



"This project has been funded under the fourth AAL call, AAL-2011-4. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein"



PROJECT N°: AAL-2011-4- 027

D10 – MyGuardian Architecture and Interfaces

Start Date of Project : 01/05/2012

Duration : 36 months

PROJECT FUNDED BY THE AAL JOINT PROGRAMME	
Due date of deliverable	M9
Actual submission date	M9:1 Feb 2013
Organisation name of lead contractor for this deliverable	HI-IBERIA
Author(s)	UniGe
Participant(s)	HIB, UniGe, Vigisense, CETIEX, Careyn, Connectedcare, AGIM
Work package	WP2
Classification	Internal
Version	1.7
Total number of pages	20

DISCLAIMER

The work associated with this report has been carried out in accordance with the highest technical standards and MyGuardian partners have endeavored to achieve the degree of accuracy and reliability appropriate to the work in question. However since the partners have no control over the use to which the information contained within the report is to be put by any other party, any other such party shall be deemed to have satisfied itself as to the suitability and reliability of the information in relation to any particular use, purpose or application.

Under no circumstances will any of the partners, their servants, employees or agents accept any liability whatsoever arising out of any error or inaccuracy contained in this report (or any further consolidation, summary, publication or dissemination of the information contained within this report) and/or the connected work and disclaim all liability for any loss, damage, expenses, claims or infringement of third party rights.

List of Authors

Partner	Authors
HIB	Inmaculada Luengo, Anna Mereu
UniGe	Jérôme Marchanoff, Katarzyna Wac
Vigisense	
CETIEX	
AGIM	
Careyn	
ConnectedCare	Martijn Vastenburg

Table of Contents

Glossary	6
1. Introduction.....	8
2. System functionalities	8
2.1. User management and profiling module	8
2.2. Mobile Application Service.....	10
2.3. Knowledge discovery module	13
2.4. Message communication module	15
2.5. Coordination Modules.....	15
2.6. State Assessment module	16
2.7. Privacy and data security module	17
2.8. User Requirement matching	18

List of Figures

Glossary

Acronym	Meaning
GCM	Google Cloud Messaging
API	Application Programming Interface
GPS	Global Positioning System

References

1. Introduction

The D10 – Architecture and interfaces deliverable describes the global architecture and services that are going to be implemented in order to achieve MyGuardian goals. This document is based on the results obtained from user requirements and use cases.

First of all, this document describes the distinct services required to take care of the needs of service users: seniors with mild cognitive impairments and their informal caregivers (e.g., relatives) as well as formal caregivers. Then this document describes the existing interfaces between all these services in a global schema of MyGuardian architecture and finally provides technologies overview.

2. System functionalities

This section describes the functionalities that will be included in MyGuardian services.

Based on the user requirements for MyGuardian, we can identify three kinds of end-users: Seniors, and their Formal and Informal caregivers. The system has to provide a simple way for all of them to register and login in both web-based and mobile device (i.e., authentication) and provide adapted services for each role (i.e., authorization). Moreover, the system has to enable an improved and facilitated way to communicate for all of these actors. An important need is also a customizable system for all messages and alerts delivered to seniors with voice recording and pictures tools. So we can deduct the following services:

2.1. User management and profiling module

Name	Priority	User
Service01: User interface for authentication and registration	Essential	ALL
Description		
MyGuardian has to include an interface for registration and authentication (once the user is registered) and in both mobile and web-based application.		
Notes		
Mobile and web-based application must have the same “look & feel” for the user and the interface must guarantee that the information put in the registration form is valid. Moreover, to ensure the security requirement, this part must use a secure protocol like HTTPS and the password should not be stored in clear-text.		

Name	Priority	User
Service02: Interface for user relationship management	Essential	Informal or Formal Caregiver
Description		
The system has to provide a way for users (caregivers) to manage the caregivers of the senior and link each care task to the responsible caregiver of the task.		
Notes		
In order to manage the care of seniors and the interactions between all the actors of the care process, MyGuardian has to maintain a "circle of users" bind to a senior. Users of a circle can communicate and access shared information. Formal caregivers who take care of several users can be member of distinct circles.		
This functionality provides a way to associate the responsibility level and task to caregiver of the senior.		
Informal caregivers, who are the most likely to be able to do that, must manage these circles.		

Name	Priority	User
Service03: User profile	Essential	Senior
Description		
The application has to include a service for the creation / edition of senior's preferences and information to adapt the system behavior.		
Notes		
The fields to be filled by the caregiver (in the senior application) will correspond to the different senior preferences in term of notifications, personal data, position sharing and all the particular service configuration settings that will be customizable by the end users. These preferences are to be defined/agreed on by the senior.		

Name	Priority	User
Service04: Zone creation/editing	Essential	Caregiver
Description		
The web-based application for caregivers will allow them (likely together with seniors) to create / edit zones on a map. The zones correspond to the allowed or dangerous areas for the senior.		
Notes		

Zones can be of different shape and size. This service will be developed by UniGe and integrated in the profile creation web service by HIB.

2.2. Mobile Application Service

Name	Priority	User
MOB-01: Interface for custom message recording	Optional	Caregiver
Description		
The mobile application for seniors will include an interface for set up custom text, images or voice messages by caregivers. These messages can be used for defining details of senior's notifications and to comfort them.		
Notes		

Name	Priority	User
MOB-02: Messaging Interface	Essential	ALL
Description		
The mobile application will include an interface where users can communicate with each other – in synchronous (i.e., “alarm”) or asynchronous manner (i.e., “notification of some kind”).		
Notes		
This interface must use the messaging service MCM-01 described in the Message Communication Module part.		

Name	Priority	User
MOB-03: User positioning	Essential	ALL
Description		
The mobile application will allow gathering the indoor/outdoor position of the user based on the GPS coordinates and/or other sources of localization such as Wi-Fi, dead reckoning and other techniques available on the mobile phone.		

Notes

The most suitable positioning source will have to be automatically selected according to the senior needs, available sources and energy consumption constraints (optional).

Name	Priority	User
MOB-04: In-App notifications and alerts	Essential	ALL
Description		
<p>The system contains a notification management system. The MyGuardian system will be able to send distinct kinds of messages like alert, notification, system messages or communication to a device from another device or from the server itself.</p> <p>The device has to show these notifications and alerts using the appropriate level of visual/audio components: Notifications in the notification bar, popup messages with sound alert, vibration, wake up the phone, ringtones.</p>		
Notes		
Google Cloud Messaging (section 3.1.2.2) will be considered as the central notification mechanism.		

Name	Priority	User
MOB-05: Play pre-recorded voice message	Optional	Caregiver
Description		
<p>The caregiver application can ask the senior device to play pre-recorded messages. Pre-recorded messages are defined using the MOB-01 service.</p>		
Notes		

Name	Priority	User
MOB-06: Image sharing	Essential	Caregiver
Description		

The caregiver application can ask the senior device to show a pre-recorded image (Stored on the senior device by the caregiver using the MOB-01 service) or can send a picture taken by the camera of the caregiver device.

Notes

Optionally, a set of pictures under Creative Commons license (or equivalent) can be added in the application so a dedicated section has to be added to give authors or licensors credits.

Name	Priority	User
MOB-07: Shortcut for predefined number	Essential	Senior
Description		
The mobile application for senior must provide an interface with shortcut to call predefined “first contact” number like informal caregiver (from family members, friends) or a professional caregiver.		
Notes		
This interface must be adapted for senior with sight trouble. It must use pictures of person called, big buttons and big letters.		

Name	Priority	User
MOB-08: Alert button	Essential	Senior
Description		
The mobile application must allow seniors to use an alert button to send an alert to caregivers when they feel stressed, nervous or when they need care.		
Notes		
The alert button must be accessible in a really simple way. When this button is pressed, MyGuardian play pre-recorded audio file set in the user profile to comfort the senior and send an alert to the caregivers. This alert message send to the caregivers contains also information about the state and position of the senior.		

Name	Priority	User
MOB-09: System status	Essential	ALL

Description
The mobile application must be able to check if everything in the system works without problems.
Notes
This functionality can be use on-request directly on the device and caregivers can check the status of a senior's device at distance. Moreover, the system itself has to check regularly if there are no connectivity problems and display indicator about the system status (In the notification bar of the mobile for example).

Name	Priority	User
MOB-10: Battery level	Essential	Senior
Description		
The informal caregiver is warned when the battery level, of the device of the seniors, is low. MyGuardian service also alarms the senior through voice message if necessary to charge. The device shall indicate clearly when is charged and can be used (again).		
Notes		
Optionally, the system can remind the senior to plug his phone when he is at home using the localization of the user.		

Name	Priority	User
MOB-11: Text-to-Speech	Optional	Senior
Description		
The mobile component of the system can convert all text messages send to the senior in audio format being played-out to the senior.		
Notes		
Optional		

2.3. Knowledge discovery module

Name	Priority	User
-------------	-----------------	-------------

KDM-01: Rules creation/editing	Essential	Caregiver
Description		
The web-based application for caregivers will allow them (likely together with seniors) to provide a set of rules that can be applied to zones created using the Service04.		
Notes		
Distinct kinds of rules can be used: rules about the localization, zone, and time spent in or out of a zone, and the alert logic for each of the created rules. The rules can also define what is going to happen when the senior or when the caregiver doesn't answer to a call or an alert.		

Name	Priority	User
KDM-02: Rules engine	Essential	ALL
Description		
The rules engine manage, according to the defined rules and zones and real-time data sent from the senior mobile application, the behavior of MyGuardian. It's the core of the notification system. The rules engine decides when alert has to be sent to whom - a senior or particular caregiver, who is the most likely to answer or who is the nearest to the senior.		
Notes		
The whole process is registered: when and which rule has been raised, who has been notified, who has accepted or rejected each notification, who has closed the alert. This information remains in the system depends the user privacy settings.		

Name	Priority	User
KDM-03: Contextual information generation	Essential	ALL
Description		
Thanks to user input (tags), the user profiles, user state identification and localization, and in combination the knowledge discovery module, MyGuardian will be capable of generating contextual information for monitoring & assistance, and for the caregivers organization.		
Notes		
User state identification data and localization data will be collected in real time by the mobile application.		

2.4. Message communication module

Name	Priority	User
MCM-01: Communication service	Essential	ALL
Description		
MyGuardian provides a service that ensures the group communication that is available on all devices. Messages can be a combination of text, pictures and pre-recorded voice messages.		
Notes		
A dedicated web-based messaging API will be used for message exchange.		

Name	Priority	User
MCM-02: Communication & Event log	Essential	ALL
Description		
Every communication and event thrown through the system has to be recorded and can be accessed by actors in a same circle of caregivers of a senior. Moreover, when an issue is solved, the system must log it and send notification to the others caregivers.		
Notes		
To protect privacy, multiple ways of storing information will be explored, including recording only action descriptions rather than content logs. For example, “The senior has been in trouble yesterday at 10” rather than “Client Janssen has been in trouble yesterday at 10”		

2.5. Coordination Modules

Name	Priority	User
COO-01: Shared availability agenda for caregivers	Essential	Caregiver
Description		

To coordinate the caregivers, the system provides a shared agenda where people can create appointments, identify care needs, link caregivers to care needs, and track the status of appointments. A caregiver has to accept a care task before the responsibility is linked to the caregiver.

Optionally, caregivers can define their availability. The system can use this information to send notifications to the right caregiver at the right time.

Notes

This agenda is accessible through both mobile and web-based application.

Name	Priority	User
COO-02: Shared task list for care tasks	Essential	Caregiver
Description		
To organize the care tasks of the patient, a shared task list is used to identify tasks, link caregivers to tasks, and to track the status of tasks. The system will use the task list to send reminders and status updates.		
Notes		
This task-list is accessible through both mobile and web-based application.		

2.6. State Assessment module

Name	Priority	User
SAM-01: Senior remote state assessment	Essential	Senior
Description		
MyGuardian provide the state of elderly in real-time, based on context, including physical activity and mobility, i.e., location and time correlations. Optionally, the device will rely physiological data gathered by wearable sensor(s) already developed through extensive research and available on the market. The state assessment aims to assess the confusion or signs of feeling lost exhibited by the senior, for example by walking in circles, or starting to run. The type of information communicated will range from the direct display of recorded data to accurate automatic recognition of critical states such as confusion or feeling lost.		
Notes		
This service contains functionality like confusion state detection module (optional), fall detection (optional), and user state awareness (body temperature, blood pressure, optional).		

2.7. Privacy and data security module

Name	Priority	User
PDS-01: Authentication	Essential	ALL
Description		
The system has to provide a secure way to authenticate user all along the use of the application. All request from clients to server have to be signed and use HTTPS. Mechanisms to be use could be OpenID, OAuth or another secure authentication protocol.		
Notes		
The user credentials has to be the same for web and mobile application.		

Name	Priority	User
PDS-02: Authorization	Essential	ALL
Description		
Any user can access to all his personal data and can edit his data. User can also request the system to delete his account. User can access other user information only if the user has explicitly authorized this user to access his personal data. This access can be granted / removed at any time.		
Notes		
This module specification has to respect the Ethical guide.		

2.8. User Requirement matching

The table below is extracted from the D6 - User requirement document. We have added for each requirement the corresponding services that will be used to achieve the functionality described.

REQUIREMENTS			
PRODUCT/DEVICE		ESSENTIAL	OPTIONAL
Patients	Mobile device	Mobile App services	
	Easy to use	N/A	
Caregivers	Alternative Access service	Mobile app or web-based app	
Battery	Use of solar panels		N/A
	Alarms if need to charge	MOB-10, MOB-02	
	Indicator to show device is ready	MOB-09, MOB-02	
	Affordable	N/A	
	Adjustable preference of the device for each profile	Service03	
TYPE OF INFORMATION ABOUT THE SENIOR			
Location	Real time localization	MOB-03	
	Recognize locations		SAM-01
Senior State	Potential to be lost	KDM-03, SAM-01	
	Awareness of the confusion state		SAM-01
User state	Fall Detection		SAM-01
	Body temperature		SAM-01
	Contextual Information (together with the neighbor)	KDM-03	
	Weather		SAM-01
FUNCTIONS			
	Set areas for the movement of the patient	KDM-01	
Safe areas	They aren't fixed, can be adjusted by the user	KDM-01	
	A warning is send to the patient if he moves out	KDM-03, SAM-01,	

		KDM-02, MOB-04	
	Multiple types of warnings		KDM-02, MOB-04
Analyze trends and changes		KDM-03, SAM-01, KDM-02	
Difference between false positives, false alarms.			N/A
Inform about the whereabouts of the caregiver.		COO-01, MOB-03	
Reminders			COO-02
Information is stored with access for the users		MCM-02	
Notifications to the informal caregiver about the status or help requested.		MCM-02	
Notifications to the formal caregiver when help requested		MOB-03, MOB-08, MCM-01	
RESPONSIBILITY AND COORDINATION			
Define your availability as a caregiver		COO-01	
Group coordination of tasks		COO-01, COO-02, MCM-01, MOB-02	
Shared agenda used for coordinating care around the patient			COO-02
Dividing tasks among users		COO-02, KDM-02	
Dispatching care activities	Mechanism to link to a 24/7 care desk and to link to nurses.	N/A	
	Assign tasks based in their proximity to the patient.		KDM-02, KDM-03, MOB-03
Preference for Filtering information		Service-03	
Responsibility and roles are automatically escalated		KDM-01, KDM-02	
PATIENT			
Device send reminders to them			N/A
Use the device to let caregivers know where they are up to		MOB-03, KDM-03, MOB-02, MCM-01	
Help not to forget the device.		N/A	
Reassurance mechanism		MOB-01, MOB-05	

COMMUNICATION		
All the information and communication is stored in a central location, where every user has access to	MCM-02	
Access rights per user	PDS-01, PDS-02, Service02	
Set alarms to close the process	MOB-04	
Use images instead of words when possible		MOB-06, MOB-07
Video communication between caregivers		MOB-02
Recording voices of the caregivers to use in navigation		MOB-01
CUSTOMIZATION		
Service preferences	Service03	
Look and feel	N/A	
Typical activities	Service03, Service04	
Network of caregivers	Service02	
Points of interest	Service04	
TRUST/ RELIABILITY		
Reassure the users that the patients are doing fine.	MOB-03, KDM-03, MOB-02	
Reassure the users regularly that MG is working	MOB-09	
Reduce stress level		N/A
Reassure the state of the patient		MOB-03, KDM-03, MOB-02