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PROJECT Nº: AAL-2011-4- 027

D7.- USE CASES DEFINITION

Start Date of Project: 01/05/2012 Duration: 36 months

PROJECT FUNDED BY THE AAL JOINT PROGRAMME	
Due date of deliverable	M7
Actual submission date	14 December 2012
Organisation name of lead contractor for this deliverable	HI-IBERIA
Author(s)	HI-IBERIA
Participant(s)	Vigisense, CETIEX, Careyn, ConnectedCare, AGIM
Work package	WP2
Classification	Public
Version	V1.0
Total number of pages	25



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Glossary

Acronym	Meaning
MCI	Mild Cognitive Impairment



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1. Introduction

Seniors with mild cognitive impairments are (to a certain degree) dependent on caregivers such as family careers and home care. The support and care by caregivers enables these seniors to continue living in their own home for as long as possible. However, these seniors might experience barriers towards moving around in outdoor environments when their caregivers are absent. The MyGuardian project aims for a product or service that facilitates safe and secure mobility of seniors with mild cognitive impairments. Not only seniors, but also caregivers are likely to be users of this future product or service. Therefore, this research explores the needs and experiences of these three different stakeholders or actors in section 2 of this deliverable.

In order to explain the functionalities of the service and how it affects daily life of the end users, this document presents a number of use cases that defines and includes the different services, applications and functionalities considered in MyGuardian and that will be also taken into account when performing the user acceptance tests and validation phases during the final part of the project.

A use case is a list of steps, typically defining interactions between an actor and a system to achieve a goal. In general, each use case has one basic course of action and one or more alternate courses of actions. The basic course of action is the main start-to-finish path that the use case will follow, where as the alternate courses represent the infrequently used paths and exceptions, error conditions.

The correct approach of use cases is of primary importance in a project's analysis phase. Their purpose is to document the business process that the application must support. Use cases should serve as an effective communication tool between users and technologists.

The use case collects together all the possible scenarios MyGuardian application can solve. All the details of each scenario can be found in the section 4 of this deliverable.



2. Actors

In this section we describe the group of persona models involved in MyGuardian service, who are also the actors involved in the mild cognitive impaired senior (MCI) environment/network (people involved around the dementia disease).

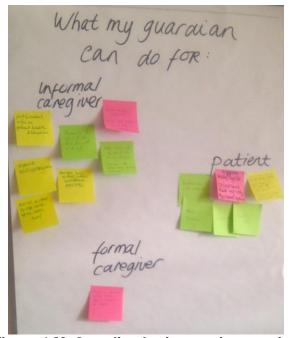


Figure 1 MyGuardian brainstorming session

Also the main functionalities of MyGuardian are explained, as MyGuardian is specially designed to cover the needs of each of the persona models around an elderly with MCI.

The main MyGuardian actors are:

• The elderly with mild cognitive impairments:

MyGuardian service is focused on seniors with mild cognitive impairments that usually live alone, with their wife or husband or with other relative (sons, daughters, sisters, brothers...) usually over 55 The seniors are often capable to do their daily tasks without help but in some occasions their short term memory fails and they need to use MyGuardian functionalities.

The principal objective of MyGuardian is to guarantee safe and secure outdoor mobility of senior with MCI. At the same time, the application aims to preserve the elderly autonomy and dignity and to increase their mobility to take part in the self-serve society.

The main problems and limitations of the patients diagnosed with MCI are: cognitive decline, general forgetfulness and difficulty recalling factual information and overall loss of the short-term memory. The illness makes them feel insecure and dependant on family. For this reason they have less freedom and they feel like being handicapped.

Because of the brain damage, the seniors get lost so easily not being able of orientate their shelf. They don't store information and forget what they are going to do, as actually



the disease affects short term memory. So the mobility of the patients is disrupted, reduced and sometimes taken away.

MyGuardian helps the elderly to solve some of these problems or at least to reduce their impact by providing a secure network and environment, ensuring them the assistance when needed (assistance of formal, informal caregivers, call-centre or maybe just MyGuardian).

Informal Caregivers:

Informal caregivers are the persons who take care of the patient in their daily life, almost 80% of the daily care tasks are responsibility of the informal caregivers. They are usually family, partners or even neighbors of the patient. Informal caregivers are the main responsible of the decisions related to the senior with mild cognitive impairments.

MyGuardian aims to facilitate the informal caregivers' lifestyle and to help them to reorganize work and social life. With MyGuardian they would increase their confidence and improve their efficiency as caregivers. Also, MyGuardian offers them some freedom and peace of mind because they know that the MyGuardian is looking for your relative and will notify you if there is any problem.

Informal caregivers have many worries and difficulties in a normal day. It is a 24 hours a day, 7 days a week job to which you need to have full commitment. This means that caregivers give up a big part of their freedom in order to give care. When they leave them alone they are worried and so scared thinking of what they could be doing that it's difficult for them to trust the patient.

To avoid some of these problems, MyGuardian helps the family to be calm and unworried since they can know where the patient is each moment, they know that if something wrong happens MyGuardian will advise them, and that there is a fully prepared team behind MyGuardian (formal caregivers, call-centre, etc.) that will be ready to help them if needed.

• Formal Caregivers:

Formal caregivers are professionals prepared to provide practical day-to-day care to the patients. They take care of the patient in specific situations, especially when the informal caregiver isn't available.

Their care tasks include home and care away from the home. The services included are visiting nurse services, homemaker services, respite care and home health aide services. They have to be available especially when the informal caregiver isn't there. When the patient gets lost, the nearest caregiver helps him and takes him home.

The main problems informal caregivers found are that in some occasions they have to look after a lot of different kinds of clients. This means, that in some situations they may be stressful and they are only able to take care the patient a very small part of the day. Also sometimes the elderly are not the only ones that needs attention or career, the informal caregivers become also patients; formal caregivers founds essential to provide tools to help informal caregivers and provide them more freedom as well as better communication channels that prevents of miscommunication between the parties around the elderly filling up the holes and making an efficient network of care around the patient.

MyGuardian will provide a communication channel and task distribution manager among the different parties involved; providing a secure and trust environment for all the actors.



3. MyGuardian functionalities/User requirements

The user requirements were detailed in the previous document (D6 User Requirements). Some probes, semi-structured interviews, and focus groups were done in order to bring out the needs and experiences about the patients. At the end, the user requirements were obtained according to the results of this workshop.

The requirements were classified according to eight features:

- Product/Device
- Type of information
- Functions
- Responsibility division of tasks
- Patient
- Communication
- Customization
- Trust/reliability

All the details of the user requirements are in the previous document.

In this document we have created some use cases in order to satisfy all the user requirements. To create the different scenarios and situations we have used some of the interviews to the patient, the formal caregiver and the informal caregiver. With these users feedback, we have focused MyGuardian services to a real situation.

Each use cases is focused in order to demonstrate MyGuardian functionalities and the impact that they have in the end users daily life MyGuardian can be adjusted to the preferences of the individual users in order to satisfy the needs of the patients and of the caregivers. For the patients, the device is mobile, easy to use and recognizable. But the caregivers will have pc and mobile access possibilities based on their preferences.

Starting from the conclusions of document D6, it has been found that MyGuardian services are very important for the informal caregiver and the patient peace of mind and comfort. In fact, the system is capable to locate in real time the patient and the caregivers (after authorization), even recognize locations, and to aware of the emotional state of the patient.

An important service is the notifications from MyGuardian to the informal caregiver about the status of the patient or about a help requested. If the informal caregiver isn't available, after three unanswered alerts, MyGuardian escalates the alarm to the call center. In this moment, the operator notifies the formal caregiver requesting an action using MyGuardian services.

When a problem is solved, formal caregivers update the status of MyGuardian alarm and they include useful information for the relatives and for the practitioner to understand the patient behavior, guidelines and anxiety cycles.

Using MyGuardian services, informal caregivers are able to adjust an area where the patient is free to move around. The patient and the caregiver are warned when the senior moves out of this area. In this moment, MyGuardian tries to help the patient reducing patients' stress in many occasions.

Other functionality that we have served in the use cases is the possibility of defining informal caregivers' availability. They are able to share agendas to coordinate care around the patient



using MyGuardian services. With this option, alarms are automatically escalated accordingly. If nobody is available to care the patient, there is a possibility of dispatching care activities to a formal care giver.

There are other optional functionalities that would help to guarantee the feeling of being safe and calm of the patient. One of them is the possibility of sending him a photo in order to remember what they were going to do when they are started to feel disoriented. Other one is the option of recording voices of the informal caregivers to calm the patient when he gets lost. And the last one we have served is the possibility of reassuring of the state of the patient whenever the informal caregiver wants.

All these functionalities are described in the uses cases. They have been mixed in order to probe all the kinds of services MyGuardian offers the users and to solve all the problems the users notifies us in the previous interviews.



4. Use case creation

In this section we explain how the use cases are created. A use case describes a sequence of actions that provide something of measurable value to an actor. It is a narrative that describes the sequence of events (including the variants) of an actor using a system to complete a process



In use cases, actors must be able to make decisions. They are the synthesis of his name and a description of his interests, his goals, his life circumstances, his appearance and his preferences. First of all, we need a good persona description. It might describe someone's skills, attitudes, environment and goals, i.e., behaviour patterns (psyche, performance in everyday life, fears, activity, hobbies...). We have taken some of the specific details of the people interviewed to compose a person description. These interviews were used to create the user requirements too.

Once we have the critical design information, we have added few personal details in order to adapt use cases to the real life. To add this information we have used the interview details too.



Figure 2.- MyGuardian Use Case creation

With all the descriptions, we have a summary of a number of people required to obtain the key goals and behaviour patterns.



After having the descriptions, we select the most important goals of each persona to focus the use cases. We try to please the life goals and experience goals that people want to feel when using MyGuardian application. Most of these goals should be solved using a well-designed product or service. For that reason, each use case is focused on the behaviours and goals related to the specific domain of MyGuardian services.

Before writing the use cases details, we have made a relational table between the list of descriptions and the application use cases we want to explain. With this table we are sure everything is covered: the different kinds of users of MyGuardian and the different situations where MyGuardian services are useful.



5. Use cases

In this section some use cases are detailed. With this use cases all the services of MyGuardian are served. We have created different scenarios with different kind of actors who needs MyGuardian services in their daily life. With all these use cases you can see how MyGuardian can help the patient and the caregivers.

5.1. Use Case 1: Service and Patient Status Reassurance

USE CASE 1	
Name	Service and Patient Status Reassurance
Short Description	Juan, the senior, is doing his daily tasks and his daughter wants to test if the senior is feeling alright or needs help.
Actors	Juan is the patient.Marta is the informal caregiver's daughter.
Actor characteristics	Juan lives alone; his wife died 3 years ago. Doctor diagnosed Juan as developing Alzheimer's disease some months ago.
Trigger(s) for using the solution	MyGuardian application is used in order to test if the senior is feeling alright or needs help. It is very useful for Marta (the daughter) and also as it enables the patient's peace of mind and comfort.
Functionalities included	 For this situation MyGuardian offers the next functionalities: The informal caregivers record some predefined message in MyGuardian. When the patient starts feeling stressed, he can press MyGuardian key and his relative (prerecorded message) tells him "Don't worry MyGuardian is taking care of you" while the service is functioning in background.MyGuardian service checks that the connectivity is OK and everything works without problems. The informal caregiver is warned when the battery level, of the device of the patients, is low. MyGuardian service also alarms the patients



through voice message if necessary to charge.

- Set up of personal repository of pre-recorded and alert messages that are configured by the carer in order to be able to send images or texts when an alarm situation occurs.
- Along the day, the informal caregiver requests the application to test if the senior is OK and the system is working.
- MyGuardian application plays the convenient recorded message and checks if everything is correct (system working and senior has no anxiety)
- MyGuardian notifies the informal caregiver about the senior's state.
- All these information is also stored in MyGuardian service providing later information about patient status, stress cycles, guidelines in the behaviour, etc. to the practitioner.

Use Case description

As Juan lives alone, every morning Marta checks if he is fine and if his mobile phone is turned on using MyGuardian service. MyGuardian asks Juan "what time is it?". If Juan answers the correct time, it means that everything is alright, otherwise an alarm is raised and his daughter could decide the action to solve it (call him to the home phone, or ask somebody to go there Today, Marta has done the same procedure. The application MyGuardian has checked that the time is OK and has notified the daughter.

For the daughter and the patient peace of mind and comfort, MyGuardian application warns him when the battery level is low. In this moment, an alarm notifies Juan that he has to connect the device.

In addition to this, there is a red key in MyGuardian application which plays the recorded messages by his daughter trying to calm down Juan. During the day, sometimes Juan gets nervous and disoriented but it is very easy to calm him. He presses the red key and a couple of messages are played. They say: "Don't be nervous Juan. MyGuardian is here with you. Don't worry dad!"

In a few minutes Juan calms and goes on with his daily activities.

When MyGuardian services are used, the reasons and the solutions of the use are stored in MyGuardian database. These data will be very useful for the next visit



to Juan's doctor, helping the practitioner to understand Juan behaviour, guidelines and anxiety cycles.

5.2. Use Case 2: Intervention triggered by the service

USE CASE 2	
Name	Intervention triggered by the service.
Short Description	Maria has gone to the market to buy some food and she became disoriented and confused and could not find the way back home.
Actors	- Maria is the patient
	- Pedro is her husband. He is the informal caregiver
Actor characteristics	Maria is 70 years old and lives with her husband. Doctor diagnosed her with dementia three months ago. She has always been a very active woman. She goes on with her daily life since she understands and accepts her condition.
Trigger(s) for using the solution	MyGuardian application is used by Maria to ask for help. When she is disoriented she presses a button and the application notifies the informal caregiver of the problem. The informal caregiver receives an alarm through MyGuardian application and also where Maria is exactly in every moment.
Functionalities included	 For this situation MyGuardian offers the next functionalities: MyGuardian helps to remember why the patient is in a specific place showing an image that reminds her about the reason of the trip. When the patient does not react to an alert message, the system automatically contacts an informal caregiver. The informal caregiver receives the notification of the problem and where the patient is in this moment.



Use Case description	Like every Monday, Maria has gone to the bakery in order
ose case description	to buy bread.
	She has gone alone. She doesn't want her husband to go along with her.
	When she reaches the bakery she has forgotten the reason and gets a bit nervous. In this moment, she looks her device for help. MyGuardian application knows where she is so it shows a bread image. Thanks to this service she can remember why she was in this shop.
	Then, she wants to go back home and walks. After 20 minutes, MyGuardian knows she starts running and automatically the application sends a message to her to know if she wants to be helped. But she doesn't.
	As Maria does not react to the Myguardian alert message, then the system automatically contact the husband.
	Pedro receives an alarm through MyGuardian services in his mobile phone and automatically he access Maria's precise location.
	Maria's husband calls her and instantaneously his voice calms her. After that, Pedro picks her up and brings her home.

5.3. Use Case 3: The informal caregiver isn't available

USE CASE 3	
Name	The informal caregiver isn't available
Short Description	Bea is in a concert and meanwhile Pilar goes for a walk around her neighborhood. After two hours, she realizes she can't remember the way to go back home.
Actors	Pilar is the patientBea is her sister. She is the informal caregiverCarlos is the formal caregiver
Actor characteristics	Bea is 68 and she loves classical music and she is a very active woman. 2 years ago her sister, Pilar, was diagnosis with mild cognitive impairments (initial level of dementia) as they live together Bea becomes Pilar career and with the months Pilar



started to become more and more dependent.

Pilar is 74 years old. She doesn't have any children. She lives with her sister Bea. Two years ago Pilar's sister had the feeling that there was something wrong. She took Pilar to the doctor and she was diagnosed with mild cognitive impairments.

Trigger(s) for using the solution

The informal caregiver trust on MyGuardian and she decides to leave the patient alone.

MyGuardian application is used by the patient to ask for help. When she is disoriented she presses a button and the application notifies the informal caregiver of the problem.

After three unanswered alerts by the informal caregiver, the service is configured to escalate the alarm to the call-center. The call-center receives an alarm and the operator calls Pilar to know about her. The operator also access Pilar's location thanks to MyGuardian application and tries to contact with the informal caregiver.

In a few time, Pilar is helped by a formal caregiver and she gets home. The call-center notifies Pilar's sister through MyGuardian services that everything is OK.

Functionalities included

For this situation MyGuardian offers the next functionalities:

- The patient presses the "help" key and MyGuardian application alerts the informal caregiver.
- The informal caregiver receives the notification of the problem but it is unanswered.
- After three unanswered notifications, MyGuardian sends the alarm to the call-center.
- The operator in the call-center phones the patient and accesses to the patient's location. Also, the operator tries to contact the informal caregiver.
- The operator sends a formal caregiver to help the patient. The operator looks for the formal caregiver who is nearest the patient location.
- The formal caregiver accompanies the patient home. And when the patient is OK, he finishes MyGuardian alarm and notifies the informal caregiver.
- The informal caregiver receives a notification where he can check that the patient is at home. Besides, the informal caregiver can read the information about the initial problem and how it has been solved, if he wants.



 Everything is inserted in MyGuardian database in order to be used by a doctor in the future.

Use Case description

Before the practitioner diagnosed Pilar with mild cognitive impairments Bea was a very active woman. Since this moment, Bea is always at home looking after her sister as she becomes more and more dependent with the months.

Bea has given up her free time activities to stay with her sister all day long. Some days she gets very stressful and nervous and she can't have her relax time going to classical music concerts as she used to do two years ago.

Three months ago, Bea discovered MyGuardian services. She has been using MyGuardian for this three months and she is sure that the application works properly.

Bea trusts on MyGuardian services and today she decided to go to a concert, in the meanwhile Pilar will go for her daily walk around her neighborhood, as she used to do, but this time with MyGuardian instead of her sister.

After having lunch, Pilar goes out for her daily walk, she starts to walk and suddenly she feels like an ice-cream. She goes to the ice-cream shop where she spent every afternoon when she was a child.

When she leaves the shop, she feels confused and very nervous. She doesn't know why she is there. She presses the key of her smart phone which asks for help.

Meanwhile, Bea is in the concert and her mobile phone is turned off. For this reason, she does not realize her sister needs help and the care request gets unanswered. Following three unanswered alerts by Pilar's sister, the MyGuardian service escalates the alarm to the call-centre, in order to start an intervention procedure for Pilar.

First, the operator calls Pilar trying to understand her state and location, and reassure her about help being dispatched. The callcentre is authorized to access Pilar's precise location, provided by the device she carries. At the same time, the call-centre keeps trying to contact her daughter. After a while Carlos, a formal caregiver included in MyGuardian network, reaches Pilar and accompanies her home.

When Bea goes out from the concert, she realizes that Pilar had suffered a confusion episode and that she had been in need of help, but, thanks to MyGuardian services she has been safely assisted to reach her home.



5.4. Use Case 4: The patient moves out of the allowed area

USE CASE 4	
Name	The patient moves out of the allowed area.
Short Description	Miguel goes to the day care centre from Monday to Friday. One day he moves out of the allowed area and MyGuardian notifies the informal caregiver.
Actors	- Miguel is the patient
	- Marina is his wife. She is the informal caregiver
Actor characteristics	Miguel is 71 years old. He is married. He was diagnosed with mild cognitive impairments a year ago. He goes to the day care centre from Monday to Friday.
Trigger(s) for using the solution	MyGuardian application is used by the informal caregiver to control if the patient goes to the daily care center everyday. This service helps the informal caregiver to be calm and sure that everything is going OK.
Functionalities included	For this situation MyGuardian offers the next functionalities:
	- The informal caregiver set an allowed area for the patient.
	 MyGuardian services notify the informal caregiver when the patient moves out the allowed area.
Use Case description	Marina has set an area, using MyGuardian services, where Miguel is free to move in his way to the center. With this service, she is calm because if he moves out of this area, MyGuardian alarms her. Miguel is also calm, quiet and self-confident because if he is disoriented and moves out of the allowed area MyGuardian application warns him with a familiar voice message.
	Today, Miguel has got up early in the morning to go to the day care centre. While he is walking he is disoriented and moves out the allowed area. MyGuardian application notifies Miguel using a lot of colors on his device.
	At the same time, MyGuardian notifies Marina about the situation. His wife decides to phone Miguel and guide him to the care center and he reaches the center without



any problem. MyGuardian services send a message to his wife to notify Miguel has arrived to the day care center

5.5. Use Case 5: Care Tasks distribution

USE CASE 5		
Name	Care Tasks distribution.	
Short Description	Ana wants to buy a present for her daughter. When she is in her way to the shopping center she needs help. One of her daughters is on a trip and the other one is working and it is impossible to talk with her. The formal caregiver has to help Ana.	
Actors	- Ana is the patient	
	- Cris and Maria are the patient's daughters.	
	- The formal caregiver	
Actor characteristics	Ana is 78 years old. Ana lives alone in a flat but Cris (one of her daughters) lives in the above flat. She was diagnosed with dementia when she was 75 but until last year there weren't a lot of evidences about the illness.	
Trigger(s) for using the solution	MyGuardian services are very useful for Ana and her daughters. For the daughters, they can set their timetable and modify it when it is necessary. For Ana, MyGuardian gives instructions to her in order to find a place. Besides, her daughters can access to the patient's location and they can send an image through MyGuardian to orient the patient.	
	As in the other cases, MyGuardian allows Ana to be sure when she is in her daily tasks.	
	Also, MyGuardian application is important for the formal caregivers. Before the existence of the application, sometimes formal caregivers had to function as mediator between children of a patient. When they get overloaded with work, formal caregiver had to communicate this to other family members. Thanks to MyGuardian, informal caregivers can distribute their daily tasks without annoying the formal caregivers. Formal caregivers feel more comfortable and free since they only have to help the patient if he has any problem.	



Functionalities included

For this situation MyGuardian offers the next functionalities:

- The informal caregivers can set when they are available and modify the timetable if it is necessary.
- MyGuardian notifies the call center about the problem and the operator in the call-center phones the patient.
- Meanwhile, the operator looks for a formal caregiver using MyGuardian services.
 MyGuardian finds the caregiver who is nearest the patient location.
- The formal caregiver accompanies the patient to home. And when the patient is OK, he finishes MyGuardian alarm and notifies the informal caregiver.
- The informal caregiver receives a notification where he can check the patient is at home.
 Besides, the informal caregiver can read the information about the initial problem and how it has been solved, if he wants.
- Everything is inserted in MyGuardian database in order to be used by a doctor in the future.
- The patient uses MyGuardian services to go to the shopping center in order not to get lost.
- The informal caregiver receives the notification of the problem and he looks for the patient's location with MyGuardian services.
- Set up of personal repository of images and alert messages that are configured by the carer in order to be able to send images or texts when an alarm situation occurs.
- The informal caregiver sends an image using MyGuardian services and the patient can remember what he wants to do.

Use Case description

Next week is Maria's birthday and for this reason Ana wants to buy her a present. She thinks she is capable of going to the shopping center.

Thanks to MyGuardian services she is more calm and self-confident. She knows if something goes wrong she will be helped.

Ana is walking to the shopping center following the



same direction as other times. Suddenly she finds a roadblock so she has to change the route. She walks but after 10 minutes she is disoriented. She gets very nervous.

She uses MyGuardian services to notify her informal caregivers that she has a problem. In this moment, his daughter aren't available:

This week Maria is on a trip. Last week she configured MyGuardian services to know it. With this option, Maria will know the problems of her mother but MyGuardian services won't ask her for help when Ana presses the "help" key.

Cris is working during the morning. MyGuardian services alarms her when Ana presses the "help" key. Immediately Cris phones her mother but she can't calm her. Ana is very nervous and disoriented; she needs someone to accompany her to home. Her daughter can't leave her work so she uses MyGuardian to alarm the formal caregivers.

In this moment, MyGuardian looks for the caregiver who is nearest the patient location. The caregiver helps Ana to go back home and update the status of the alarm when finishes. After that he notifies the informal giver of the situation through MyGuardian services.

MyGuardian services store the problem and the solution in the database.

Next day, Ana tries to go to the shopping center again. In order not to get lost, she uses My Guardian services and follows its instructions to get the shopping center.

After buying the present, MyGuardian services notifies Ana it's time to buy some medicines so he decides to go to the pharmacy before going back home.

When she goes into the chemistry, she realizes she can't remember what she wants to buy. She is disoriented again.

In this moment, she presses the "help" key and MyGuardian alarms her daughter Cris. Instantaneously, the daughter access to Ana's location and MyGuardian service indicates she is in the pharmacy. Cris sends Ana a picture of some medicines through MyGuardian application.

When Ana watches the image, he remembers why he is there. After that, she goes back home without any problem.



6. Annexes

Template used for the use cases description

USE CASE ID	
Name	Name of the use case.
Short Description	Short description of the main objective of this use case.
Actors	Persons who are taking part in the use case.
Actor characteristics	Description of the main characteristics of the actors: Specific person details and behaviour characteristics.
Trigger(s) for using the solution	Explanation about why is the application useful for this use case.
Functionalities included	Description of the functionalities the application offers to achieve the goals of the use case.
Use Case description	Brief story explaining the problem and how to solve it using the application.

