing visits by tele-healthcare, and reducing paperwork

**C)** In treating chronic illnesses, the same intervention, whether medical or behavioural, may differ in effectiveness depending on when in the course of the illness the intervention is suggested:

- Use technology to monitor the effect of deployed interventions

**D)** Necessary interventions can require input and careful coordination among from multiple specialists that may not usually work together (actuaries, physicians, medical economists, nurses, nutritionists, physical therapists, statisticians, epidemiologists, etc.):

- Use technology for changing the elder's home into a "virtual hospital", where multiple specialists from anywhere can work together and share information.

## 4.2 PARKINSON´S DISEASE

The ability to measure activities of daily living (ADL) and hand and gait function for people with Parkinson's disease via an Internet-based tele-rehabilitation system would have a significant impact on the equity, accessibility, and management of the condition for patients who live in rural and remote communities (Hoffmann et al., 2008).

Parkinson's disease (PD) is a chronic, neurodegenerative movement disorder, affecting approximately 1% of the population over the age of 65 years (Tison et al., 1994). People with PD typically have disturbances in voluntary and involuntary movement and display signs of movement dysfunction such as tremor, rigidity in their limbs, bradykinesia, and postural impairments (Shultz-Krohn 2001). Tremor and rigidity in the upper limbs can contribute to gross and fine motor coordination difficulties, which can subsequently adversely impact on hand function. These difficulties typically become evident during tasks such as cutting food, buttoning shirts, and handwriting (Gage and Storey 2004). Parkinson's disease can significantly alter a person's capacity to perform their regular activities of daily living (ADL), such as self-care tasks, as well as work and leisure activities (Gaudet 2002). Reduced independence in ADL has been linked to a poorer quality of life in people with PD (Behari et al., 2005).

The pathophysiology of gait and postural instability in Parkinson's Disease (PD) is not fully understood, but the poor responsiveness to Levodopa (L-dopa) treatment of these symptoms suggests that they may result from further nondopaminergic lesions (Bonnet et al., 1987). These disorders frequently cause falls, in particular during the initiation and termination of gait (Stolze et al., 2004).

Occupational therapy can help people suffering from Parkinson's disease to maintain their independence in ADL for as long as possible (Deane et al., 2001). The work done by Milsteed 2000 examined the evidence for non-pharmacological rehabilitation for people with Parkinson's disease and concluded that occupational therapy intervention can have a significant positive effect on the functional independence and quality of life of people with Parkinson's disease. As Parkinson's disease is a progressive disease, monitoring and frequent reassessment of function is important in the management of this condition. This helps to ensure that the therapy provided is tailored to the person's current needs and functional level (Hoffmann et al., 2008).

Despite the efficacy of occupational therapy intervention for people with Parkinson's disease, timely access to occupational therapy services is not always possible. This is particularly the case for people who live in rural and remote communities (Milsteed 2000). Without access to occupational therapy, the ability of people with Parkinson's disease to perform ADL at an optimal functional level may be compromised (Deane et al., 2001). Due to the progression of the disease, the patient will need a constant remote monitoring and frequent re-assessment of function to manage the condition efficiently.

Thus the patient will need to have a therapy tailored to the person's current needs and functional level. The use of occupational therapy can assist PD patients in remote areas to maintain independence in ADL for as long as possible. The design of an efficient occupational therapy intervention that have a significant positive effect on the functional independence and quality of life of PD patient is essential (Hoffmann et al., 2008).

The need for accessible and quality health care in rural and remote areas has been one factor driving the development of tele-rehabilitation applications which have the potential to deliver high quality, specialist care to rural and remote areas (Russel et al., 2002, 2003). The University of Queensland in Australia has developed a tele-rehabilitation application, which is based a based computer-based that enables remote clinical interactions with patients across Internet (Hoffmann et al., 2008). Such system includes high quality audio and video technologies and a battery of measurement tools that can objectively measure various aspects of functional performance across an Internet link (Hill et al., 2006; Hoffmann et al., 2008). The tele-rehabilitation system has been specifically designed to operate across low-bandwidth Internet-protocol connections that are available in rural and remote areas of Australia (Hoffmann et al., 2008).

A similar protocol could be applied in rural areas of Europe with, perhaps, a more advance tele-rehabilitation system. The inclusion of the Australian system in this document serves as an example that can be applied in the future

### 4.2.1 Needs of Parkinson's disease Patients

The technology to be developed should concentrate in the following aspects in relation to movement disorders (e.g. Parkinson's disease) and the elderly.

Prevent falls, monitor stability of walking and freezing of gait – wearable accelerometers to monitor patient during daily life so as reducing hazards at home are some of the factors to be monitored remotely in patients suffering from movement disorders. On the other hand it is important to improve balance and strength through exercise which could also be monitored remotely.

Develop a device for measuring and monitoring balance and gait among older people and patients suffering from movement disorders (e.g. Parkinson's disease). Such system should be able to record complications of medical therapies that include wearing off and dyskinesias in PD patients. This will also allow evaluate motor complications for both clinical care as well as for trials of novel therapies, the ability to measure activities of daily living (ADL) for people with Parkinson's disease and assessments in the areas of speech pathology (a battery of speech pathology assessment).

### 4.2.2 Tele-rehabilitation/Prevention and Parkinson's disease

Current best evidence demonstrates that exercise could play a crucial role in the well-known prevention of falls and disability in elderly and in patients suffering from Parkinson's disease. Compliance with exercise is often disappointing, suggesting some reluctance on part of older adults to participate in such programs. Thus, it is important to develop home-based exercise programs and motivate the elderly to follow such programs. Thus it is essential to develop remote devices which will motivate and to monitor the progress of cognitive and motor therapies in the elderly/PD patients remotely.

## *4.3 HYPERTENSION*

The prevalence of hypertension is considered to be linked to the epidemic of obesity (Prentice 2006; Maokdad et al., 2001). The increasing prevalence of hypertension occurred in conjunction with a dramatic increase of the number of people with overweight and obesity (Francischetti, and Genelhu 2007). The strong association between blood pressure and body weight has been well documented in various populations (Doll et al., 2002).

The number of effectively treated patients with hypertension is not satisfying. This is partly related to the patient's poor knowledge about their disease. Blood pressure self-management is a powerful tool to keep the patients attention on their disease. Therefore, continuous education for the patients with hypertension is needed to modify their behavior and lifestyle factors (Fleischman et al 2004).

Recently, telecommunication techniques enable patients to access medical content and hence increase their knowledge about their diseases (Diaz and Griffith 2002). A few studies have been performed to test the effect of cellular phone or Internet interventions on obese patients with or without diabetes (Morak et al., 2008; Kim and Kim 2008). Also, a few computer-based or electronic-management systems, such as cellular phone with fax-back system (Logan et al., 2007), web with an e-mails (Green et al., 2008), and Internet (Nunes et al., 2006), have been reported to improve hypertension care.

### 4.3.1 Needs of cardiovascular disease Patients (Heart failure, Hypertension)

What needs to be evaluated in patients with cardiovascular disease? Intensive home-based monitoring reduces hospital admissions and inpatient time for patients suffering from severe congestive heart failure (Kornowski et al., 1995)

It has been suggested that the quality of life of patients with heart disease was improved when such patients used electrocardiogram (ECG) transmission during their rehabilitation at home (Ades et al., 2000).

It is important to monitor:

- Constant monitoring of heart rate
- Blood pressure
- Oxygen consumption
- Temperature

Equipment required that can be used to monitor CVD patients are the following:

- ECG recorder that performs 12 channel system of ECG signals and transmits them through the internet or email.
- Ambulatory blood pressure device measures BP and can be connected to a PC.
- Portable patient interface device with automated data transmission capabilities connected to the patient's phone line will allow a closer monitorization can be used in elderly people after coronary artery bypass grafting (Barnason et al., 2006).

### 4.3.2 Telerehabilitation

Heart failure is a vital problem in modern cardiology. Statistics show that more than 10 and 4 million people suffer from Heart Failure (HF) in Europe and in the USA, respectively. According to the present guidelines for HF patients, regular exercise training has obtained the class of recommendation I, level of evidence A [Dickstein et al., 2008). According to the present guidelines for Hear failure patients, regular exercise training is an essential for their rehabilitation. The problem medicine needs to deal with is the provision of cardiac rehabilitation (CR) to all HF patients and thus complying with these recommendation.

Despite the benefits of CR, many HF patients are inactive (Piepoli et al., 2008). Common patient's rejection of existing forms of rehabilitation and limitations resulting from the disease itself hinder the outpatient CR. That is why home telemonitored CR seems to be the optimal form of physical activity. Telemedicine can be the most useful method for the patients to perform exercise training. Telemedicine could control the stability of clinical status and help supervise training sessions. In order to control those two tasks, it is important to develop a system that can monitor the following symptoms: fatigue, dyspnea, chest pain), and parameters like heart rate, arrhythmias, ischemia, blood pressure, body mass, saturation, medication taken, etc.

Regarding Hypertension is a leading cause of cardiovascular disease. Advances in technology have added telemedicine as a tool to manage Hypertension. The efficacy of telemedicine depends on patient's ability to adhere to schedules of home monitoring and case management. Thus it is essential to develop a system that can measure blood pressure (BP) that can transmit the readings via a modem and a phone line to a Pharmacist (or doctor) case manager.

## *4.4 STROKE*

Stroke is the leading cause for disability in Europe and the United States (Kolominsky-Rabas et al., 2001). Recovery of motor deficits following stroke is incomplete in the majority of affected subjects despite intensive rehabilitation (Kwakkel et al., 2002). Six months following stroke up to 60% of stroke survivors still suffer from impaired manual dexterity, which affects their activities of daily living, and only a minority of those patients return to their professional life (Kwakkel et al., 2002). Given these epidemiological facts there is a socioeconomic need to develop and implement innovative, neurobiologically founded strategies in stroke rehabilitation.

### 4.4.1 Tele-rehabilitation and Stroke

The objective of tele-rehabilitation is to convey therapeutic interventions at a distance for subjects with disabilities due to various injuries (Burdea et al., 2000 Piron et al., 2002). In this regard, several disabilities due to neurological lesions might benefit from the increase in frequency of treatment that could be provided via telemedicine without the systematic displacement of therapist or patient a randomized controlled study with a larger group of post-stroke patients.

Motion and neural rehabilitation are strictly correlated. Prompt motion rehabilitation is essential to ensure good recovery performance from the stroke defect. Remote therapy, should monitor daily motion activity. An optimal tele-rehabilitation program should be capable of monitoring patient activity starting from a high disability of imbalance, when there is the need for properly designed aids or prosthesis. The program should continue when the patient improves his or her condition, and progressively changes or abandons aids or prosthesis. New home care for remote activity monitoring has been proposed (Giansanti et al., 2009). A system to allow activity monitoring of step-counting for the continuity of care at home would also very relevant for gait rehabilitation. The system should allow monitoring of other physiological parameters (blood pressure, heart rate, blood glucose) useful to investigate in stroke rehabilitation.

Telemedicine may benefit stroke patients and the elderly from an increase of treatment that could provided without the systematic displacement of therapist or patient. Use technology to constantly monitor blood pressure levels and alert the elderly patient (and the health Center) on time. Use monitor technology to detect signs of stroke and motivate the patient and or family members to turn in to a hospital for further examinations.

Prevention of stroke is an important public health concern. The most important modifiable risk factor for stroke are high blood pressure and atrial fibrillation, cholesterol levels, diabetes, smoking (active and passive), heavy alcohol consumption, lack of activity, obesity and unhealthy diet. Technology can be used to motivate, guide and supervise patients in their efforts to modify and

maintain healthy nutrition and lifestyle habits; encourage social interaction, gaming and other entertainment and exercise.

## 4.5 ASTHMA

Asthma is a chronic disease that affects the airways and is characterized by recurrent attacks of breathlessness and wheezing. About 300 million people suffer from asthma worldwide (WHO 2007). Over the last 20 years, the prevalence of asthma has increased, especially in the industrialized countries, which imposes a social and economic burden on both the patient and society (Weiss and Sullivan 2001). In spite of effective pharmaceutical treatment and an increasing number of published guidelines asthma is a growing health problem in countries around the world (Suisa et al., 2001). Under-treatment is currently the most common problem found in European asthmatic subjects (Raben et al., 2000). Experience from other fields of internal medicine shows that computer- and Internet-based technology can be used to treat and monitor various diseases (Louis et al., 2003).

The new technology handles complex calculation programs and algorithms easily, and it is a unique way of communicating. All these advantages can be amplified in the treatment of asthmatic subjects. Internet-based asthma diaries are available today, but only a few have a feedback system. It seems that none of them have combined an electronic action plan and a treatment decision support system (Finkelstein et al., 1998; Louis et al., 2003). This has inspired the development of an Internet-based asthma management tool, which was created in a collaboration between Danish physicians, a patient association (The Danish Asthma and Allergy Association), and a pharmaceutical company (Anhoj and Nielsen 2005). The fact that approximately 81% of the Danish population has access to the Internet constitutes an ideal setting for Telemedicine Home Care projects (The Danish National Statistics Report 2004).

It is important to develop a system to monitor patients suffering from asthma so to improve the symptoms, lung function, airwaves responsiveness, and quality of life. Continuous monitoring of asthma severity is essential to be able to take the pertinent steps to prevent worsening and manage attacks. Home monitoring of asthma has a central role in asthma self-management programs. Lung function monitoring in self-management and education interventions is useful for controlling asthma by providing an objective measure of respiration.

## 4.6 DIABETES

There is a range of technologies for diabetes care from patients accessing web-based education to video visits at home. In earlier studies, invasive glucose meters were connected to a telephone line to communicate data and even provide patients with feedback in some cases (Ahring et al., 1992; Shultz et al., 1992; Edmonds et al., 1998; Piette et al., 2000).

In recent studies, hand-held devices have become more popular, such as a computer with glucose meter (Gomez et al., 2002) and an advanced messaging device with two-way audio-video functions (Chambler et al., 2002).

Non-invasive glucose meters (that measure blood glucose without penetrating the skin) or low-invasive systems are already available commercially (Botsis et al., 2008). An example isthe GlucoWatch (Animas Technologies, West Chester, Pennsylvania, USA) which is like a wristwatch. The MiniMed Paradigm realtime system (Medtronic Minimed Inc., Northridge, California, USA) combines a low-invasive insulin pump with realtime continuous glucose monitoring (Botsis et al, 2008). The GlucoDay (Menarini, Florence, Italy) is also low-invasive and can provide reliable online glucose values during recording (Renard 2005).

There are many glucose meters available. The devices mentioned above indicate that apart from collecting blood samples to measure blood glucose manually, there are several new technologies that provide more automated and non-invasive methods of monitoring (Botsis et al., 2008).

### 4.6.1 Needs of the patients suffering from Diabetes

1. Glucose monitoring:
    - Low invasive systems are available commercially
    - Non invasive and constant monitoring of glucose which can be connected to a telephone line to communicate data and even provide patients with feedback (Piette et al., 2000)
    - The MiniMed Paradigm realtime system (Medtronic) combines a low invasive insulin pump with real time continuous glucose monitoring

2. An ideal device would be one that apart from collecting blood samples measures blood glucose manually.

### 4.6.2 Diabetes and Rehabilitation

Trends towards lower levels of physical activity in patients suffering from type 2 diabetes have been observed. Tools to capture, store and use information about physical activity might improve motivation to increase the level of such activity. This is especially important for Type 2 diabetes, since physical activity is one of the key components in achieving healthy blood glucose values. The ideal equipment to develop would be a system that automatically and wirelessly reports the amount of overall physical activity -non only steps through a pedometer- using a mobile phone as the patient terminal. The index of physical activity can help to prevent obesity and cardiovascular complications.

## *4.7 SUMMARY*

It is important to monitor chronic conditions through telemedicine but there are other factors to be taken into account which will help the elderly to improve quality of life even further. These are the following:

**Physical activity:**

- Promotion of regular exercise and self-care through telemedicine should be a goal
- Planning and monitoring physical activity programs for the elderly with the objective to reduce age-related decline of musculoskeletal, cardiovascular systems and cognition
- Application to individual monitoring of physical activity making sure doses are safe
- Advice concerning health status of individual subjects
- Monitoring of health status during the practice
- Motivation of the elderly to get involved in physical activity

These factors were initially analyzed in REMOTE through the Activity Advisor service (UC2.1), so it can be taken into account for future analysis.

**Healthy dieting:**

- Diet and nutrition are important factors in the promotion and maintenance of good health throughout the entire life course
- Mediterranean Diet incorporates healthy eating in addition to “regular physical activity” lowering risks of heart disease and cancer
- Develop methods to control the practice and the compliance of such nutrition recommendations
- Recommendation and advice to the elderly to improve maintain proper nutrition

In REMOTE has been implemented the Nutritional Advisor application to solve the nutrition problems and to advice the user on daily or weekly basis on recommended recipes and calories uptake (UC2.3).

**Cognitive activity to promote mental health and reduce stress:**

- Motivation of the elderly to get involved in cognitive activity at home
- Individualized exercises to maintain memory and mental activities level
- Promotion of cognitive activity through mental exercises and physical activity
- Telemedicine can be used to enhance people´s stress management capabilities
- Develop educational programs for proactive stress management techniques

In REMOTE has been implemented the Brain Skills Trainer application to improve cognitive abilities and possibly to delay Alzheimer's disease onset and/or progress.

The Brain Skills Trainer includes these use cases:

- UC3.1.- Brain skills trainer for memory support
- UC3.2.- Brain skills trainer for memory assessment

**Promoting recreation through gaming, social interaction and independent living:**

- Computer-mediated recreation, such as single or multi player games, can provide the elderly a number of opportunities:

  a) Stimulating challenges and enjoyment (mental health)
  b) Practice of cognitive skills (Individual skills practice)
  c) Enjoy social interaction (Social inclusion
  d) Learn about new information society technologies (e-inclusion)

To promote the social gaming in REMOTE, Brain Skills Trainer service has been implemented. This application allows and promotes user friendly communication of elderly users with their family members as well as other users with common interests.

The Brain Skills Trainer application includes these use cases:

- UC3.3.- Cooperative brain and skills trainer
- UC3.4.- Social gaming

**Promoting socialization through Telemedicine:**

- Part of Telemedicine should involve the development of a social community platform. This can be employed at different levels to fight the social isolation of the elderly and to facilitate communication and group experience. Some of the tools that can be used to avoid social isolation could the development of e-learning systems, virtual communities and social webs.

To promote the socialization in Remote has been implemented the Brain Skills Trainer application. This application includes the following use case:

- UC3.5.- Social networking

# 5 STANDARDIZATION ACTIONS

The following section summarizes how REMOTE project contributes in the standardization and policy making community in the field of AAL.

## *5.1 CONTEXT*

As it was described in the Description of Work, REMOTE project intends to improve the quality of life of end users, and especially the ones that are exposed to rural deprivation. REMOTE will contribute to knowledge in the field, and standards in particular, which has the potential of lowering the cost of technology involved in the services subscribed by the users.

During the development of the platform, REMOTE has been using existing standards but when the existing technology did not cover the needs of the project, new knowledge has been applied in order to guarantee multivendor system products and plug-and-play capabilities of all the devices. It is important to say, that integration task is one of the most critical actions in order to have common platform working in the same level.

REMOTE has been elaborating on its findings and outcomes to translate them into useful guidance to developers, into appropriate input to standardisation working groups, and into a R&D roadmap for aging-well that will be disclosed to policy developers, academia and industry.

## *5.2 STANDARDS*

From the project's objective of creating an open and flexible platform, it becomes clear that standards will be of key importance.

The project standards are documented in technical deliverables, especially because some standards will be adopted as a result of decisions taken in the course of the project. This group of standards includes: a full range of common internet protocols and architecture models definitions, standards that involves communication systems for home devices and healthcare-specific standards. On the other side, there are a huge group of official (ISO, ETSI), voluntary (CEN), industry (Continual Health Alliance) and open (openAAL) standards that could be adopted in terms of AAL projects.

The contribution to existing standards is demonstrated from a consolidation point of view, showing how the standards have been used in a common platform as a perfect integration. REMOTE works with different technologies and standards such as GSM, GPRS, UMTS, Bluetooth, Zigbee, WLAN, etc., to cater for the different technologies and IT infrastructure available Europewide. In specific domains however it follows the most promising standards, such as OSGi for web services, MIDPI 2.0 or more for mobile devices s/w, OWL and FIPA – based standards for each agents, etc.

As REMOTE must ensure that it abides to all existing and emerging standards in the area, and as it lacks the resources and time to initiate each own standardization activities, the project intents to join the "World-wide OASIS Industrial Forum" (on relevant AAL ontologies and architecture) and the "AEGIS Open Accessibility Everywhere Group – OAEG" (on ICT services accessibility). It will thus follow all recommendations and standards created within these groups: thus guaranteeing interoperability of REMOTE services with a much wider community of key actors and services.

## *5.3 STANDARDIZATION ACTIVITIES*

The following table reflects a set of standardization activities that was carried out in the course of the project:

| Area | Standards / Rules | Description | Standardization Activities |
|---|---|---|---|
| Wireless Connectivity for short range Body-Sensors-Network and Personal-Area-Network | IEEE 802.15.1 | Medium-rate Bluetooth, which cover only the lower OSI layers. | To integrate Body-Sensors in mobile REMOTE software. |
| Interoperability of applications and services | JCP (JAVA Community Process)<br>JSR293 (Location and Navigation API)<br>JSR179 (Location API J2ME)<br>JSR232 (OSGi for PDA)<br>JSR291 (OSGi for desktop) | Standards for enhanced location-based features on the Java ME devices | Optimization of the standards developed within the JC Process and the OSGi community. |
| Domotics | CECED | Working Group of leading white good manufacturers to select and/or develop common standards for the white good area | Products are available from BSHG (Bosch Siemens Hausgeraete GmbH) and from Miele |
| Web Services | SOAP 1.2 (W3C) | SOAP Version 1.2 provides the definition of the XML-based information that can be used for exchanging structured and typed information between peers in a decentralized, distributed environment | Optimization of existing Web services regarding the requirements of elderly users. Integration of Web services in the REMOTE ontologies |
| | OMA (Open Mobile Alliance) Web Services 1.0 | Definition of best practices by which mobile applications can be exposed, discovered, and consumed using Web services | Use of Web services for the data communication between mobile client and server side |
| | OMA Mobile Locations Protocol 3.1 | Application-level protocol for obtaining the position of mobile stations (mobile phones, wireless personal digital assistants, etc.) independent of underlying network technology | Usability within REMOTE to be analysed. Potential UC is the monitoring of the users movements and the provision of help in case of emergency |
| Interoperability of applications and mobile devices | JSR-75<br>JSR-179<br>JSR-135<br>JSR-172 | Location API for J2ME<br>Mobile Media API<br>J2ME Web Services Specification | Use of packages that provide standard access from JME to location discovery, mobile media and web services |
| Mobile Communications | Association (GSMA) standards | The GSMA represents the interests of the worldwide mobile communications industry. Spanning 219 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 | It is applicable for the overall mobile work in the project. |

| Area | Standards / Rules | Description | Standardization Activities |
|---|---|---|---|
| | | companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, Internet companies, and media and entertainment organisations. The GSMA is focused on innovating, incubating and creating new opportunities for its membership, all with the end goal of driving the growth of the mobile communications industry. | |
| Agents communication | SC00061G: ACL Message Structure Specification | The objectives of standardizing the form of a FIPA-compliant ACL message are:<br>· To help ensure interoperability by providing a standard set of ACL message structure, and,<br>· To provide a well-defined process for maintaining this set. | The agent communication language is used between agents' interactions. |
| | SC00008I: SL Content Language Specification | This specification defines a concrete syntax for the FIPA Semantic Language (SL) content language. This syntax and its associated semantics are suggested as a candidate content language for use in conjunction with the FIPA Agent Communication Language | The SL language is used in order to implement the message content for inter-agent messages |
| | SC00084F: Agent Message Transport Protocol for HTTP Specification | This document deals with message transportation between inter-operating agents and also forms part of the FIPA Agent Management Specification | Agents use it for exchanging messages when they are located in different locations. |
| | SC00026H: Request Interaction Protocol Specification | The FIPA Request Interaction Protocol (IP) allows one agent to request another to perform some action. | This protocol will be used within the REMOTE service network |

**Table 5-1. Standarisation activities.**

## *5.4 STANDARDIZATION CONTRIBUTORS*

REMOTE project contributes in the standardization and policy making community as it shown in the following table:

| Organization | Actions and Impacts |
|---|---|
| AALIANCE<br>The AALIANCE2 project, funded by the European Commission's ICT Programme within the European Framework Programme, will continue and built upon the successful work and the wide network already established in the AALIANCE Innovation platform (2008-2010). Subject of the Coordination Action will be Ambient Assisted Living (AAL) solutions based on advanced ICT technologies for ageing and wellbeing of older persons in Europe. | REMOTE project consolidates the research and community roadmap in terms of AAL. |

| Organization | Actions and Impacts |
|---|---|
| AAL Association<br>The AAL JP is a funding activity 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). It carries out its mandate through the funding of across-national projects (at least three countries involved) that involves small and medium enterprises (SME), research bodies and user's organizations (representing the older adults). | All the partners that belongs to REMOTE project consortium have a common objective: To consolidate the AAL JP efforts making REMOTE platform a feasible project close to market product and exploitation models. |
| ETSI HUMAN FACTORS<br>Human Factors is the scientific application of knowledge about the capacities and limitations of users with the aim of making products, systems, services and environments safe, efficient and easy to use. | REMOTE project has taken into account the recommendations proposed by ETSI HF in terms of accessibility:<br>- EG 202 116 Guidelines for ICT products and services; 'Design for All'<br>- EG 202 132 User Interfaces; Guidelines for generic user interface elements for mobile terminals and services<br>Additionally, REMOTE has elaborated its own modifications that are reflected in technical and UI design deliverables. |
| ISO (TC 215)<br>Standardization in the field of information for health, and Health Information and Communications Technology (ICT) to promote interoperability between independent systems, to enable compatibility and consistency for health information and data, as well as to reduce duplication of effort and redundancies.<br><br>The domain of ICT for health includes but is not limited to:<br>• Healthcare delivery;<br>• Disease prevention and wellness promotion;<br>• Public health and surveillance;<br>• Clinical research related to health service. | REMOTE project implements the ISO / IEEE 11073-10471 standard for AAL relevant sensors. |

**Table 5-2. Standardization contributors.**

## *5.5 SUGGESTED STANDARDS: STANDARDISATION GAP.*

Despite of the most important standards for REMOTE platform were described above, this section aims to reflect some standardisation actions or future standards that does not exist, and they would be potentially relevant in order to cover some needs that arose during the project. The following table shows a list of standards/initiatives:

| Area | Description |
|---|---|
| Human activity | Standard that will classify the level of activity of a person once the movements have been monitored. How to measure these movements. |
| Real Nutrition monitoring | Standards that indicate a real nutrition monitoring: amount and type of food. |
| Final User Interface Design | There are global recommendation of how to design an interface focused on elderly, but it is critical to define a final standard |
| Devices | Standards that define physical characteristics devices focused on elderly |
| Software installation | Stantdards that define how to design the installation process of software focused on elderly |
| Security | Security standards for AAL services in different areas |
| Anonymous User Profile | Set of schemas based on XML to store an anonymous user profile: common data, health records,... |

**Table 5-3. Suggested standards**

# 6 CONCLUSIONS

This deliverable makes an overview of the lesson learned during the course of the project, draws the roadmap obtained from the result of the project and finally collects a set of standards relevant to the REMOTE platform. After providing an introduction of the objectives of the deliverable, we find that there are several aspects that should be pointed out.

Firstly, we conclude that a constant practice and well structured lessons learned allow the project team to encourage desired results and to repeat the success in other projects, avoiding those that encourage failure. It is also important to analyze that the use cases and see what has been done in REMOTE and see what remains to be done. Of the remainder to be done, will be part of the future tasks of Remote.

Secondly in the Roadmap, we have seen the following: that the management of chronic diseases implies the oversight and education activities conducted by health professionals to help patients learning and understanding more about their conditions and thus live successfully with it; the Telemedicine can be used to continuously educate and motivate patients; and the Technology can help to monitor patients and make sure they follow therapies and interventions.

It is important to monitor chronic conditions through telemedicine but there are other factors to be taken into account such as: physical activity, healthy dieting, cognitive activity to promote mental health and reduce stress, promoting recreation through gaming, social interaction and independent living.

Finally, it is important to pointed out how critical is the adoption of several standards during the course of the project from a consolidation point of view and from AAL community integration in a more concrete way. Then there are three important steps than have been followed from standards actions perspective. First, existing standards have been adopted in order to implement the most part of the project, second, a contribution to existing standards has been carry out once these standards have been implemented and finally, a lack of standards or standardisation actions have been concluded.

Given the conclusions above, this deliverable reflects part of the outcomes that should be taken into account for future projects implementation.

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