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Florence

Multi Purpose Mobile Robot for Ambient Assisted Living

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Table of Contents

1 Introduction

The deliverable is provided in WP1 as a result of work carried out in task 1.2 Definition of Robotic Service Scenarios. This task is responsible for defining scenarios for the Florence Project, which will be a set of descriptions of the context of use of the Florence services. These scenarios must be realistic in terms of cost, flexibility of the care-process, required change of habit, expected acceptance, inherit restrictions, and required additional side actions like extra monitoring services. This is based on the requirements defined in task 1.1, and the initial architectural ideas about robots in smart environments defined in WP2.

The main aim of this deliverable is to provide a Selection of key service scenarios as specified in the first project milestone (MS1). All partners are involved in defining the scenarios the Florence project and Florence system should be set up with.

The domains in which the scenarios will be described include *social connectedness*, *coaching*, *safety* and *collaborative activities*.

The initial diagram where different possible applications and domains were presented in the DoW is the following.

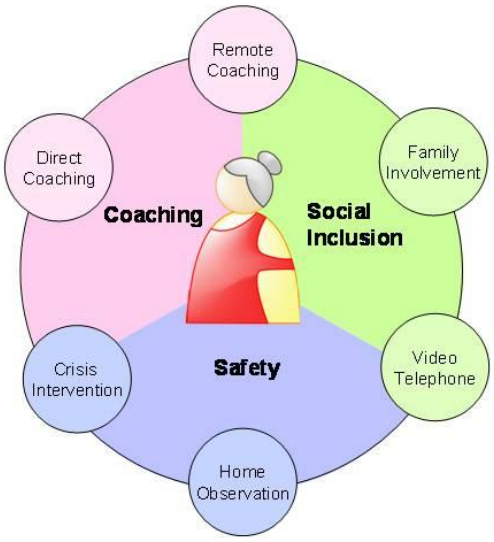

Figure 1:Florence possible applications and domains.

Following the introductory section, in section 2 the scenario objective and definitions are reflected and the process and templates chosen for the Florence project are described. Scenario and use case process definition is explained in the next section. This is the process that the Florence project has chosen to better understand and define the key scenarios and use cases related to those.

The initial scenarios chosen are described in section 4 and analysed in section 5. Input for the focus groups coming next is collected in Key points for focus groups; and a final summary and conclusive reflection are also included.

Annex A is a collection of the starting scenarios and the required functionalities for each scenario. Annex B provides a summary of a general feasibility check done to all scenarios.

2 Scenarios

2.1 Scenario definition and objective

Scenarios are descriptions of people using technology, allowing discussion of the system before it is built **Error! Reference source not found.**.

The basic argument for scenario-based methods is that descriptions of people using technology are essential in discussing and analysing how the technology is or could be reshaping their activities. A secondary advantage is that scenario descriptions can be created before a system is built and its impact is felt.

The emphasis on people's changing goals, plans and understandings is one thing that distinguishes user interaction scenarios from the related software engineering concept of use cases.

In Scenario-Based-Development (SBD) the output of any phase (definition of requirements, design, prototype and evaluation) includes user interaction scenarios (**Error! Reference source not found.**, see figure below). In the Florence project, scenarios will be used in the first phase of the development, that is, as a **tool for analyzing and defining the requirements of the system**.

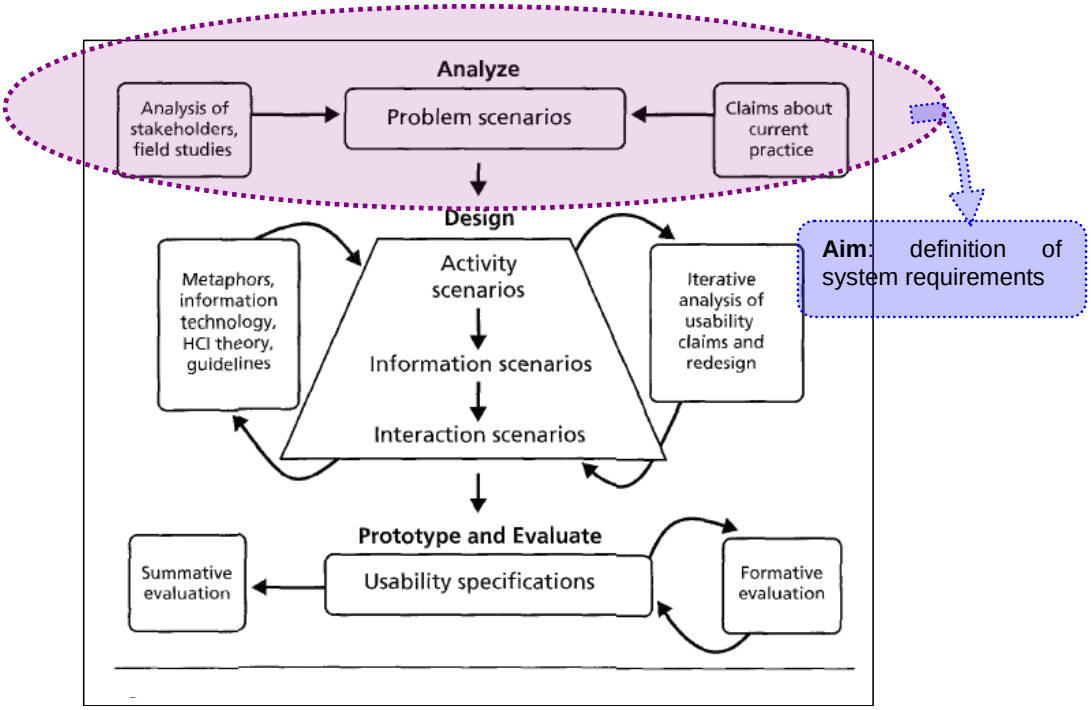

Figure 2: Overview of the scenario.

In **requirements analyses** (see **Error! Reference source not found.**, chapter 2, and figure below), the problem situation is studied through interviews with clients and other users (the stakeholders), field studies of the current situation and brainstorming among users and developers. This input is used to formulate **problem scenarios** that convey important characteristics of the users, the typical and critical tasks they engage in, the tools they use and their organizational context.

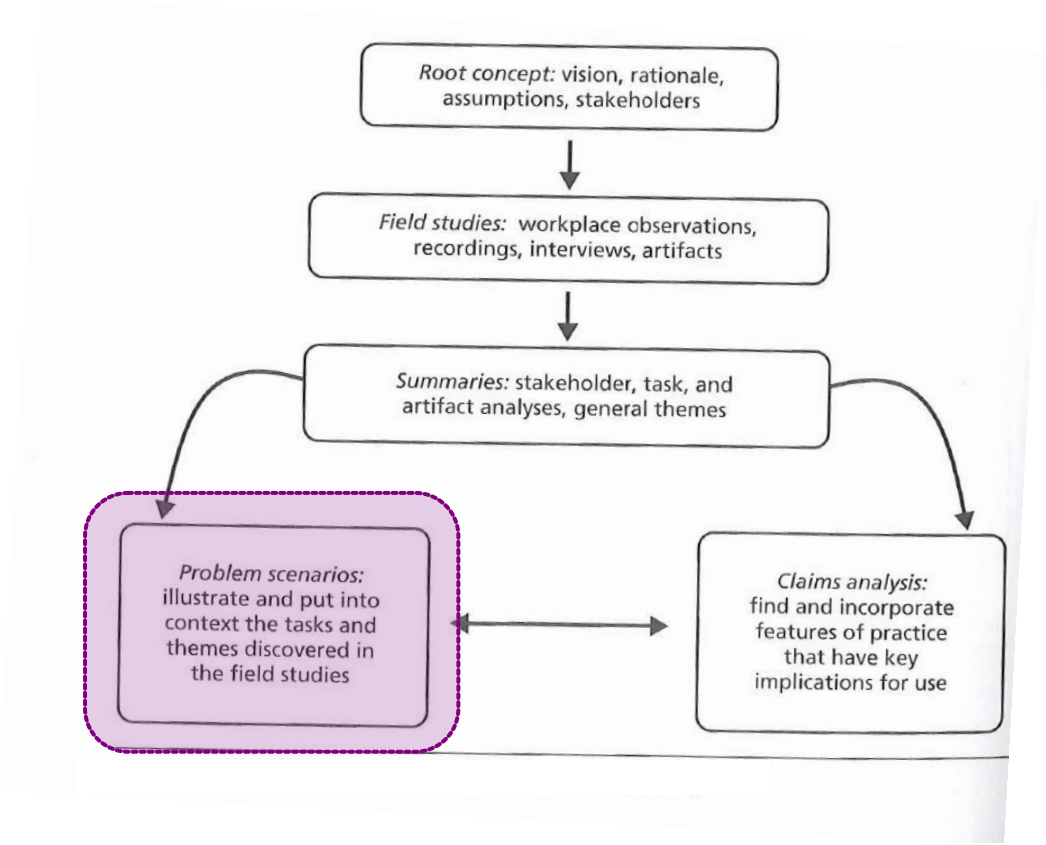

Figure 3: Overview of scenario based requirements analysis.

In SBD, the analysis and refinement of scenarios is stimulated by claims: statements that list important features of a situation and their impacts in user experiences. Claims are related to the general notion of trade-offs in design, because they always analyse both positive and negative usability impacts.

2.2 Scenario creation procedure

The **scenario creation procedure** suggested in Florence project contains two phases. The first phase encourages reflexive steps to understand the current practice. The second phase is where the scenario elements and the scenario of the foreseen future situation are described.

The proposed scenario template in Florence contains a functional description and the scenario itself.

First phase

This first phase consists of collecting and summarizing information on the current practice, including the following topics:

1. A short description of the **scenario**: the current practice/situation, including the perceived need.
2. A short description of **stakeholders** in the current practice/situation.
3. The analysis of **tasks** in the current practice/situation.

4. A short description of artefacts (devices, tools, etc.) in the current practice/situation.

See definitions and examples for these previous topics in the table below:

Reflexive elements	Definition	Examples
Current short scenario	A short description of the current scenario including identified need. This need will be targeted in the future foreseen scenario.	Jose and his grandson Carlos are making a puzzle together. They enjoy playing together, and this day they've decided to make a big puzzle that the grandson individually wouldn't be able to complete. Carlos starts with the puzzle, and Jose helps him with difficult parts. Carlos loves feeling his grandpa is there for helping him and cheering him up. When it's time to leave, Carlos' parents let him know it's time to pick up. Carlos complains because they still haven't finished with the puzzle. Jose is also sorry they can't spend more time together.
Stakeholders	Groups or individuals that should be consulted or observed in the fieldwork. The brief description of each group's interest points to questions or tasks that should be raised and observed	• Grandfather who enjoys spending time with his grandchildren. Very satisfied when he can share his background knowledge and experience with his grandson. Making puzzles is challenging for him, as he started with this entertainment together with his grandson. • Grandson aged around 10, loves puzzles and this type of "intellectual" games, although sometimes it is difficult for him to finish them and he gets bored when difficulties arise • Parents who bring the grandson to the grandfather's house every now and then
Task analysis	A brief list that documents the tasks of each stakeholder. It helps make sure all relevant tasks are considered.	• Grandfather: helps selecting a puzzle, helps selecting a working surface, helps making some parts, makes other difficult puzzle parts, encourages the grandson while making puzzle

		• Grandson: selects a puzzle according to the picture and quantity of pieces, selects the surface on which to make the puzzle, puts a reference image in a visible place, makes puzzle. • Parents: determine when and how long grandson and grandfather can be together.
Artifacts	The description of the different devices, tools, etc. that are used. It will help in making interaction design choices as well as provide input in the task analysis.	• Puzzle • Puzzle cover (reference image) • Surface to make the puzzle on (table) • Chairs

In order to do this, as stated in the previous section, field studies, background knowledge and literature review will be used.

Second phase

Once current practices in current scenarios have been analysed and collected, next step requires switching to the foreseen scenarios in which the Florence system will be operating.

The steps to follow are:

1. Subtask 1: Analysis of the scenario characteristic elements (see table below)
2. Subtask 2: Definition of the aim of the scenario + Scenario itself

For the first subtask, the following table should be filled in for all scenarios in section 4. Information from this table will help build appropriate scenarios.

Scenario element	Definition	Examples
Setting	Situational details that motivate or explain goals, actions, and reactions of the actor(s): - What does the space have in it - What do people do in the space -Does the nature of the space change with different actors (i.e. wealthy/poor, active/sedentary)	Jose's home, dining room. Saturday afternoon, 16:00. Jose is reading the newspaper. He is alone.
Actors	Human(s) interacting with the computer or other setting elements; personal characteristic relevant to scenario	• Jose, a 70 years old grandfather having a strong relationship with his grandson Carlos, who lives 25 Km. far from him.
Task goals and actions	The effects on the situation that motivate actions carried out by	Goals: • Have fun with his grandson

	actor(s) An observable behaviour	• Collaborate to succeed in finishing a big puzzle, bigger than the one they would finish individually Actions: • Communicate with Carlos thanks to the video conference system integrated in the Florence robot • Help Carlos putting correctly some difficult pieces of the puzzle remotely • Make parts of the puzzle • Encourage Carlos to finish the puzzle
Plans	Mental activity directed at converting a goal into a behaviour	• Making the difficult parts will encourage Carlos to continue • If they don't finish this afternoon, Jose will continue with the puzzle the following day
Evaluation (optional)	Mental activity directed at interpreting features of the situation	
Events	External actions or reactions produced by the computer or other features of the setting; some of these may be hidden to the actor(s) but important to scenario	• Florence robot prompts him to take part on the interactive puzzle his grandson Carlos is making at home • Carlos is putting pieces together • Carlos asks grandpa to make that part of the sky that it is so difficult for him
Artifacts	Physical objects that populate the scenario	Florence robot

Aim of the scenario, example:

The making puzzle service implemented in the Florence system provides family relatives the option of performing a collaborative ludic activity like puzzle making, remotely and synchronized, both players at the same time or asynchronized.

Scenario description, example:

Jose and his 10 years old grandson Carlos have a strong relationship. They both like very much making puzzles. They both have grown closer sharing this activity.

It is Saturday afternoon and Jose is in his dining room reading the newspaper. The Florence robot is around. Suddenly, the robot system comes to Jose and prompts him to join remotely the puzzle making activity his grandson is carrying out at home by means of a tablet pc. Jose is very glad to accept.

Carlos has selected a big and difficult puzzle, as he is asking grandpa to collaborate to bring together the puzzle image. Jose starts helping with some difficult pieces, encouraging Carlos to first look carefully to the reference image on the cover of the puzzle-box and then to the pieces. It is really funny to play together remotely at the same time, the voice communication integrated in the robot makes things easier.

Carlos asks grandpa to bring together that part of the sky that it is so difficult for him. Pieces start moving magically. Carlos loves feeling that grandpa is with him, even if he isn't physically there.

As time goes by and they haven't finished, Jose promises Carlos to continue with the puzzle. He will try to finish by tomorrow.

3 Scenario and use case definition process

The scenario and use case definition process is divided into two stages and each of them will produce one deliverable (D1.1; D1.3).

The aim of the first stage is to select the key scenarios that will be part of the project. A brainstorming session was carried out, were different ideas for scenarios were collected. These ideas were further expanded and functionality requirements' analysis was made for each of the scenarios. The draft scenarios and functionality tables were provided to WP2, WP3 and WP5 for comments and feasibility check was requested, especially from WP2.

In parallel work in T1.1 progressed and the analysis of the literature and previous experience was done.

The feedback from the various work-packages and the user and caregiver needs analysis helped to select the initial key scenarios for the Florence project in an internal discussion session held in June in the Malaga project meeting @FASS.

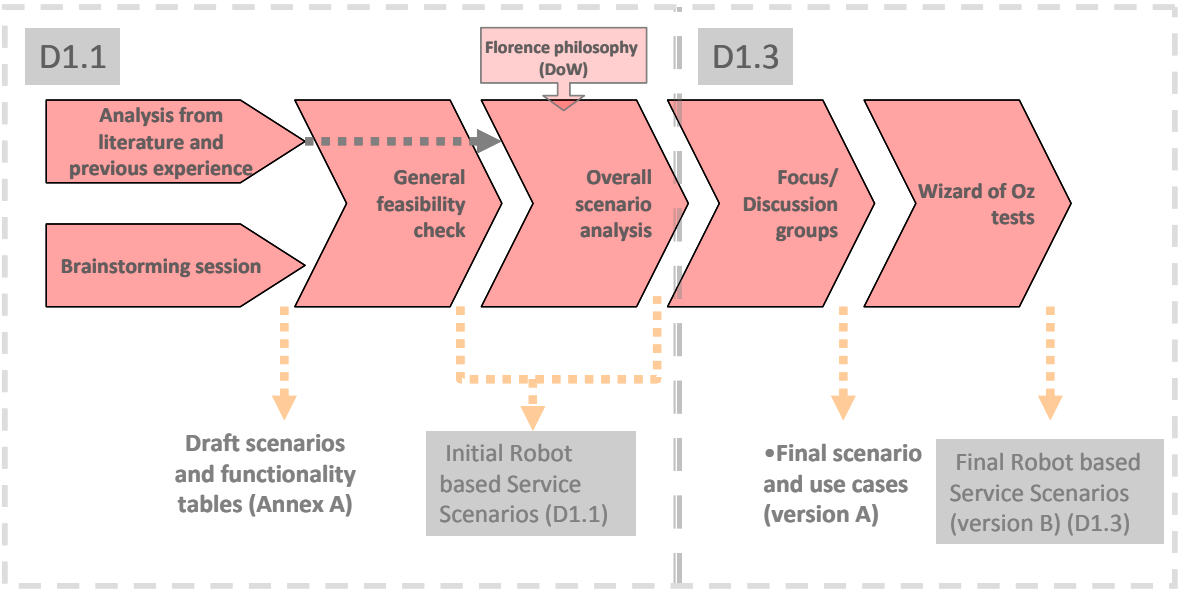

Figure 4:Initial keys scenarios for the Florence project.

In order to enrich the selected scenarios a current practice assessment was done and all the relevant scenarios elements considered. The overall scenario analysis contemplates user need aspects as well as all the relevant element of the Florence philosophy (progress on user acceptance, innovation, home and robot integration, unique interface). The enriched scenarios are the main output of D1.1 Initial Scenarios.

Use cases are initiated by a user with a particular goal in mind, and are successfully completed when that goal is satisfied. It describes the sequence of interactions between actors and the system necessary to deliver the service that satisfies the goal. It also includes possible variants of this sequence, e.g., alternative sequences that

may also satisfy the goal, as well as sequences that may lead to failure to complete the service because of exceptional behaviour, error handling, etc.

At this stage no specific use cases have been developed for different reasons:

- A use case at this stage would be such high level it would be similar to a scenario and would not provide any additional information.
- Use cases will be used in Florence to determine system's requirements and are therefore more meaningful to be developed once the scenarios have been taken to the focus/discussion groups.
- Use cases developed in version A can be taken to the wizard of oz tests as specific sets of actions to be tested. High level use cases would not be helpful.

Once D1.1 has been delivered, stage two will follow with discussion and focus groups to which partner will bring several concerns and issues to the focus/discussion groups to better understand how the involved actors understand, interpret and perceive what is being offered in a scenario.

Feedback from focus/discussion groups will help refine the scenarios and define the use cases that will be tested in the wizard of oz experiments. The possibility of interacting with the service at such a soon stage of the project will help in redefining the scenario and use cases that are basis for the future services (version B), improving acceptance of the end system.

During the development of the scenario definition process, the consortium found that the level of scenario definition achieved in the draft scenarios (Annex A) only allowed for a *general feasibility check*. At this stage it was relevant to keep the scenarios still open enough for variants to be included.

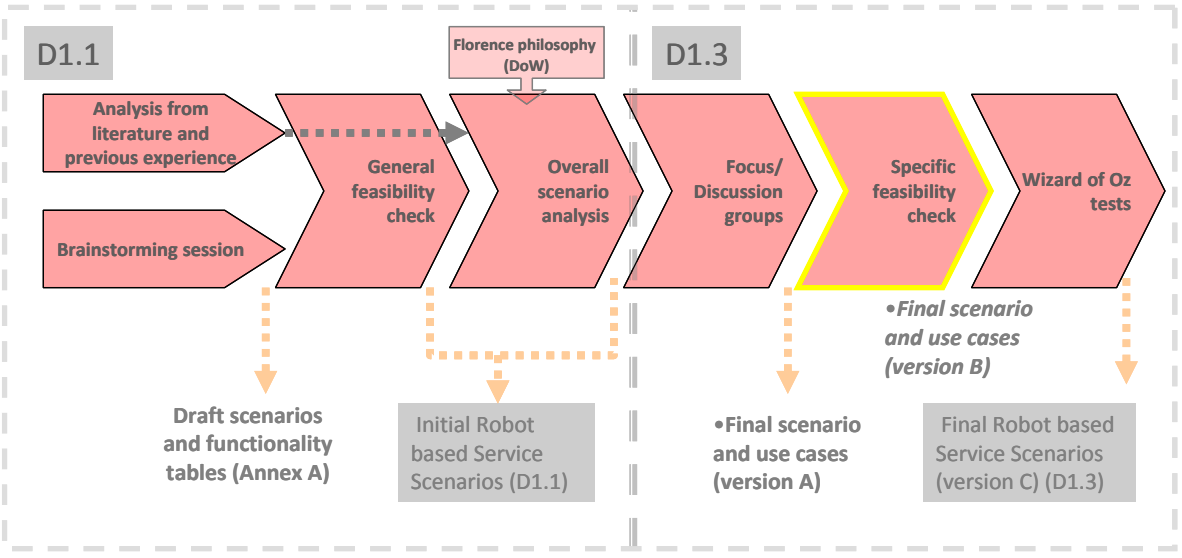

Figure 5: second specific feasibility check.

Therefore, a second *specific feasibility check* was included as feedback to obtain version B of the scenarios and use cases. The specific feasibility check will provide input to redefine the use cases, before the wizard of oz tests.

4 Initial Scenarios

In this section the initial scenarios will be presented. The selected scenarios will be a reference input to WP2, WP3, WP4 and WP5.

The chosen scenarios will evolve through focus groups sessions' feedback and will be evaluated through Wizard of Oz tests.

The scenario development has been done following the process and templates described in the previous sections.

4.1 Keeping in touch [KEETOU]

Current scenario and practices:

Reflexive elements	Examples
Current short scenario	Carla is feeling lonely since she widowed. She does not feel like going out as often as she used to and even if her son, Marcus, and his family visit her on weekends, and once a week she gets a call from her friend Sofia, there are still plenty of moments when she could do with some extra chatting or socializing in order to cheer her up.
Stakeholders	• Carla is a grandma that has recently widowed and is feeling lonely. • Marcus: Carla´s son. He and his family try to visit grandma as often as possible but they live 40 km away from her. • Sofia: Carla´s friend. She used to meet Carla every now and then and now that Carla stays home longer, she tries to call her every week, but misses feeling next to her.
Task analysis	• Carla welcomes her family when they visit her and answers her friend's phone calls. • Marcus and his family visit Carla. • Sofia phones Carla.
Artifacts	Telephone

Foreseen scenario with Florence system

Scenario element	Examples
Setting	It is Tuesday morning and Carla is feeling down, the bad weather doesn't help. She gets up and makes some coffee.
Actors	• Carla, widowed and feeling lonely. • Marcus: Carla´s son. He and his family who visit grandma virtually more often and send her photos and small text messages. • Sofia: Carla´s friend. She can visit Carla virtually.
Task goals and actions	Goals: • Keep in touch with her family and friends • Avoid feeling alone Actions:

	• Answer virtual visit calls • React to photos and text messages
Plans	• Whenever Carla is feeling lonely she checks if she got new messages or photos. • When she answers a call she expects a virtual visit
Events	• Florence system takes call to Carla • Florence system provides tele-presence to Marcus • Florence system shows pictures and messages sent by Marcus's sons. • Florence system detects when Carla is feeling sad and/or has low activity.
Artifacts	Florence system

Aim of the scenario

The "Keeping in touch: visits from family and friends and small life snapshots" offers elderly people an innovative communication tool when at home or far from beloved ones. The "Keeping in touch" scenario includes two different options: (1) family or friends can visit the elderly using the robot as a tele-presence tool, (2) easy access is provided to the elderly to web 2.0 tools.

Scenario:

It is Tuesday morning and Carla is feeling down, the bad weather doesn't help. She gets up and makes some coffee. Carla widowed four months ago and since then she is feeling lonely. On Tuesdays she would play tennis with her husband, but today she is not feeling like going out on her own.

The Florence system detects Carla's mood and lets Marcus, her son and Sofia, her friend, know that Carla would benefit from some chatting.

Sofia phones Carla. The Florence system finds Carla and lets her know she has a request for virtual visit call. Carla accepts and Sofia and Carla happily talk to each other. Sofia can virtually move with Carla in the house to check the new curtains Carla would like to show her. By the time they hung up Sofia is feeling much better and starts preparing lunch.

In the evening the Florence system receives two pictures from Marcus's son's social networking tool. The Florence system knows Carla has been watching TV all the afternoon so it informs her about the new pictures.
Carla likes one picture very much and let's her grandson know about it.

4.2 Advanced Home Interface [HOMINT]

Current scenario and practices:

Reflexive elements	Definition
Current short scenario	John is 75 years old and hearing impaired. He is still able to move well, but he is getting increasingly tired and once he is sitting on his couch he does not like to get up again soon. Often he is sitting on his couch watching TV and realizes that he has forgotten to turn off the main lights in the living room or kitchen, or has left a window open in the sleeping room. He then has to get up again, walk to the wall switch and turn off the lights, or to the sleeping room to close the window. Since John is also a bit forgetful at times, he sometimes does not remember to close the window in time. Many times, he is also not hearing the door bell ring when Alex his friend is visiting because he has hearing problems. Often he has to turn the TV really loud, too. John would be happy to have a solution that assists him in performing tasks at home (like opening a window, the shutters, turning on and off lights, or informing him of the door bell ringing) in a more automated and comfortable way.
Stakeholders	• John, an elderly person with hearing impairment • Alex, his friend visiting and ringing the door bell
Task analysis	• John gets up from where he sits to switch on/off lights, open/close windows, or open/close door • John hears the door bell ringing • John walks to the door • John checks who is on the other side of the door • John opens the door • If John has opened a window or a shutter, he has to remember to close it again • John closes the window
Artifacts	• Door • Doorbell • Door viewer • Door Lock • Window • Shutters • Lights • Light switch • Couch • TV

Foreseen scenario with Florence system

Scenario element	Definition
Setting	John is 75 years old, hearing impaired and sitting on his couch watching TV. The main lights in the room are still on, although John prefers a more cosy indirect light when watching TV. John has a home control system installed at his home which is connected to smart devices, sensors and actuators that can turn on/off lights in different rooms, open/close windows and lock/unlock doors. John's door bell is equipped with camera and a microphone/speaker system. These are connected to a smart software component running on John's Home Gateway to notify him when the bell is rung. John also owns a robot with several I/O devices including a touch screen and speaker system. He also owns a mobile phone which he occasionally uses.
Actors	• John (main actor) • Alex, John's friend
Task goals and actions	Goals: • Control lights without having to get up from his couch • Lock/ unlock doors automatically in a comfortable and secure way • Open/close windows automatically in comfortable and secure way • Have a notification mechanism indicating if the door bell was rung (if John does not hear it) • Have means to check who is in front of the door without having to get up • Have means to communicate with the person in front of the door without having to get up or having to hear and see well. Actions: • Signal home control system to turn on/off lights, open/close windows, lock/unlock doors • User switches to outdoor camera view
Plans	Attend the Florence system´s notifications
Events	• Florence System (robot) switches off the light • Robot instructs home control system to lower lights • Florence system detects door bell ringing • Florence System detects which interface is currently in use by John (if one at all) • Selects interface for notification • Triggers notification • Florence System generates notification for selected interface

	• Reminds John if the windows are open for too long and offer to close them automatically • Provide possible transcription of speech of a visitor in front of the door
Artifacts	• Window actuator • Door lock actuator • Light actuator • Notification Distribution System • Outdoor camera • Outdoor microphone/speaker system • Home Gateway • TV Set • Mobile Phone • Robot • Couch

Aim of the scenario:

The robot is used as an intelligent interface to the home control system to assist the elderly user. For example, the elderly person can simply give voice commands or interact with the robot touch screen or the TV system to control the home environment (e.g. to switch lights in specific room on/off, open close windows and shutters, or remotely lock/unlock doors).

Scenario:

John is 75 years old, he suffers from hearing impairment and is sitting on his couch watching TV. To switch off the main room light without getting up he just asks the robot to switch it off and turn on the lamp next to his TV. The Robot takes John's order and passes it to the home control system which in turn switches off the light in the room and powers up the smaller lamp.

While John is watching TV, the door bell is ringing, because John's friend Alex is visiting. John's door bell is equipped with camera and a microphone/speaker system. If someone is ringing the bell, John can see and interact with the person on the other side of the door using whatever interface is currently in use by John, i.e. which interface John is currently interacting with. This could be the TV set, a mobile phone or the Robot.

Since John is currently using the TV, he gets a visual notification on the TV indicating the door bell is ringing.The output of the camera on the door bell is also shown to John, so he can see who is in front of the door.
John's friend Alex can even speak into the outdoor camera's microphone which may result in a transcription of the words to text (speech recognition) shown on John's screen(s).
Using the robot and/or the TV remote control, John can instruct the opening of the door. This again is automated by the home control system the robot interfaces with.

While John and Alex are having fun in the living room, the windows in John's bedroom are open. Taking into account sensor information, e.g. room temperature and humidity level, the robot realises that the window has been opened for long enough and the air quality is now ok. It therefore suggests John to close it. John agrees and the robot sends a signal to the home control system to close the windows automatically.

4.3 Fall situation handling [FALHAN]

Current scenario and practices:

Reflexive elements	Examples
Current short scenario	Peter fell down in the kitchen when he was trying to find some milk. Taking into account he was doing a potentially low risk task at home, he did not have neither his mobile phone nor his remote emergency push- button. He can not move since he injured his hips Peter shouts but nobody hears him.
Stakeholders	• Peter. An elderly, apparently independent person aware of his ageing decline. • Tele-assistance' s call center unit, taking over the situation, monitoring the crisis through a emergency panic button and following a protocol of calming Peter down as calling out his family-carers and emergency services.
Task analysis	• Peter falls down without any communication or emergency devices on him. He is injured and can not move. This fact leads him into high levels of anxiety • Tele-assistance unit doesn´t get the call and can neither communicate his family and emergency services nor handle the situation following a protocol.
Artifacts	• Telecare system

Foreseen scenario with Florence system

Scenario element	Examples
Setting	Peter fell down and got injured, therefore unable to move.
Actors	• Peter who is apparently independent but his resilience to falls is low. • Tele-assistance unit. • Emergency services
Task goals and actions	Goals: • Cope with falls in two ways: a) Calling out emergencies and/or relatives at any situation b) Reduce the anxiety of being alone after a fall through professional tele-presence. Actions: • Follow the Florence advises
Plans	• Calm down, do not panic
Events	• Florence system recognizes the situation of a person who has fallen. • Florence system calls the tele-assistance centre. • Tele-assistance centre calls emergencies and/or relatives and supports the person calming him down.
Artifacts	• Florence robot

	• Tele-assistance setting

Aim of the scenario:

The "Fall Handling" offers an elderly person an innovative tool to recognize and manage emergencies like a sudden fall, contacting the telecare system to manage the emergency and offering immediate support from a professional. This scenario includes three stages or layers 1) Recognizing the fall 2) Contacting the telecare/emergency service 3) Enhancing an interaction from professional teleoperator and the user via voice and image.

Scenario:

Peter is in a relative good physical and mental condition for his age. He lives on his own since four years ago he widowed. His sons live in the same city as him and visit Peter at least twice a week. Peter has lately started to be aware of his forthcoming age decline and requested the Tele-care service along with the Florence system. This makes him feel secure in case of an unexpected emergency.
In fact, he has already had an accident a while ago. The experience has not been too traumatic since he was supported from the beginning. While the emergencies were coming to Peter´s place, the tele-care operators called Peter´s son. They were following a protocol to support Peter. Peter now regards Florence as a need.
Peter has just woken up at the usual time. While he was preparing some breakfast and for no apparent reason he fell down and is not able to move naturally. He is in pain and fears the fact that he is alone and does not know how serious his fall was. Florence robot recognizes that fall and quickly approaches Peter. The tele care service gets notice and communicates with Peter calming him down, assessing the situation and warning the local emergency units.

4.4 Agenda reminder [AGEREM]

Current scenario and practices:

Reflexive elements	Examples
Current short scenario	Santiago has to take 6 pills every day at different times. He sometimes either forgets to take them or gets confused on which one has to choose every time. Many times is a hassle for him to find them or just going to the kitchen where he places them.
Stakeholders	• Santiago, an elderly independent person aware of his memory fragility as well as his problems of mobility. • Tele-assistance centre, in charge of monitoring Santiago.

Task analysis	• Santiago forgets to take the pills prescribed, and whenever he remembers it, he also doubts upon the number or the type of pill to take. • Take the pills according to the telecare system´s indications
Artifacts	• Pills

Foreseen scenario with Florence system

Scenario element	Examples
Setting	Santiago´s home. He has just had lunch and must take three different pills. Santiago fails to remember that after lunch he must take three different pills.
Actors	• Santiago • Tele-assistance service unit
Task goals and actions	Goals: • Assuring that treatment is being accomplished Actions: • Take medication according to reminders indications. • The user confirms the medication intake in order to make notice to the teleassistance unit that medication has been taken.
Plans	• Security and Confidence that he will take his right medication on the right moment.
Events	• Florence system's alarm goes off when a medication has to be taken. • Florence system offers communication with the tele-assistance unit centre to register a track, being concerned whenever he fail to take the medication
Artifacts	Florence robot: a) Alarm that reminds the intake b) Touch Screen which specifies which medication and prompts the user to confirm that medication has been taken

Aim of the scenario:

The Agenda Reminder is an effective and innovative way to manage and assure certain routines that in a medium term are crucial, such as reminding the medication intake. By this service, Florence tackles a challenge to the user, memory. This scenario includes 1) Alarm that reminds the medication intake on time 2) Approaching the user 3) Dispensing the medication 4) Pressing ok in order to make sure of the task accomplishment.

Scenario:

Santiago quite often fails to remember the intake of his medication. Even when he remembers, he does not get right which one to take and how many. After having lunch, Santiago usually takes a nap. Right before that, he should have remembered to take his medication. Florence alarm goes off and the whole system approaches Santiago. He notices it and wakes up. Florence's alarm goes off reminding the intake of his medication. After taking them, Santiago confirms the system he has taken the medication and this action goes into a record. In the case he does not confirm it, or the telecare unit detects a failure on the intake, Santiago will be contacted to make sure he is fine. Santiago feels relieved for the fact that thanks to Florence his medicine intake is not going to be disturbed by his memory failures.

4.5 Lifestyle improvement [LIFIMP]

Current scenario and practices:

Reflexive elements	Examples
Current short scenario	Thomas is 75 years old, his wife recently passed away. Thomas is managing alone quite well. But he is facing some small health issues; he is suffering from back pains and gets tired quickly. He doesn't like to go out much anymore. He sits in his chair most of the day. His daughter is worried about him because he is alone and she doesn't know if he is well or not.
Stakeholders	• Thomas who wants to continue to live alone as long as possible. He doesn't want his daughter to worry about him. • Daughter: who is worried and checks on her father regularly. • Physiotherapist that recommends Thomas to move regularly, he is afraid that Thomas will stop moving.
Task analysis	• Thomas sits in his chair and performs only simple and basic tasks • Daughter calls her father to hear if he is well. • Physiotherapist that needs to let Thomas know what kind of exercise he should do.
Artifacts	• Telephone, paper • Chair

Foreseen scenario with Florence system

Scenario element	Examples
Setting	Thomas' dining room. Thomas' activities are monitored to see if everything is ok
Actors	• Thomas • Thomas' daughter • Physiotherapist

Task goals and actions	Goals: • Changing behaviour so that he changes his activity pattern; moves more and feels more confident moving • Make sure that family members are at ease; they know Thomas is monitored and that they will be alerted of any sign of decline or crisis. Actions: • Thomas: take a walk following Florence robot' s suggestion • Physiotherapist: send videos with exercises to the Florence robot, remind Thomas to do the exercises and make sure that he does the correct amount of exercises
Plans	
Events	• Monitoring of actions of user through: sensors in bed that analyse sleep pattern, laser monitoring by robot of user movement, weight analysis through scale, electricity usage, noise analysis, pedometer. • Florence robot receives videos and exercises from physiotherapist
Artifacts	• Florence robot • Pedometer that is on the keys of Thomas: when he is outside the house, this measures his activity • Inside, the robot and the home sensors together measure activity

Aim of the scenario:

The aim of the scenario is to provide the following functionalities:

1. **Logging of Health-Data for short term and middle-long term health assessment: both to make sure that on the short term, stakeholders are warned when something out-of-the-ordinary is detected. On the middle- long term, the logging data gives inout to physiotherapist and Florence lifestyle improvement service.**
2. **Showing instruction videos: a physiotherapist (or any authorized therapist) can send videos with instructions to a person. The robot can show these videos to the elderly person.**
3. **Tele-communication via video: The Florence robot can initiate a video call between the elderly and anyone else that has a proper video phone, like the physiotherapist in the example above. If the physiotherapist doesn't have a camera, but only a display an asymmetric video call could be setup (audio going both ways, but video only going from the elderly to the therapist)**

Scenario:

Thomas is a 75 year old senior whose wife recently passed away. He just woke up and is getting ready for the day in the bathroom. He stands on the scale and the results are being sent to his in home Florence system. Upon entering the kitchen for making breakfast he consults the Florence robot. The robot looks at the latest health records and since it's a sunny day and Thomas has no other appointments in the morning he suggests to take a walk through the park.
After he gets back Thomas notices his hip being stiff again. Luckily his weekly telephone call with his physiotherapist is scheduled for later today. The Florence robot notifies Thomas that it is time for the call. Thomas discusses his stiff hip with the physiotherapist who advises him to do some exercises to improve his stance and ease his hip. The suggested exercises are being sent to the Florence system. Thomas' robot assists him by displaying the exercises on his screen. Since the robot is mobile Thomas can exercise wherever he wants and without needing a physiotherapist, whenever he wants.

4.6 Device coach [DEVCOA]

Current scenario and practices:

Reflexive elements	Examples
Current short scenario	• Anna is 70 years old, she is living alone. She is managing fine. The only thing she has trouble doing is operating the many electronic devices she has. They make her life easier but they also give her headaches. She doesn't always want to call her children to help her out so she often waits for one of them to visit and has a whole list of problems to solve when they come.
Stakeholders	• Anna • Her children
Task analysis	• Children: have to let Anna see how to operate devices throughout the house • Anna: has to remember how to operate. She finds it difficult and writes things down. This way, the explanations take a long time. Both Anna and her children would rather spend this time having a nice conversation.
Artifacts	• Devices • Paper and pen to write stuff down

Foreseen scenario with Florence system

Scenario element	Examples
Setting	Anna's son got her a new coffee machine for her birthday. She loves the machine, but it is so advanced that she sometimes has difficulties operating it. It gives her a message that says it should be cleaned but she doesn't know how. Anna is connected to a community that forms a pool of people that help each other using devices.

	Anna can use the Florence robot in every place in her house to set up a video connection with someone that can help and show them at the spot where she has difficulties. The person at the other end has a clear view on what is going on. Florence robot can take video on command that can be accessed at a later point in time. This video can also become part of the community pool. Additionally, in learning to operate the robot (complex device), Anna's children can record macro's into the robot that perform actions often used.
Actors	• Anna • Pool of helpers/ peers and social network
Task goals and actions	Goals: • Have access to help at the place and time that Anna needs it • Relieving Anna's children of having to help her when they come visit her. • Avoid having to read complicated manuals. • Connecting with social network by helping each other. Staying in touch. Actions: • Recording macro's (Anna's children) • Connect to social network through shared coaching. Both in request to community and in responding to requests of others.
Plans	• Request help whenever she does not know how to operate the new coffee machine
Events	• Triggered by request input: people in the community are alerted about request. • (Someone in the community reacts) • Anna's robot alerts her of the reaction. • Macro or video connection is started.
Artifacts	• Florence robot • Coffee machine

Aim of the scenario:

The aim of this scenario is to provide following functionalities:

1. **Video conferencing for help from peers and relatives**
2. **Improve social connectedness by letting elderly help each other**
3. **Improve feeling of wellbeing by being able to solve problems using devices independently instead of having to rely on relatives**

Scenario:

Anna has always been fond of new technology that can make her life easier. However, she notices that she often has to ask her children to help her to use a particular device for the first time. She is sometimes forgetful, this makes it hard to remember how to operate devices. Her son recently gave her a new coffee machine. She loves the freshly brewed coffee it makes but one morning, the coffee machine gives an error. Anne doesn't know what to do. She asks the Florence robot to help her and enters the device coach service. Anna is connected to a community of users of this service and asks for help by entering the brand and type of her coffee machine, she also gives a description of the problem.
The Device Coach Service sends a message to the community.

Robert, a senior who lives in a city nearby sees Anna's message. He has had the same problem with his coffee machine and knows how to help. He contacts Anna through the video conference system that is part of the community. He sends her an on screen interactive presentation of part of a manual that helped him solve the problem. Step by step they together follow the procedure to fix the error. In the end, Anna has her coffee and Anna and Robert chat for a while.

4.7 Collaborative gaming [COLGAM]

Current scenario and practices:

Reflexive elements	Examples
Current short scenario	Mary and Susan love to make puzzles together at Mary's place. They both feel they are part of a good team. Mary is very patient and can play for long hours while Susan is good at spotting a specific tile. They are proud of being able to make a 1000-tile puzzle together. These last months, however, Susan is suffering from arthritis, so she is not as mobile as she used to and can not visit her friend as often as she would like to.
Stakeholders	• Mary: likes to make puzzles and is very patient. • Susan: suffers from arthritis and is good at spotting appropriate tiles.
Task analysis	• Mary: participate in a puzzle-making activity, placing a high percentage of the tiles; chat with Susan • Susan: participate in a puzzle-making activity, placing the difficult tiles; chat with Mary
Artifacts	• Puzzle • Working surface • Puzzle cover

Foreseen scenario with Florence system

Scenario element	Examples
Setting	Mary is making a big puzzle at home and would like Susan's help, she doesn't feel able to finish the puzzle by herself. Unfortunately, her friend Susan is staying at home because she is in pain due to her arthritis. This

	makes Susan feel bored, sad and with bad humour. Both women own a Florence system.
Actors	• Mary • Susan
Task goals and actions	Goals: • Make a big and challenging puzzle together • Keep the puzzle making social activity ongoing Actions: • Mary makes the puzzle at her place • Susan observes remotely how Mary is making the puzzle and gives her indications on the appropriate tiles for difficult sections • Mary takes into account Susan´s indications to place the tiles correctly • Mary and Susan chat while making the puzzle
Plans	• Ask Susan to help her with the big puzzle • Social interaction to keep mentally active and have fun
Events	• Florence system goes around the working surface to show different views • Florence system zooms in and out as requested remotely by Susan • Florence system is directed to certain puzzle areas
Artifacts	• Puzzle • Puzzle cover • Working surface • Florence system

Aim of the scenario:

The making puzzle service implemented in the Florence system provides family relatives and friends the option of performing a collaborative ludic activity like puzzle making, remotely and synchronized. The Florence system is able to show a better view of the puzzle at every instant more intuitively than a remotely guided robot so that the people can concentrate on collaborating with each other.

Scenario:

Mary is at her place, ready to start making one of her favourite activities: making puzzles. She has chosen a big and challenging one.

Unfortunately, her friend Susan isn't with her; it is a pity. Mary and Susan love to make puzzles together. They both feel part of a good team. Mary is very patient and can play for long hours while Susan is good at spotting an specific tile. They are proud of having been able to make a 1000-tile puzzle together last winter.

These last months Susan is suffering from arthritis, so she is not as mobile as she used to and can not visit her friend as often as she would like to. Today, is one of those days, but not to worry!, the Florence system that both Mary and Susan own, will make it possible that they can continue with this activity remotely.

Mary places all the puzzle tiles and the cover with the reference image on a table. The Florence system connects her with Susan, who is able to see and hear what's going on with the puzzle. The Florence system goes around the working surface to show different views, and zooms in and out as requested by Susan. She gives indications to Mary on the appropriate tiles for the difficult sections that Mary by herself is not able to fix. Mary takes into account Susan's indications and places tiles correctly. Meanwhile, they can chat as usual.

After an hour, they both are happy to see that the work progresses correctly and a small but difficult part of the puzzle is already done. They agree to continue with this funny and entertaining activity tomorrow.

4.8 Logging system [LOGSYS]

Current scenario and practices:

Reflexive elements	Examples
Current short scenario	With increasing age, Tom's mobility is decreasing. His movements are getting more and more unstable and the risk of a fall is getting higher. Situation got worse two months ago, when he suffered a knee-surgery. Now, he has to take some rehabilitation training to recover from the surgery. Since he is a little forgetful, he doesn't always remember how much exercises he already did this week and he can't tell the doctor the current values of his training schedule. All this issues are making him feel down. Even if the doctor says he is doing fine, he feels his knee is more sore than expected.
Stakeholders	• Tom • Rehabilitation doctor • Caregiver, relatives
Task analysis	• Tom: rehabilitation exercises, daily life activities • Doctor: recommend rehabilitation exercises according to user's condition and progression • Caregiver
Artifacts	-

Foreseen scenario with Florence system

Scenario element	Examples
Setting	Tom had a knee surgery two months ago. He has recovered well but to support the rehabilitation his doctor has created some exercises to train his muscles. He is using a recumbent bike for that. Tom is aware that, unless he recovers totally from the surgery, he won´t be as stable as he was and could have high risk of falling. He is worried about it, but happy to own a Florence robot which will monitor his rehabilitation progression, assess his mobility and even collect his subjective opinion on his health status.
Actors	• Tom • Relatives, caregivers (local and remote) to check logs • 3rd party Service provider (energy company, LifeLog Host, …) • (Tele-) Care service
Task goals and actions	Goals: • Improve rehabilitation by having a tool that will assess Tom's outcome • Have a tool to log subjective data and compare it with objective data • Feel safe having a tool that will monitor mobility and other health status parameters and inform him and other actors (caregivers, tele-care services) when a problem arises Actions: • Train for recovering from knee surgery • Log in subjective data like your personal impression on rehabilitation progress, if your knee hurts… • Interact with Intelligent home environment for collecting objective health data
Plans	Take rehabilitation to recover from knee surgery
Events	• Florence system collects the data from the training bicycle and gives an overview of the training status. The doctor checks this status once a week to have a look if everything works fine. • Florence system gathers objective data like gait profile for Long-Term Health Assessment. • Florence system calls the tele-assistance centre in case of decreased mobility, risk of falls…(crisis reaction service) • Tele-assistance centre sends people to check health status of the person
Artifacts	• Florence robot • Systems to gather data (Sensors, Intelligent home environment Medical devices, Robot) • Tele-assistance setting

Aim of the scenario:

The aim of the scenario is to provide following functionalities:

1. Logging of objective Health-Data for Long Term Health Assessment: With increasing age peoples mobility decreases. Normally the person itself doesn't take much notice of it because the change is slow. It has been shown that the risk of falls can directly be connected to peoples mobility. Assessments of mobility are normally performed in controlled environments (clinics etc.) which change the normal behaviour of the persons. So the actual mobility value is distorted. Besides mobility, also other data is relevant for long term observation: data for social inclusion (visits, days out, phone calls), biodata (blood pressure, sugar level, ..). Long Term observation are typically done outside the home, so the data-log could be hosted by an external service provider
2. Logging of objective Health-data for short term reaction: Measured data over a small period of time should be stored to allow the frequently visiting care person to assess the actual status. Logged data could refer to medication, meals and drinks, biodata (blood pressure, …) etc,. This data is typically stored and retrieved at home
3. Logging of subjective data, which cares about personal data that is of importance for caregivers

Scenario:

Tom had a knee surgery two months ago. He has recovered well but to support the rehabilitation his doctor has created some exercises to train his muscles. He is using a recumbent bike for that. Tom is aware that, unless he recovers totally from the surgery, he won´t be as stable as he was and could have high risk of falling. He is worried about it., but happy to own a Florence robot which will monitor his rehabilitation progression, assess his mobility and even collect his subjective opinion on his health status.

Tom trains regularly, and the Florence Robot collects the data from the training bicycle and gives an overview of the training status. The doctor checks this status once a week to have a look if everything works fine. He should not completely stop the training to keep her muscles strong enough. Even if the doctor considers rehabilitation progression is good, Tom is sceptic about it. The knee sometimes hurts and he doesn´t still have the range of motion he had to. He wants the doctor also know about it, so he logs his impressions in the Florence system, so that the doctor can also check how he feels.

Tom is also aware that his risk of falling is getting higher. So he is pleased that the robot is monitoring his gait velocity and with these results his physiotherapy can be adopted and the caregiver personnel can react accordingly. One day, his assessment values have reached a critical value. So his care givers are advised by the robot to move some of the flowers from the corridor to the corner of the living room, where the risk of falling over it is much lower.

5 Overall analysis of the selected scenarios

In this section an analysis of several aspect of each scenario will be done in order to make sure all relevant aspects of the project are being considered. This overall analysis will help bridge the gap between the scenarios and the future services behind them.

The overall analysis here present aims at facilitating collaboration and cooperation among the different work packages to ensure the correct development of the future services.

Every scenario should specify the following:

- **Need addressed:** the user need that is being satisfied by the service. Users can be the elderly person, family, formal/informal caregivers, AAL service providers.
- **Innovative approach:** scenarios should include innovation in their setting or in their ways of doing, so that they contribute to the general Florence system innovation.
- **Focus on user acceptance:** specification of where the extra attention and effort will be put in order to increase user acceptance.
- **Florence system meaningfulness:** justification of the need of a Florence system to provide the service behind the scenario.
- **Features from other WPs included:** specification of building blocks from other WPs that are foreseen to be required.
- **Technical challenges and fallback option:** when necessary specification of the technical challenges foreseen in developing such a scenario into a service and a fallback option that will make sure the service can still be delivered, even if the technical challenge can't be fully met.
- **Partner responsible for associated service:** the **principal partner** and other partners collaborating

Keeping in touch	***DOMAIN: Social connectedness***
Need addressed	User need of being socially active in their life. Family need of checking on their elderly relatives for good quality care
Innovative approach	Social network access will be provided with limited functionality to ease the use of the tools. Additional social network services will be eventually incorporated.
Focus on user acceptance	Virtual visits functionality will respect the elderly user's privacy at all times. This service will not allow family to check up on someone unless explicitly requested by the elderly.
Florence system meaningfulness	Mobile robot/ Connected to the house/Greater privacy /
Features from WP2 needed	• Robot control services: navigate near the person and take a position in which the video/audio call is comfortable for him/her, high level

	navigation • Audio/Videoconference enabler module • Remote multimedia content provision module (pictures & text messages) • Notifications module (for new content reminders) • Core components in order to enable network communications, gesture detection, privacy requirements (identity management, etc).
Features from WP3 needed	• Context reasoning: mood detection, user localization, user following, activity detection (TV watching) • Decision making: decision to call friends, • Triggering: approach the user, interact with the user, follow the user, show pictures, send a message
Features from WP4 needed	• Dialog Mgmt & Workflow: establish video conference, present web pages etc. • Interaction Components: touch screen interface, microphone, speakers, camera, text input (dictation software, touch keyboard?), gesture recognition

Technical challenges	• Mood detection: This will probably done through indirect means, like level of activity, deviations of normal schedule, number of (virtual) visits today or the last few days.
	• For telepresence, there are a number of technical challenges related to the automation of the remote control:
	  ○ Easy navigation: how to let the remote user navigate the robot as easy as possible?
	  ○ Positioning camera and robot automatically
	  ○ Following the elderly automatically
	  ○ Easy switching between “automatic” control and remote user control?
	• Voice generation and recognition to trigger feedback from the elderly (to pictures)
	• Deciding and selecting which moments are suited for social interaction, e.g. to show the pictures

	and snapshots received from grand children.
Fallback option	• A remote user controls the robot “completely”. • Use touch screen input instead of voice recognition
Partner responsible for associated service	**Philips**

Advanced Home Interface	***DOMAIN: Safety and social connectedness***
Need addressed	The robot is used as an intelligent interface to the home control system to assist the elderly user
Innovative approach	Robot is the one and only interface for all home automation devices, new devices can be integrated remotely, the user doesn’t have to care about special devices. They can all be accessed by one interface the user is familiar with.
Focus on user acceptance	The Robot won’t act itself; it controls the home automation if the user demands it.
Florence system meaningfulness	Elderly don’t have to care about new technologies in home automation. They get more secure (e.g. by seeing who has rang the doorbell).
Features from WP2 needed	• Configuration awareness in order to choose the appropriated IF for the user • Robot control services: High level home navigation (go to the door, go to the kitchen…) • Gesture detection • Service modules in order to provide home automation services: switching lights, door opening/close, KNX/EIB connection module • Video and audio coumuncation • Speech recognition module • Voice synthesis module • Notifications module • Location service, in order to select which interface to use (mobile phone or robot) • Core components in order to enable network communications, privacy requirements (identity management, etc).
Features from WP3 needed	• Context reasoning: detect someone is ringing the bell, detect which device in

	use + activity detection, find the user, • Decision making: decision over the interface and an appropriate notification, ask the user for a decision, • Triggering: switch off/on lights, approach the user, send a message, open the door, close the window
Features from WP4 needed	• Dialog Mgmt & Workflow: establish video connection (e.g. to front door), present interface for control home devices • Interaction Components: touch screen interface, microphone, speakers, camera, voice commands
Technical challenges	Integrate multiple devices from different vendors into robot system. The system has to be heavily modular to achieve that.
Fallback option	If not all devices can be integrated it should be reduced to a webcam at the door and an automatic doorbell.
Partner responsible for associated service	**NEC**

Fall situation handling	***DOMAIN: Safety***
Need addressed	Decreasing Mobility leads to a high risk of falls. Falls can lead to serious injuries or even deaths.
Innovative approach	The problem of recent technologies like panic buttons or acceleration sensors is that it isn't sure what has really happened (sensor fell down, button accidentally pressed). The robot in contrast can approach the user and check what has really happened. The Telecare center personnel can have a look at the current situation so the correct reaction can be applied.
Focus on user acceptance	Video-check functionality will respect the elderly user's privacy at all times. This service will not allow other persons than the trained telecare personnel to check up on someone unless explicitly requested by the elderly. The robot will first try to contact the elderly before triggering any action.
Florence system meaningfulness	Mobile robot with sensors can identify critical situations much better than small devices with very selective functionality. Telecare gets much better judgement base

Features from WP2 needed	• Robot control services: High level home navigation to explore where the user is • Fall detection service modules (videocamera control, pattern recognition) • - Video/audio call module to call the telecare centre
Features from WP3 needed	• Context reasoning: fall detection, user localization, • Decision making: decide to call tele-care, decide on turning on the video chat • Triggering: approach the user, turn on the video chat,
Features from WP4 needed	• Dialog Mgmt & Workflow: approach user, contact user, establish video conference to tele-care • Interaction Components: microphone, speakers, camera, remote control component, gesture recognition
Technical challenges	Fall detection (user on ground), contacting user (speech)
Fallback option	Integrate panic button and react like fall detected automatically
Partner responsible for associated service	**OFFIS** (NEC)

Agenda reminder	***DOMAIN: Coaching and safety***
Need addressed	Ageing triggers memory failure. It is crucial in many cases, to follow the right medication schedule.
Innovative approach	Current reminder systems neither connect to caretakers nor ask for user's ratification of the intake; therefore this reminder will contact teleoperators in the case that the user has not ratified the intake.
Focus on user acceptance	Connection to the telecare unit will only happen if the user fails to ratify the intake. Programming the medication will be held according to privacy legislation.
Florence system meaningfulness	Apart for its integrative nature, the reminder will also be a tool for an effective telecare, monitoring inconveniences.
Features from WP2 needed	• Robot control services: High level home navigation to explore where the user is • Notification and reminder module • Tactile/Voice interface to confirm pill

	intake • Core components in order to enable network communications, privacy requirements (identity management, etc).
Features from WP3 needed	• Context reasoning: user localization, activity detection, pill intake detection • Decision making: inform the user to take the pill, call the call center • Triggering: turn on the video chat
Features from WP4 needed	• Dialog Mgmt & Workflow: present reminder events, schedules • Interaction Components: touch screen interface, speakers (alarm sound), text input (dictation software, touch keyboard?)
Technical challenges	Movement of robot towards user, programming of calendar reminders, communication with pill dispenser
Fallback option	Event initiated by telecare calendar, movement of robot, manual confirmations of user.
Partner responsible for associated service	**TID / FASS**

Lifestyle improvement	***DOMAIN: Coaching and safety***
Need addressed	User need to stay healthy, independent. Relatives need to know that the elderly person is all right and managing.
Innovative approach	Supporting care in the home of the elderly person via video conference and video manuals.
Focus on user acceptance	User will be in control of the system, informed about what the system is monitoring/ logging and what and when it is transferring to others
Florence system meaningfulness	Connection to home sensors; making a bridge between a (mostly hidden) home network and services to make use of the information in the network
Features from WP2 needed	• Robot control services: navigate near the person and take a position in which the videos can be seen, high level navigation • Audio/Videoconference enabler module • Remote multimedia content provision module (video) • Notifications module (for new video

	received) • Health data logging • External notifications module (in order to inform the relatives about the status of the patient) • Core components in order to enable network communications, gesture detection, privacy requirements (identity management, etc). • Mobile phone with pedometer • Service modules in order to provide home automation services: detection of movement in bed, detection that the user remains in a chair for a long time • Video/audio call module to interact with the physiotherapist
Features form WP3 needed	• Context reasoning: anomaly detection, logging contextual info, event notification, • Decision making: decision to go for a walk, call the doctor, decide on turning on the display • Triggering: decide on turning on the display
Features from WP4 needed	• Dialog Mgmt & Workflow: establish video conference, present health information, schedules • Interaction Components: touch screen interface, microphone, speakers, camera, text input (dictation software, touch keyboard?), gesture recognition
Technical challenges	Determining activity decrease based on context information.
Fallback option	Limited logging and combination of data. Use video conferencing for instructions of care takers.
Partner responsible for associated service	**NOVAY** (FATRONIK)

Device coach	***DOMAIN: Coaching and collaborative activities***
Need addressed	Live independently and use facilities and new equipment that is not always 'designed for all', gaining self-confidence. For relatives: take away part of the tasks that are needed to help elderly person.
Innovative approach	Connect community of peers and relatives to help needed in everyday use of devices.

Focus on user acceptance	Make it easy to ask for help; people help each other. Add community element to make help informal
Florence system meaningfulness	Florence robot is able to provide access to community in any location of the house. Also, the user can show problems from any place in the house to the person helping on the other side.
Features from WP2 needed	• Robot control services: navigate near the person and take a position in which the device and the videos can be seen, high level navigation, macro recording module • Remote multimedia content provision & recording module (video) • Video/audio call module to interact with the members of the social network • Social network interaction module • Core components in order to enable network communications, privacy requirements (identity management, etc).
Features from WP3 needed	• Context reasoning: … • Decision making: decide over sending a message, decide on sending a message to the community, decide on turning on the video chat • Triggering: sending a message to the community, turn on the video chat
Features from WP4 needed	• Dialog Mgmt & Workflow: present videos / information (online/offline) • Interaction Components: touch screen interface, microphone, speakers, camera (+object recognition?), text input (dictation software, touch keyboard?)
Technical challenges	Robot needs to follow the user around the house to the devices. Using the robot to find the correct instruction video and/or peer should be a lot easier than operating the problematic device.
Fallback option	Digital and interactive manuals database.
Partner responsible for associated service	**NOVAY**

Collaborative gaming	***DOMAIN: collaborative activities and social connectedness***
Need addressed	Collaborative activities offer elderly people a space to enrich and improve

	their social life while achieving a certain goal. Collaboration allows people to achieve more ambitious goals or to even achieve individually unreachable objectives. When collaborating people keep socially connected and engagement and motivation may be promoted. This service provides users with a tool to maintain leisure activities fighting isolation.
Innovative approach	Use the robotic platform as a tool for collaboration trying to make the Florence system as transparent as possible.
Focus on user acceptance	Work on intuitiveness for successful collaboration experience. Use gesture interaction combined with voice commands trying to make the use of the service intuitive for the collaboration to be successful, which will improve the user acceptance.
Florence system meaningfulness	The Florence system provides great features of intuitiveness thanks to its mobility, allowing someone to feel part of the collaboration taking place.
Features from WP2 needed	• Robot control services: navigate near the person and take a position in which the puzzle and the remote video can be seen, high level navigation, remote control in order to zoom, move the camera, etc • Video call module • Core components in order to enable network communcations, privacy requirements (identity management, etc).
Features from WP3 needed	• Context reasoning • Decision making: decide which view to show and zoom in (maybe this is made by the user on the other side), decide on turning on the video chat • Triggering: turn on the video chat, show a specific view
Features from WP4 needed	• Dialog Mgmt & Workflow: establish (video) conference, present game • Interaction Components: touch screen interface, microphone, speakers, camera, game input (dictation software, touch keyboard, gesture recognition?)
Technical challenges	Easy navigation based on vision identification and navigation techniques

	Gesture recognition.
Fallback option	Use markers to guide the vision and support vision with touch screen interaction mode and/or voice commands,
Partner responsible for associated service	**FATRONIK** (Philips)

Logging system	***DOMAIN: all***
Need addressed	1. Subjective data logging, which cares about personal data that is of importance for caregivers 2. Objective data logging, that is used for long and short term monitoring and user assessments 3. Non-health data monitoring for entertainment, coaching or other purposes
Innovative approach	The logging is concentrated in one device, different modalities can be connected and a full context analysis can be arisen from that.
Focus on user acceptance	The data stored on the robotic system will be protected from unauthorized access. A user that has not the correct rights to access the system will be blocked. Only the exactly defined group of medical staff etc. can make use of the data.
Florence system meaningfulness	System can make long-term and short-term monitoring of the user's status, so sudden accidents or slow changes of behaviour can be detected.
Features from WP2 needed	• Service modules in order to provide home automation services: getting data from the bike • Logging module service (multimedia recording…) • External notification module (in order to provide feedback to relatives and telecare service) • Core components in order to enable network communications, gesture detection, privacy requirements (identity management, etc).
Features from WP3 needed	• Context reasoning: logging contextual info, user following • Decision making: contact caregivers, send the collected data, review the logged data • Triggering: follow the user, show the logged data.

Features from WP4 needed	• Dialog Mgmt & Workflow: present logged information, warnings about training progress etc. • Interaction Components: touch screen interface, speakers, text input (dictation software, touch keyboard?), remote control / access to data
Technical challenges	Secure storing of patient related data
Fallback option	Only unoffending data will be stored so that no strong data protection is necessary.
Partner responsible for associated service	**NEC** (NOVAY, FATRONIK)

6 Selection of items for focus groups

As it has been explained in section 4 of this document, the scenario-definition process includes the realization of several focus groups to refine scenarios that are presented in this document.

The aim of this section is to determine which are the key points that should be worked out in the focus groups, for each scenario.

A priori interesting topics are proposed in the checklist below. For each scenario the key points of the interesting topics should be developed. These key points will be around issues where there might a lack of knowledge or need of reassurance.

(In what follows scenario acronyms will be used to identify key points for specific scenarios)

General topic	**Subtopic**	**Specific issues for this topic** (guideline examples)	**Scenario key points for focus groups**
Acceptance	Current robot acceptance	• Feelings • Interest of proposed service • Could the robot be useful? • Perception of cost/benefit • Is it considered intrusive?	[COLGAM] Cost/benefit: Would you be happy with a robot moving around the working surface knowing it helps you feel connected to the other person? Would you rather have a static robot? Does moving the robot make the other person more present? [KEETOU] Do elderly want that their children receive some kind of clue on whether it is a good moment to call? (for example the elderly user did receive very little visits the last few days, or the elderly is not feeling well.) [LIFIMP]: Do elderly want to measure their daily activities? Will they accept advice from a robot? [LOGSYS] Is a robot considered as a spy if he logs data? [HOMINT] Would you like to have a robot that can open / close windows, doors etc? Or is it frightening (Robot could take control of the home and arrest user)? [FALHAN] Would you feel safer if you knew that there's a robot checking for accidents and calling help automatically?
	How to improve acceptance	• Reorient proposed service • Aesthetics (show examples and check for acceptance)	[LOGSYS] Which actions of daily living should NOT be logged at all [COLGAM] Would you like the system to detect when you are feeling lonely or would you rather let the system know yourself how you are feeling? [LIFIMP]: give clear (usability aspect!) control over what is measured and where it is send [AGEREM] What should Florence do if the user fails to confirm the medication intake or just takes

		• Improve interaction • What if the robot is not presented as a "robot" but as a "technological personal assistant"?	a bit longer? [FALHAN] If the robot detected a fall, which person should the robot call first, a relative or the telecare center? [HOMINT] Are there any devices the robot should not be able to control in any case (room doors etc)? [LOGSYS] Would you like to be able to access your logged data from outside (mobile devices, internet)?
Interaction	How user starts interaction	• Voice commands? • Touch screen? • Gesture recognition? • Activation in a user-worn device (bracelet with button)?	[FALHAN] Do you like to have an additional panic button which calls the robot and sets it into an alarm state? [COLGAM] Would you like the system to propose you to game when the other person is gaming or only when you demand the service? [HOMINT] Do you want to have speech control for the home or just kind of pushbuttons on a screen? [LOGSYS] How should a medical log be designed? Like a medical record or like a ships log or something?
	How the system starts interaction	• Voice communication • Light • Vibration • Warning in a user-worn device	[FALHAN] Would you mind the robot talk aloud to you to check if you are still responsive [AGEREM] Should be an alarm, some melody? [ALL] Should the robot approach you before starting to interact?
	Usability aspects	• Size and colour of text, graphics…	[KEETOU] What level of automation for remotely controlling the robot would the remote users want?(E.g. focusing the camera on the elderly's face could be done automatically) [DEVCOA] How can video taping instructions be made intuitive to use for elderly? [ALL] What is preferred, images or text (e.g. in case of buttons)?
	Interaction flow		[COLGAM] Should the system always let you see your friend and the puzzle or only when your friend is talking? [DEVCOA] Define correct moment to alert elderly of input to community. Make selection of input to be alerted about based on profile? [AGEREM] Apart from the times in which medication has to be taken, shouldn't Florence assure the user he is up to date with all his medication? [LOGSYS] Should the robot present a summary of the activities logged at the end ot the day? Should specific actions be erasable?

Scenario-specific issues			[COLGAM] Is a puzzle a “common” collaborative game among elderly? What other collaborative games would they enjoy? [KEETOU] For which situation would telepresence have clear benefits over a video call via the PC or TV? [HOMINT] Which home automation devices are most widely spread? Which devices are expensive and rarely used?

7 SUMMARY

In this deliverable we described the 8 key scenarios on which the further development of Florence application will rely. We also described a process which led to the creation of the scenarios.

The user needs were analyzed from literature and partner experience and together with a general feasibility check and the Florence philosophy items (robot and home integration, lifestyle and AAL services, innovative approach, progress on user acceptance), the brainstormed ideas for scenarios were filtered, merged and improved to deliver the final 8 key scenarios.

The Florence application is supposed to provide services from four domains: social connectedness, safety, coaching and collaborative activities. Most scenarios combine several aspects of the domains. The following diagram illustrates the overlap of scenarios with domains

Figure 6: Scenarios with domains.

Each partner will contribute with its expertise to the different scenarios where needed. Collaboration among different partners will help in delivering enriched services from the different scenarios.

8 CONCLUSIONS

The diagram in the previous section shows how service domains and the final 8 key scenarios relate to each other. This diagram shows the balance between the different scenarios and the service domains.

Most of the scenarios have a target aim within one concrete service domain, but still contribute to the fulfilment of other goals in different service domains. This is a reflection of the complexity of human activity and the purposes behind it (*for example, do people go to a doctor because they need his help or because they feel alone and want to talk to someone?*)

The Florence system provides a framework with a set of capabilities and functionalities with which it is possible to develop services. These scenarios will contribute to demonstrate the Florence system through a defined set of services, even if many others could also be developed. The scenarios will evolve to the provided services through the project lifetime.

The diverse services are provided over one single platform, unifying all the electronic devices to be used via a unique interface. This universal interface contains different interaction modalities and is supported by decision making modules which allow understanding the preferences and needs from the various home and robot sensors. It can even be accommodated and personalized. Therefore the user experience will be enhanced. Improving the user perception improvement will ease acceptance. Focus groups being run in the near future should help validate and fine tune the approach taken.

We analysed the scenarios and presented the results of the analysis in the form of tables that should help better coordinate collaboration between all work packages to be able to successfully design and implement the various add-ons and services needed to satisfy the proposed scenarios.

The Florence consortium is aware that this initial set of scenarios is not completely fixed. It was designed to be flexible, in order to accommodate some reasonable changes that might be triggered by the focus groups feedback on user preferences and acceptance, and the technical challenges involved. It is the aim of the Florence consortium to provide services that are meaningful to the user and accepted by them.

9 REFERENCES

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10 ANNEX A: Draft Scenarios and Functionality tables

10.1 Ambient intelligence and safety context

The AAL safety scenarios will contain the following cases:

- *Monitoring*: Several parameter of the user will be monitored. This includes directly measurable parameters via the robots sensors (for instance object recognition on the floor) or the sensors of the home infrastructure (for instance presence detector or smoke detector) as well as activity parameters which can be deduced by the behaviour of the elderly person.

- *Crisis detection*: If a sensor detects a crisis situation, for example, a smoke detector goes off or a fall detection sensor indicates the elderly has fallen, a decision process will be initiated to execute an adequate alert handling process.

- *Initiation of situational alert: The alert will escalate from a user interaction up to interaction with remote care takers. The advantage of the robot is that the robot is able to move towards the person and check the actual situation. In the case there is a crisis and the person is responsive the robot can provide a communication interface. In cases the person is not responsive the robot could send a message or in worst case a taken picture of the person to the care taker. This context also includes ambient intelligent solutions that bring safety and/or comfort to the user.*

10.1.1 Monitoring of person/behaviour

Monitoring of a person or a person's behaviour can be divided into tow classes. One is the short term monitoring to detect urgent crisis, the other is long term monitoring which detects changes over longer periods of time (even years).

Short term monitoring can determine unusual changes of a person' s behaviour for a specific task. For example, the person stays much longer in bed as usual. This could be a sign that the person is not able to stand up alone any more (or even worse cases like heart attack). The robot is able to detect this situation and react accordingly (try to contact person, if this fails, contact medical personnel).

Long term monitoring will help to identify slow but steady changes of the every day life. By getting older, the person will slow down its way of movement. It takes more time to get from one waypoint to another. For example this monitoring can help to detect the risk of falling by measuring the gait velocity ("Mobility Assessment"; it has been proven that there is a correlation of gait velocity and risk of falling). It is also possible to conclude some aspects of the mental status of the person.

The person lies in a bed and can't go up any more due to a dizzy spell. The robot which has learnt that the person normally stands up at 9 o'clock waits for a specific period of time (the usual variation in get-up-time) and afterwards approaches the bed. It uses synthetic voice commands to establish contact with the person. The person does reply but tells the robot that it is too weak to get up. The robot suggests calling a relative or doctor. The person decides to call its daughter to ask her for coming around and do a check on him.

In an alternative scenario, a heart attack could be considered instead of the dizzy spell. In this variant, the person doesn't reply and the robot decides to call a doctor with video conferencing function so the doctor can have a first optical check and then can react appropriately.

It is known that the less mobile a person is, the higher is the risk of falls. The robot analyses the mobility of the person and can give an advice to the medical personnel if the person's mobility has changed within the last weeks/months/years. If the risk of falls is getting high, the care taker can decide to remove dangerous obstacles (e.g. flowers) out of the usual paths followed by the person.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	yes
Follow the user (robot)	yes
Remote control of the robot	-
Speech recognition	-
Gesture recognition (hands and arms)	yes
Facial expression recognition	Maybe
Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	-
Activity monitoring	yes
Domotic control	?
Communication capabilities – Internet	yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	maybe
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Connection to home environment	yes

10.1.2 Monitoring of environment

Monitoring of the environment can be used to get a higher "feeling of safety" for the elderly person. The robot has additional eyes and ears to detect unusual changes in the

environment. It has the function of a "guard dog". The person will feel more comfortable if it can be sure that any abnormal event is being recognized, recorded and presented directly to the user. During absence of the user the robot can trigger an alarm or notify the user if someone is entering the house without permission.

Another type of environment monitoring can care about open windows, doors etc. This can help to reduce energy or unhealthy conditions (too cold). If the environment is equipped with home automation it would be possible for the robot to automatically close open windows for example. If the user leaves the house, the robot can switch off all the lights and turn the alarm system on. The robot then can also act as remote control for windows etc. So the user doesn't have to go to all rooms to check and open/close windows, doors etc.
This can also include the control of kitchen devices like fridges, cooker etc. Devices like cookers can cause serious accidents if left running without observation.

The person is at home and has the feeling that someone has entered the house without permission. It sends the robot on patrol. The robot moves from room to room and sends a video stream to the TV where the person can have a look and check if everything is ok.

The person has left the house. The robot is aware of that and after a little while it checks if every device that is not needed is turned off. Via access to the intelligent home infrastructure, the robot is able to turn off lights and even kitchen devices like the oven, to reduce the risk of an accident.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	yes
Follow the user (robot)	-
Remote control of the robot	yes
Speech recognition	yes
Gesture recognition (hands and arms)	yes
Facial expression recognition	-
Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	maybe
Activity monitoring	yes
Domotic control	?
Communication capabilities – Internet	yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	-
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Connection to home environment	yes

10.1.3 Crisis handling

If the robot has detected a crisis situation, it will be able to inform or help the user.

Warning functions: The robot could detect dangerous objects (like something lying on the floor in the way of the user) it will be able to warn him. The robot can move in front of that object to get the focus of the user to the object. Another approach would be to remove the object by pushing it out of the way. The robot can also use acoustical of visual warning signs.

Helping functions: If the user has fallen and lies on the ground, the robot can approach the user and try to get into contact. If the user is able to communicate, the robot can act as hands-free phone and call the person the user wishes. If the user is not reacting, the injury might be very dangerous and the robot can call emergency directly.

If there is another kind of emergency like fire, smoke or similar, the robot can act as a guide for the user to show the way out of the hazard. If there is no visibility due to smoke, the robot can acoustically show the way to the next door etc. The robot simultaneously can call the fire-fighters to get help as soon as possible. The robot might try to get the users attention beforehand in case the user is sleeping or the like. This could be done with all interaction modalities available.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	yes
Follow the user (robot)	yes
Remote control of the robot	yes
Speech recognition	yes
Gesture recognition (hands and arms)	yes
Facial expression recognition	-
Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	maybe
Activity monitoring	-
Domotic control	?
Communication capabilities – Internet	yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	-
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Connection to home environment	yes

10.1.4 Safe robot operation

The robot takes care of safe operational circumstances. That means that the robot will only stay at defined positions where it doesn't disturb the user. If the robot stays in the middle of the movement paths of the user, it may cause the user to stumble over it. So the robot will use safe places for example in the edges of a room where it should interfere least. The user has commands (visual, acoustical, remote control) to let the robot approach. This might also be supported by the home environment which allows detecting if the user is sitting in a chair and it is safe for the robot to move around.
It is also possible that the robot makes some noise while moving around so the user is always aware of the moving robot.

The robot has its own place in the room. It always stays at that place and only comes out of it if called by the user. While approaching, the robot makes some kind of noise to make the person aware that it is coming. If the user has finished its robot interaction, the robot moves back to his home position.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	yes
Follow the user (robot)	yes
Remote control of the robot	yes
Speech recognition	yes
Gesture recognition (hands and arms)	yes
Facial expression recognition	-
Tactile interaction	-
Capture images	-
Capture video	-
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	?
Communication capabilities – Internet	-
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Connection to home environment	maybe

10.1.5 Home control via the Robot

The Robot is used by the user to interface with the home control system and perform specific actions. The elderly person can simply give voice commands or interact with the robot touch screen or the TV system to simply control the home environment (e.g. switch lights in specific room on/off, open close windows). In addition to this, the Robot

monitors the surrounding environment and it can suggest the elderly person to carry out certain actions.

John is sitting watching TV. The room light is annoying him, so he just asks the Robot to switch it off and enable the ambi-light on his TV. The Robot takes John' s order and it passes it to the home control system which in turns switches off the light in the room.

The window in John's bedroom has been opened for a while. The Robot, taking into account sensors information, e.g. room temperature and humidity level, realises that the window has been opened enough and the air quality is now ok. So, it suggests John to close if. If John agrees then the Robot closes the windows automatically, by interacting with the home control system (assuming that windows can be open/closed automatically).

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	Yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	Maybe
Remote control of the robot	Maybe
Speech recognition	Maybe
Gesture recognition (hands and arms)	-
Facial expression recognition	-
Tactile interaction	Maybe
Capture images	-
Capture video	-
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	-
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	-
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	-
Connection to home environment	Yes

10.1.6 Visual/Audio Bell

The door bell of an elderly person is equipped with a camera, microphone and speaker. Once someone is ringing the bell, the elderly person has the possibility to see and interact with the person on the other side of the door using the Robot, and possibly a TV set. Based on the elderly person's impairments the appropriate notifications are sent to the users (e.g. in the case of a deaf person, bell rings will be notified with visual alerts on the Robot screen or on the TV)

Mary is deaf, when someone rings her door bell, Mary's robot is contacted. The Robot in turns provides a visual notification to Mary, by displaying a message on the TV (if she is watching it) or on the Robot screen. The output of the camera on the door bell is also shown to Mary, so she can see who is in front of the door.
Using the Robot and/or the TV remote control, Mary can instruct the opening of the door.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	Maybe
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	-
Remote control of the robot	-
Speech recognition	Maybe
Gesture recognition (hands and arms)	Maybe
Facial expression recognition	-
Tactile interaction	Maybe
Capture images	-
Capture video	-
Project images (e.g. on a wall)	Maybe
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	-
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	-
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	-
Connection to home environment	Yes

10.2 Coaching context

The robot will provide guidance in constitutional, wellness or daily life activities to the user. The exercise or activity will be monitored and direct feedback given to the user. Another feedback loop will be established to a remote 'coach', be it a doctor, a care taker or a trainer.

There are two main purposes of coaching for better life with a robotic device. First, by allowing the coaching in a home environment, daily life can be monitored continuously. This can, for example reduce the effort and stress associated with frequent visits to a clinic. Furthermore, it makes it easier to detect possible alarming situations. In the case of coaching for physical exercise, a person performing rehabilitation exercises will feel more comfortable in a known surrounding he is used to, will be able to exercise in preferred time, and in preferred place. The robotic device can also be less intimidating than a human coach, in case of initial mistakes in properly performing the exercises. Second, the quality of rehabilitation exercises can be raised

when the exercises are guided by a robotic device. The exercises can be perfected as long as needed since a robotic assistant is never tired, and thus more patient.

10.2.1 Remote Interaction with the doctor

The robot can be used to establish an audio/video connection with a doctor so that the elderly person can talk to him without the need to go and see him. This approach can save doctor's time since they can address patient's simple issues without the need to travel and go to see them directly. The Robot camera could also be used to show particular parts of the body to the doctor.

Alex does not feel very well. Probably he ate something too heavy last night. He also discovered that he has some little red spots on his stomach. Therefore, he would like to contact his doctor and check with him whether it is something serious or not.
Alex therefore calls the Robot and he asks it to call his doctor. A video communication between Alex and the doctor is set up. Alex can see his doctor either on the Robot screen or on his TV screen. Alex also shows his doctor the spots on his stomach by instructing the Robot accordingly. The doctor realises that it is nothing serious and that everything will go away in one or two days.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	Yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	Yes
Remote control of the robot	Yes
Speech recognition	Maybe
Gesture recognition (hands and arms)	Maybe
Facial expression recognition	-
Tactile interaction	Maybe
Capture images	Yes
Capture video	Yes
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	Maybe
Communication capabilities - phone	Yes
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	-
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	-
Connection to home environment	Maybe

10.2.2 Reminding

The reminding service takes care of the personal schedule of the user throughout the day. Besides reminders for appointments, the system also can deliver special services like remembering to eat, remembering to take medicine, remembering to close doors and turn of the heat, etc.

Suzanne is an old lady who tries to her fullest to have an active live despite her having some minor ailments that come with age. It's still early in the afternoon and Suzanne is reading the newspaper after having had lunch. The Florence robot, which stands quietly in the corner of the room, draws her attention with an audio cue. With a simple voice command Suzanne asks the robot what it's trying to tell her. The robot responds telling her it's her daughter's birthday tomorrow. Suzanne completely forgot about this and orders the robot to come near to her so she can have a video call with her son in law to ask for any ideas about a proper present.
After the call Suzanne gets ready to go to the town to shop for a present. As soon as she gets ready to leave the house the robot again tries to draw her attention. This time telling her not to forget her medicines if she's going away for more than an hour. Suzanna quickly grabs her pills from the cupboard and rushes to town.
It took her quite some time, but she has found a proper present and even some nice magazines for herself. It is well in the evening when she finally gets back and Suzanne immediately starts reading her new magazines. The Florence robot reminds her again, this time telling her it's time for dinner and since it is Wednesday she's having dinner at her neighbours. Suzanne is glad that her Florence robot is guiding her through the day.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	yes
Follow the user (robot)	yes
Remote control of the robot	-
Speech recognition	Yes
Gesture recognition (hands and arms)	No
Facial expression recognition	Maybe
Tactile interaction	Maybe
Capture images	No
Capture video	yes
Project images (e.g. on a wall)	-
Activity monitoring	yes
Domotic control	?
Communication capabilities – Internet	yes
Communication capabilities - phone	Yes
Learning about interests of user (cooking, cycling,…)	maybe
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	Yes
Giving information based on user preferences (appropriate media, appropriate timing…)	Yes, timing!
(Any other)	
Connection to home environment	Yes

Relation with / *similar to*. ***Us*_Agenda/reminder (10.3.7)** and **health advisor (10.2.8).**

10.2.3 Coaching on fitness

Coaching on fitness aims to coach the user in leading a healthy lifestyle. The service gathers data about the health status of the user (via connected devices and sensors) and combines this with contextual information (e.g., weather report, agenda, etc.). The result is meaningful coaching and motivations to lead improve lifestyle behaviour.

Dave is a senior who's fully enjoying his retirement. He just woke up and is getting ready for the day in the bathroom. He stands on the scale and the results are being sent to his in home Florence system. Upon entering the kitchen for making breakfast he consults the Florence robot. The robot looks at the latest health records and advices him it might be best to have a light breakfast and since it's a sunny day and the user has no other appointments in the morning he suggests to take a long walk through the park.
After he gets back Dave notices his hip being stiff again. Luckily his weekly telephone call with his physiotherapist is scheduled for later today. The Florence robot notifies Dave that it is time for the call. Dave discusses his stiff hip with the physiotherapist who advises him to do some exercises to improve his stance and ease his hip. The suggested exercises are being sent to the Florence system. Dave's robot assists him by displaying the exercises on his screen. Since the robot is mobile Dave can exercise wherever he wants and without needing a physiotherapist, whenever he wants.

System functionalities	Required
Localize user	yes
Localize robot	-
Go to the user	yes
Go to a specific room/place (specify location accuracy)	yes
Follow the user (robot)	Maybe
Remote control of the robot	Yes
Speech recognition	-
Gesture recognition (hands and arms)	Yes
Facial expression recognition	Maybe
Tactile interaction	-
Capture images	No
Capture video	yes
Project images (e.g. on a wall)	-
Activity monitoring	yes
Domotic control	?
Communication capabilities – Internet	yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	Yes
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	Yes
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Connection to home environment	Yes

This scenario is closely related to 'health advisor' (10.2.8) scenario mentioned in Social Connectedness theme-

10.2.4 Device coach

This service is aimed at helping the user to effectively use other devices and services. A problem many older people face is that electronics are integrated in more and more home equipment. Often, older people find devices difficult to use or have difficulties remembering specific operations. The device coach could also help users use the robot for specific actions.

Elizabeth has always been fond of movies. Now that she is retired she has plenty of time to watch them. Her children bought her a new TV set that is connected to the internet. She can now find movies online, buy them via "pay per view" and watch them at home. Although Elizabeth thinks that this is exactly the kind of service she has been waiting for, she has difficulties performing the right steps to find and buy a movie.
Her son has a solution: he has shown Elizabeth, and the Florence robot, how to operate the new TV set. While doing this, he has verbally explained every step. The Florence robot has taped the whole procedure both in video and audio.
Now, next time that Elizabeth wants to look up a movie, she asks the Florence robot to stand by, 'Florence, I want to look up a movie, can you help me?'. The Florence robot finds the required recorded procedure and Elizabeth will again hear and see her son's step by step explanation.

In an alternative scenario the robot could present, on the TV screen, an interactive presentation of device manuals or even its own services.

System functionalities	Required
Localize user	Yes
Localize robot	-
Go to the user	Yes
Go to a specific room/place (specify location accuracy)	Yes: go to device
Follow the user (robot)	Maybe
Remote control of the robot	Yes
Speech recognition	Yes
Gesture recognition (hands and arms)	No
Facial expression recognition	No
Tactile interaction	Yes
Capture images	No
Capture video	Yes and audio
Project images (e.g. on a wall)	-
Activity monitoring	no
Domotic control	?
Communication capabilities – Internet	no
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	no
Learning type of user needs / preferences (visual or hearing impairments, prefers visual	no

cues in the morning…)	
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Connection to home environment	no

10.2.5 Coaching on food intake

Coaching on food intake service can be linked to a goal (such as losing weight) and/or to a condition of the user (diabetes, high blood pressure). The service can keep track of what the user eats and stores this information for later review by a human coach/doctor/diet specialist. The service can also provide advice on a balanced diet and help with creating grocery lists that corresponds with the user's specific health related needs. Additionally, it could offer a social element in letting users with the same needs share recipes.

Scenario 1:
Victor has recently had his yearly check-up at the doctor. His doctor has strongly advised him to try to reduce his level of cholesterol. Victor agrees to do this. The doctor sends a coaching application to Victor's Florence system that is set-up to reduce the cholesterol level by eating sensibly. The Florence robot now is set to become Victor's personal food coach. When Victor wants to have a meal, he asks Florence for suggestions based on his diet. Florence also helps Victor to create grocery lists and offers alternatives for products that do not fit the diet.
To keep him motivated, Victor has joined a group of people that share experiences and recipes, he interacts with this group using the touch screen and video conference system of the Florence robot.

Scenario2:
Claudia has been overweight for years; she is now experiencing back and leg problems and is therefore determined to lose weight. Her dietician has set-up a programme for her to follow and has send this to Claudia's Florence system. The Florence system is set-up to motivate Claudia to keep up with the programme. During the day, Claudia (verbally) tells the Florence robot what she eats. The Florence robot may ask for specification (amount of food type), may directly offer an alternative for what Claudia is planning to eat and keeps track of everything that Claudia eats during the day. On the display of the Florence robot Claudia can continuously see how she is doing in a subtle way; a floating balloon shows her progress in losing weight. Claudia is very much motivated to keep the balloon in the air.

System functionalities	Required
Localize user	Yes
Localize robot	-
Go to the user	Yes
Go to a specific room/place (specify location accuracy)	Yes: go to kitchen
Follow the user (robot)	Maybe
Remote control of the robot	Yes
Speech recognition	Yes
Gesture recognition (hands and arms)	No
Facial expression recognition	No
Tactile interaction	Yes

Capture images	No
Capture video	Yes and audio
Project images (e.g. on a wall)	-
Activity monitoring	No
Domotic control	?
Communication capabilities – Internet	Yes
Communication capabilities - phone	Yes
Learning about interests of user (cooking, cycling,…)	No
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	No
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Connection to home environment	no

10.2.6 Activity Stimulator

The activity stimulator checks the mental state of people and stimulates them to start an activity (e.g. walking, reading, studying, playing games, etc.) if this is considered to be beneficial. It keeps track of the activities that the user likes and dislikes.

Since Mary's husband passed away, she often feels sad and is not motivated to do anything. She often stays at home; watching television while nothing interesting is on. Her children bought her a robot that stimulates her to be active.

Today, the activity stimulator recognizes that Mary is down and did not go outside yet. Since it knows that Mary likes walking and listening to music, it proposes her to go to the concert that is organized by the local music ensemble. Mary is happy to hear about this concert and thanks the activity stimulator for the suggestion.

System functionalities	Required
Localize user	
Localize robot	
Go to the user	
Go to a specific room/place (specify location accuracy)	
Follow the user (robot)	
Remote control of the robot	
Speech recognition	yes
Gesture recognition (hands and arms)	
Facial expression recognition	Yes (emotion detection)
Tactile interaction	
Capture images	
Capture video	
Project images (e.g. on a wall)	
Activity monitoring	yes
Domotic control	

Communication capabilities – Internet	Yes
Communication capabilities - phone	Yes
Learning about interests of user (cooking, cycling,…)	Yes
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	

10.2.7 Exercise Coach

The exercise coach motivates seniors to engage in physical exercises and supports them while exercising. It monitors their physiological parameters and coaches during the exercise. Professional caregivers can offer training or rehabilitation programmes via the exercise coach.

Betty's physiotherapist has made a training schedule for exercises at home and sent it to her exercise coach. Now, the exercise coach can help Betty to follow the schedule.

The exercise coach reminds Betty about her daily physical activity. While Betty is exercising, the heartbeat is monitored to ensure a safe training. If the heartbeat is too high, the coach advises her to slow down. On the other hand, the exercise coach motivates her if the heartbeat is too low for a fitness exercise. In order to prevent injuries, the exercise coach checks whether Betty carries out the exercises correctly. After the exercise, the results are summarized and the exercise coach gives nutrition tips that strengthen the benefits of exercising.

System functionalities	Required
Localize user	
Localize robot	
Go to the user	yes
Go to a specific room/place (specify location accuracy)	
Follow the user (robot)	
Remote control of the robot	
Speech recognition	Yes
Gesture recognition (hands and arms)	
Facial expression recognition	
Tactile interaction	Yes
Capture images	
Capture video	
Project images (e.g. on a wall)	
Activity monitoring	yes
Domotic control	
Communication capabilities – Internet	yes
Communication capabilities - phone	Yes
Learning about interests of user (cooking,	Yes

cycling,…)	
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	Yes
Giving information based on user preferences (appropriate media, appropriate timing…)	Yes
(Any other)	
Connection to home environment	
Speech synthesis	yes
Connection to physiological sensors	Yes

Close relation / quite similar with 'coaching on fitness' and with 'health advisor' scenario mentioned in Social Connectedness theme!

10.2.8 Health Advisor

The Health Advisor scenario has been deleted due to the ethical issues involved when measuring, tracking and storing medical data as well as the advisory role the system might have, which can at times overrule doctor's recommendations.

The health advisor aims to improve seniors' quality of life by providing health related information, advise, and assistance. It gathers data about the health status of the user via connected devices and sensors and translates this into meaningful information for the user. Users can communicate with the advisor about health related topics.

Anna is having her morning coffee. Her health advisor asks how she feels today. Actually, Anna felt a bit tired today. The coach advises Anna to use the device that measures her glucose value. The glucose value is low and the coach advises Anna to postpone her medication this morning and take her pills in the evening. The measurement data is sent to her doctor.

Later that day, Anna looks at the brochure that she got from the hospital last week. There are some complicated medical terms she doesn't know. She asks the health advisor to explain the terminology. The advisor answers her questions and gives some additional information.

In the evening, Anna is watching television and totally forgot about her diabetes pills. The health advisor kindly reminds Anna that she has to take her pills. Anna thanks the advisor for the reminder and takes her pills.

System functionalities	Required
Localize user	
Localize robot	
Go to the user	
Go to a specific room/place (specify location accuracy)	
Follow the user (robot)	
Remote control of the robot	
Speech recognition	
Gesture recognition (hands and arms)	
Facial expression recognition	
Tactile interaction	yes

Capture images	yes
Capture video	
Project images (e.g. on a wall)	
Activity monitoring	
Domotic control	
Communication capabilities – Internet	Yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	yes
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	
. (Any other)	
Connection to home environment	yes
Connection to external sensors	yes

10.2.9 Coaching on therapy or fitness

A TV set at the home of elderly people, in combination with the camera on the Robot, could be used to remotely deliver some form of training/coaching classes on physical activities to a group of elderly people. The trainer's classes/advice will be distributed real time to a group of elderly people via the TV set. The care personnel will also have the possibility to observe the movements of each elderly person participating in the training, via the camera on the Robot, so they can assess how well the elderly person is performing. It is also possible to establish two-way audio/video between the elderly person and the training centre so the trainer can address a specific elderly person and advice him.

This scenario can apply to several similar cases, e.g. coaching for physiotherapy, fitting exercises, etc.

The advantage of this approach is that one single trainer can at the same time coach a small number of people, rather than just one at the time.

Andrew has to carry out ½ hour of particular physical exercises on a daily basis. He participates to a remote training class. Andrew switches on his TV at a specific time (the Robot might remind him to do so) and he switches to the training channel. Here, he will see live Alex (the professional trainer) who will explain the exercises to be carried out. Alex explanations are not just for Andrew, but for a small group of other elderly people that needs to do the same exercises as Andrew.

Andrew can interact with Alex simply by talking to him. Alex, or a colleague of him, can also have access to a live video created by the camera on Andrew's Robot and in this way assess how well Andrew is doing his exercises.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	Yes
Go to a specific room/place (specify location accuracy)	-

Follow the user (robot)	Maybe
Remote control of the robot	Maybe
Speech recognition	Maybe
Gesture recognition (hands and arms)	Maybe
Facial expression recognition	-
Tactile interaction	Maybe
Capture images	-
Capture video	Maybe
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	Yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	-
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	-
Connection to home environment	-

10.3 Social connectedness

Social connectedness or a feeling of lack thereof, is one of the main problems elderly face today, due to their limited mobility, and because they often live far away from their family and friends. Note that the term “social connectedness” does not refer to bonding between the robot and the elderly but refers to the fact that the robot can play a “catalysing” role in the social interaction of elderly with their family friends and care givers.

Current social connectedness services focus on young and technology-wise people using mobile phones, instant messaging and social networking sites like Facebook and MySpace. These “Web 2.0” services are not well suited for elderly due to their rather complex and “gadget-like” interfaces. In this section scenarios aiming at developing a social connectedness for elderly that take into account their specific social connectedness needs and their limitations will be described.

In the social connectedness scope, different dimensions were defined: *I* for those services in which only the user interacted, *Us* for those services in which two people interacted through it, and *All* for community oriented services.

10.3.1 *I*_Lifelog

The LifeLog service allows elderly to record, and recall later, different moments of their life. A lifelog would resemble a multimedia diary. Moreover, it would enable sharing pictures and publishing short status messages associated to them, extending the scenario to the *Us* scope, or even to the *All* scope, by publishing this information on the web.

Ralph used to live in a small village when he was a child. He has a lot of memories of this place, and would like to share these memories of his childhood with his grandchildren. Thus, he uses the lifelog service to easily build an album called 'Your grandpa's memories of the village'. His grandchildren like it very much, and encourage him to publish his memories in the web, so everyone can know about those times.

Ralph finds the Lifelog service easy to use, as it allows publishing photos in a very intuitive way. Moreover, he really enjoys recording audio messages attached to the pictures, as if he really were storytelling to his grandchildren.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	-
Remote control of the robot	-
Speech recognition	yes
Gesture recognition (hands and arms)	Maybe
Facial expression recognition	Maybe
Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	-

10.3.2 *I*_Feel

The Feel service will contain different ideas on displaying emotions and gathering emotion related data. It will provide to informal caregiver (say, a family member or a friend) some information about the emotional mood of the person. Besides, it will encourage the elder to play games or listen to music when the system detects he/she is not feeling happy.

Sarah's father lives in a city far away. She has checked the general status information about her father provided by the system, and she's noticed it showed a 😐 face, indicating he was a little sad today. Thus, she decided to cheer him up with a videocall.

While Sarah speaks to his father, he tells her he was a little bored on the morning, but the system suggested him to play a cards game with some friends, and now he's feeling much better.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	yes
Follow the user (robot)	yes
Remote control of the robot	-
Speech recognition	yes
Gesture recognition (hands and arms)	yes
Facial expression recognition	yes
Tactile interaction	-
Capture images	-
Capture video	-
Project images (e.g. on a wall)	-
Activity monitoring	yes
Domotic control	-
Communication capabilities – Internet	yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	maybe
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	yes

10.3.3 *Us*_TV Friend

The TV Friend service assists seniors in watching TV and helps users to find an interesting TV-programme in an enjoyable manner. It informs users about programme details, recommends programmes based on their profiles or a genre that they specify, and reminds them about their favourite programmes.

John is zapping around, looking for some interesting TV shows. His TV Friend indicates that he just zapped by a channel where an interesting movie is about to start, although now it's showing commercials. The TV Friend reads out the movie review. It sounds nice to John and he asks the TV Friend to record it.

While John is watching the movie, the TV Friend reminds him that one of his favourite programmes starts on another channel. John asks the TV Friend to switch to that programme and to remind him later to watch the remainder of the movie.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	y-
Follow the user (robot)	-
Remote control of the robot	-
Speech recognition	yes
Gesture recognition (hands and arms)	Maybe
Facial expression recognition	-
Tactile interaction	-
Capture images	-
Capture video	-
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	yes
Communication capabilities – Internet	yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	yes
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	yes

10.3.4 *Us*_Chatting Buddy

The Chatting Buddy service provides companionship to seniors, by acting as a conversation partner. This concept is similar to "chatterbots", which are software programs that give the appearance of intelligently conversing with a user in a natural language. The chatting buddy listens to complaints of elderly and enables social talk.

Ira lived alone for a few years, but she couldn't get used to the silence in her home. She felt the need to chitchat but didn't want to bother other people constantly. That's why she found interesting the chatting buddy service.

Every now and then, Ira starts talking to her chatting buddy. And although it doesn't understand everything, she is pleased she can share what's on her mind. The chatting buddy often asks how Ira is doing or starts social talk. Ira and her chatting buddy are regularly chitchatting on various topics, such as the weather, news, family,

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	yes
Remote control of the robot	-
Speech recognition	yes
Gesture recognition (hands and arms)	yes
Facial expression recognition	yes
Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	-
Activity monitoring	yes
Domotic control	-
Communication capabilities – Internet	yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	maybe
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Connection to home environment	-

10.3.5 *Us*_PartyMode

PartyMode is used as a physical presence in another place, both online or offline. E.g. grandfather could participate in grandchild's birthday remotely or viceversa, or the robot can take pictures and videos of a party, so the elder person can see them later.

Bernadette's son lives in a city far away from her. She frequently visits her son, but sometimes she's not able to be there when there is some family event to celebrate. Today's is Bernadette's son is celebrating his 37 birthday and though Bernadette couldn't be there in person, she uses the PartyMode service so she can participate in the party.

Thus, by using the service she can see what's going on via a web cam placed in her son's living room, hear the same music they are hearing there and also send live messages to her son's home.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	yes
Follow the user (robot)	yes
Remote control of the robot	yes
Speech recognition	yes
Gesture recognition (hands and arms)	-
Facial expression recognition	-
Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	yes
Activity monitoring	-
Domotic control	Maybe
Communication capabilities – Internet	yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	yes

10.3.6 *Us*_Videoconferencing

This is a horizontal service, which can be used alone or as an enabler to support other services, such as the Telepresence one. It enables video communication capabilities and associated services, as asking the caller to wait until the callee is ready, door bell videodisplay....

Since Simone, 45 years old, lives quite far away from her mother, she can not visit her mother as much as she would like to. Therefore she uses the telepresence functionality offered by the Florence robot to visit her mother "virtually". This gives her a better sense of being present than a plain phone call. In this way, Simone can also talk to her mother when her mother is cooking and can give her advice.
The following extensions can be foreseen:

- *The robot will adjust the lighting such that the mother is well visible during the video call.*
- *The daughter can look around the room/house to see whether everything is OK.*

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	yes
Remote control of the robot	-
Speech recognition	-
Gesture recognition (hands and arms)	Maybe
Facial expression recognition	-
Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	Maybe
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	-

10.3.7 *Us*_Agenda/reminder

Enriched agenda service with reminders related to activities and social events, birthdays, cultural agenda, etc. The aim is to offer a wide variety of activities to try and keep the elderly person successfully engaged in an activity most of the time. Moreover, the agenda service will offer interaction capabilities, such as sending a greetings e-card or provide access to some useful phone numbers.

Daniel enjoys jazz music very much. Today he has received in personal agenda information about a concert which will take place on the weekend in Daniel's town auditorium. He is pretty much interested on going to the concert, so he decides to buy the tickets by opening a phone call with the ticket agency. Moreover, Daniel sends the information to his friend Steve, asking if he would like to go.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	Maybe
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	-
Remote control of the robot	-
Speech recognition	yes
Gesture recognition (hands and arms)	-
Facial expression recognition	-
Tactile interaction	-
Capture images	-
Capture video	-
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	yes
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	yes

10.3.8 *Us*_Messenger Robot

The aim of the messenger robot is to allow seniors to use new communication technologies in an easy and natural way. The messenger robot supports users in creating, sending, and receiving short messages (e.g. SMS, MMS, e-mail).

Hannah likes to keep in touch with her children and grandchildren, but they live far away. They don't call her very often, but rather send an email or an SMS. Hannah has problems with these new communication technologies and finds them difficult to use.

Since a few months, Hannah has successfully been using a messenger robot. Today she received a message from her grandchild Bob. The robot reads out loud: "Hi grandma. How's life? My holiday started today and tomorrow I will go swimming. See you, Bob." Hannah replies with a short video message, explaining that she is doing fine and at the same time showing her new glasses.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	-
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	-
Remote control of the robot	-
Speech recognition	Maybe
Gesture recognition (hands and arms)	yes
Facial expression recognition	Maybe
Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	yes
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	-

10.3.9 *Us_* SocialGaming

The Florence robot acts as a gaming partner or as the framework provider to play games with others. The robot could also suggest gaming activities depending on activity status or cognitive abilities of the user, allowing also an early diagnosis of cognitive decline.

Cindy feels a bit bored and wants to play a game. She asks her the Social Gaming service to play her favourite game. The game requires a lot of thinking, which Cindy finds pleasant to do since it stimulates her brains and it trains her memory.

The system detects there are other elders playing the same game at that moment, thus, it suggests Cindy to open a new match with them instead of playing against the machine, so the social interaction of Cindy is improved.

System functionalities	Required
Localize user	yes
Localize robot	yes
Go to the user	yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	-

Remote control of the robot	-
Speech recognition	yes
Gesture recognition (hands and arms)	Maybe
Facial expression recognition	Maybe
Tactile interaction	-
Capture images	-
Capture video	-
Project images (e.g. on a wall)	Maybe
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	yes
Communication capabilities - phone	Maybe
Learning about interests of user (cooking, cycling,…)	maybe
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	-

10.3.10 *All*_HobbiesBuddy

The aim of this service is to take the benefits of web 2.0 to the elderly in the appropriate format. The service would allow the elderly and caregivers to share health related concerns in selected communities, show weather and news displays, share digital wall with family and friends, or knowledge with different interest groups (e.g. gardening, patchwork)

Josephine loves gardening. She spends many hours in her garden watering her roses and taking care of them. Today she has discovered some strange spots in the leaves of her favourite rosebush, and she doesn't know what to do to remove them.

She decides to consult the HobbiesBuddy, where she can place a message in the gardening forum, to see if any other gardener can give her some clue. Thus, she has taken a picture of the leaves and recorded an audio message describing what's going on. Soon she receives an answer from another gardener; it can be due to a little bug and can be solved by using some specific product.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	Maybe
Remote control of the robot	Maybe
Speech recognition	Maybe
Gesture recognition (hands and arms)	-
Facial expression recognition	-

Tactile interaction	-
Capture images	yes
Capture video	yes
Project images (e.g. on a wall)	yes
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	yes
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	
Connection to home environment	-

10.3.11 (I/Us/All)_MyFlorence

This service allows porting some of the Florence service in the mobile phone of the user.

Steven has gone for a walk and carries, as always his mobile phone with him. He receives a message in his mobile phone, with a note from his grandchildren, letting him know that they are playing a football match at school this evening, and asking him to go and watch the match.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	-
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	-
Remote control of the robot	Maybe
Speech recognition	Maybe
Gesture recognition (hands and arms)	-
Facial expression recognition	-
Tactile interaction	-
Capture images	Maybe
Capture video	Maybe
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	Maybe
Communication capabilities – Internet	yes
Communication capabilities - phone	yes
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences	yes

(appropriate media, appropriate timing…)	
(Any other)	
Connection to home environment	Maybe

10.4 Collaborative activities

We foresee two domains for scenarios related to collaborative activities:

- *Collaboration between the elderly and their relatives and friends,* using the robot in an intuitive way. Two aspects are reinforced in this scenario: (1) collaboration is made possible using the robot and (2) the use of the robot is made intuitive.

  Success will be determined by the extent to which the robot is "hidden" from the collaborating people .

- *Collaboration between volunteer caretakers*. It is often the case that various volunteer caretakers (but sometimes also the professionals) do not know exactly what others have been doing. The objective of this scenario is to set-up a kind of web-log service that contains short reports of the volunteer care takers (using robotic interfaces or standard web-based tools), enhanced with a system-generated summary of the daily activities of the user, as observed by Florence.

  Success will be determined by the intuitiveness of maintaining and accessing the content, and the added value perceived by the care providers.

All these activities need to be very intuitive. Communication is with the other person not with the robot. The robot should be an intuitive tool used with the ease that nowadays applies to regular phones.

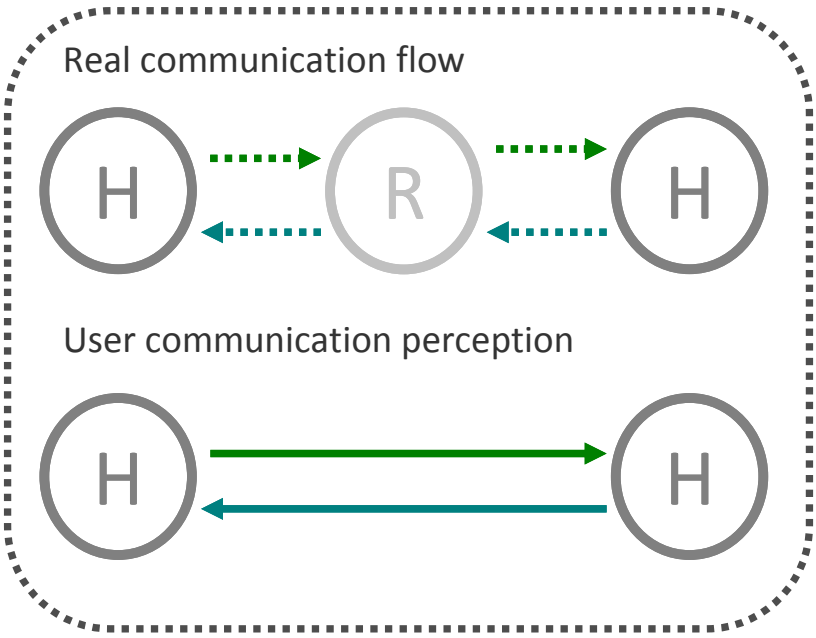

Figure 7: Real and user communication perception.

10.4.1 Intergenerational task sharing

The intergenerational task sharing is a web based service in which different generations help each other to gain some knowledge or expertise. The Florence system not only supports the collaborative teaching and learning activity when it is taking place, but also provides support to the users when they need to prepare a lesson to be taught.

Pilar is a very active grandma that loves being with younger people. She has recently joined a task sharing group where young and elderly teach each other different skills.

Pilar knows very well how to knit and makes excellent paella, so she has offered herself to teach people to knit and make paella entering the information in the Florence system.

Today the system reminded her it is her turn to give the paella lesson. She has already prepared the lesson with the aid of the Florence system.

During the lesson the robot follows her to make sure the other group members can easily follow her instructions.

Next week it is time for Pilar to learn how to send an e-mail. She is very nervous about it and at the same time eager to learn. Her grandson lives in Tokyo now and she knows e-mailing will be a great way to keep in touch.

System functionalities	Required
Localize user	yes
Localize robot	-
Go to the user	yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	Yes
Remote control of the robot	-
Speech recognition	-
Gesture recognition (hands and arms)	Yes
Facial expression recognition	-
Tactile interaction	Yes
Capture images	yes
Capture video	Yes
Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	Yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	-
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	Yes
Giving information based on user preferences (appropriate media, appropriate timing…)	Yes
(Any other)	

10.4.2 Remote participation in a Mutual help group

The remote participation in a Mutual help group allows people that normally attend a mutual help groups to keep doing so when difficulties to attend arise. The Florence service makes it possible for members of the group to attend the group experience remotely while preserving their intimacy at home.

Adolfo lovingly takes care of his wife Luisa. It is sometimes hard for him to recognize his wife; the Alzheimer has changed their life. Adolfo attends a Alzheimer's informal caregiver mutual help group every Wednesday when Laura, his daughter, comes and takes care of her mother.

Laura can not always make it on Wednesdays and this meant Adolfo could not contact his group, which is of great relief to him.

Adolfo has just started to use the Florence service to remotely connect to his group. With basic intuitive gestures he can command the service to start and stop bilateral communication, so that he can always see and hear the group, but he can keep his privacy if he needs to attend his wife. The system also helps him contribute when necessary and record some specific parts when he is busy.

He enjoys being present in the group and it helps him follow the group progress.

System functionalities	Required
Localize user	yes
Localize robot	
Go to the user	
Go to a specific room/place (specify location accuracy)	
Follow the user (robot)	
Remote control of the robot	
Speech recognition	
Gesture recognition (hands and arms)	yes
Facial expression recognition	
Tactile interaction	yes
Capture images	
Capture video	
Project images (e.g. on a wall)	
Activity monitoring	
Domotic control	
Communication capabilities – Internet	yes
Communication capabilities - phone	
Learning about interests of user (cooking, cycling,…)	
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	

10.4.3 Making puzzles with your grandchild

The making puzzle service implemented in the Florence system provides family relatives the option of remotely performing a collaborative activity, like puzzle making, in a synchronized (both players at the same time) or asynchronized way.

Jose and his grandson Carlos like very much making puzzles. Jose and his 10 year old grandson have grown closer sharing this activity.

They now collaborate on bringing the puzzle image together from their respective homes. Carlos starts playing with his puzzle game on a tablet pc. He knows that sometimes some pieces can seem to start moving magically when grandpa is also playing with him from his house. They sometimes play synchronously, others asynchronously, and even if they don't see each other, they know they are both part of the puzzle they are working on.

The Florence system robot comes to Jose when Carlos is playing so that they can enjoy sharing the activity synchronously. It is much more fun for him, when he knows Carlos is on the other side.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	-
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	yes
Remote control of the robot	Yes- give command of searching for the user remotely
Speech recognition	
Gesture recognition (hands and arms)	
Facial expression recognition	
Tactile interaction	yes
Capture images	
Capture video	
Project images (e.g. on a wall)	
Activity monitoring	Yes (need to know when the user is at home and when it is carrying out a task that can be interrupted like watching tv)
Domotic control	
Communication capabilities – Internet	yes
Communication capabilities - phone	
Learning about interests of user (cooking, cycling,…)	
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in	yes

the morning…)	
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	

10.4.4 Gardening together

Gardening together is a new era game in which by physical movements one can have their own digital garden in which two people can collaboratively work to make the digital garden look fantastic.

Fred loves gardening but it is winter and there is nothing to do in the garden. He feels bored and grumpy. The robot suggests him to invite a friend and play together in a collaborative game. Fred accepts, and calls Paul to join him.

As Paul comes in, the robot projects the game in a wall. It consists of creating a lovely garden from scratch, and taking care of it. The first image only shows an empty piece of land, so there are lots of things to do. Fred and Paul start plowing, then sowing the grass. The robot detects all their movements and projects the changes in the garden. Fred is busy with plants and flowers, Paul with the vegetable garden. Whenever they need a new tool or plant, they only have to tell the name, and the robot displays it on the corner of the wall. They have to go to that part of the wall, pick it up, and place it where desired. After several hours, they are happy with the work they have done together.

Fred and Paul have the possibility either to finish the game, or more realistic, to consider it an alive system. They choose the second option. The following days, the "virtual" garden evolves according to the typical spring weather of the place. Each 2-3 days, the robot prompts Fred to check the garden and work to keep it nice. When the work is too hard, Fred calls Paul to help him maintain the nice garden they created together.

System functionalities	Required
Localize user	yes
Localize robot	-
Go to the user	yes
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	Yes
Remote control of the robot	-
Speech recognition	Yes
Gesture recognition (hands and arms)	Yes
Facial expression recognition	-
Tactile interaction	-
Capture images	-
Capture video	-
Project images (e.g. on a wall)	Yes
Activity monitoring	Yes
Domotic control	-
Communication capabilities – Internet	Yes
Communication capabilities - phone	-

Learning about interests of user (cooking, cycling,…)	Yes
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	Yes
Giving information based on user preferences (appropriate media, appropriate timing…)	-
(Any other)	
Emotion detection (detect when he is bored)	Yes

10.4.5 Informal caregivers network

The informal caregivers' network is a place where experiences, advice, suggestions and thoughts can be shared. The basis of the network is that cooperation among individuals in similar characteristics can lead to better decision making, general improved wellbeing and better care provision.

Paula's life has changed a lot since her husband had a stroke 4 months ago. Before that, she was an active and socially engaged woman, but now, she hardly ever has time for herself. As they live alone and their children live far away, she spends the day taking care of her husband, who has severe difficulties for walking, grasping and even talking. She has lots of concerns regarding how to take care of her husband, the technical and social aids they could have…, and she wonders if there are people in similar situations who could help her.

She asks the robot to look for information on caregivers' network, and she is happy to see there are people wishing to share their experience. She joins the network, and soon she is able to know about tricks and aids to make taking care of her husband easier. She receives photos and videos, and thanks to the wireless camera integrated in the robot and its mobility, she also is able to send media information on the specific difficulties she has with the stairs and the narrow bathroom they have at home.

After a while, she is happy to see she can also contribute in the network, making others job easier. More than that, she has found friends that are in a similar situation, who share similar concerns and even timetables, and they have created a group to go for a walk together once a week.

System functionalities	Required
Localize user	-
Localize robot	-
Go to the user	-
Go to a specific room/place (specify location accuracy)	-
Follow the user (robot)	Yes
Remote control of the robot	-
Speech recognition	-
Gesture recognition (hands and arms)	-
Facial expression recognition	-
Tactile interaction	Yes
Capture images	Yes
Capture video	Yes

Project images (e.g. on a wall)	-
Activity monitoring	-
Domotic control	-
Communication capabilities – Internet	Yes
Communication capabilities - phone	-
Learning about interests of user (cooking, cycling,…)	Yes
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	Yes
Giving information based on user preferences (appropriate media, appropriate timing…)	yes
(Any other)	

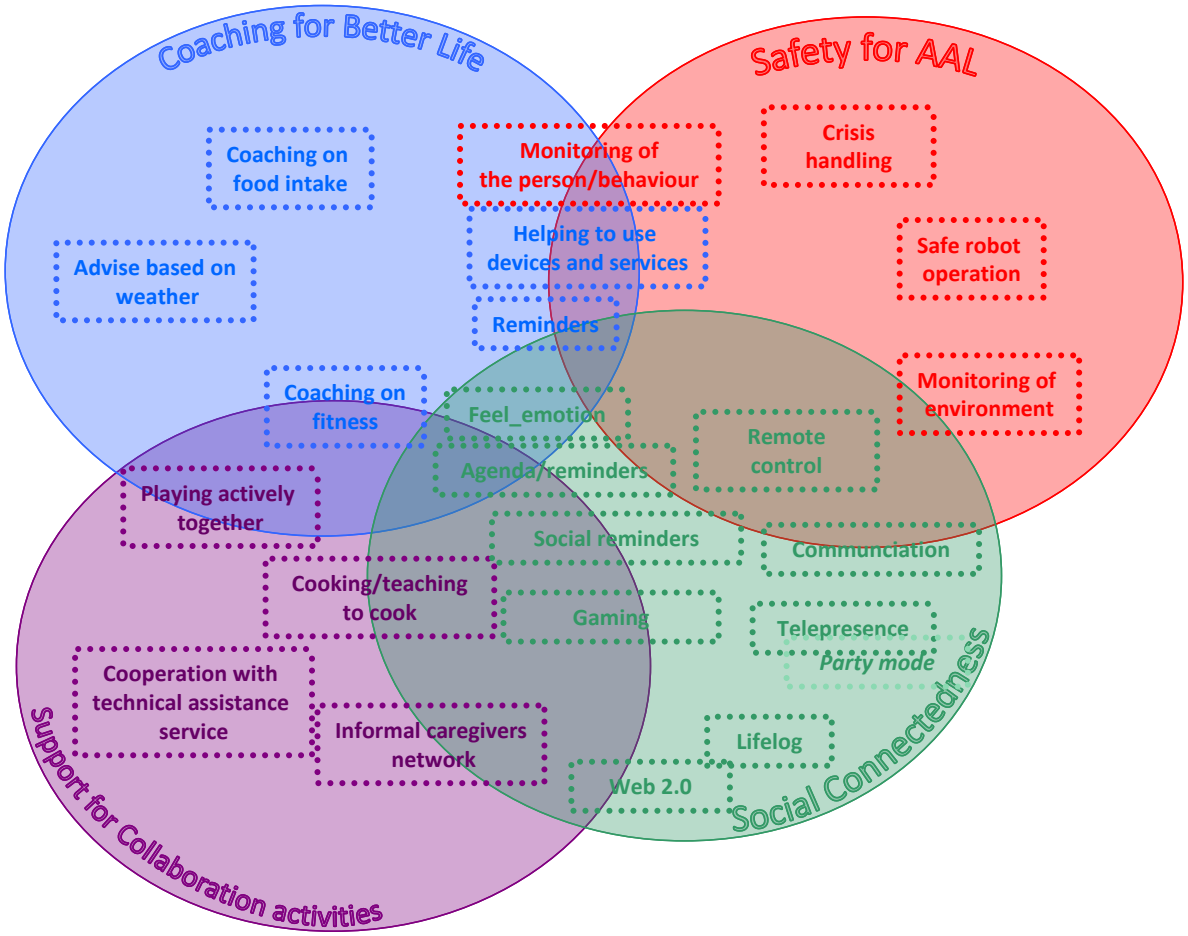

Figure 8: Project purposes.

11 ANNEX B: Summary and comments from feasibility check

In this section a brief summary of the general comments from other WPs are included.

Comments from technical WPs	Approach taken
All scenario where found feasible at least to some extent.	In order to make sure scenarios would be feasible without compromising the innovative factor of the project; technical challenges will be identified in the overall analysis as well as fallback options to degrade the service gracefully. *(see section 5 Overall Analysis for the selected scenarios)*
Some of the scenarios have already been tackled in other projects. Consideration on Florence's innovative factor should be made.	An additional effort will be made to assess the innovative and differentiating factor of each of the scenarios. The Florence approach is considered innovative as an overall system with a framework where a set of services will be demonstrated, however, it is interesting to see what differentiation each of these scenarios holds. *(see section5 Overall Analysis for the selected scenarios)*
Many of the scenarios are overlapping.	Overlapping scenarios will be merged when the key scenarios are selected.
It would/might be necessary to describe in more detail how a certain scenario would evolve	More detailed descriptions of the scenarios required would be specific use cases. The use cases will be defined after feedback from the focus group is obtained. An extra specific feasibility check has been included after the focus groups *(see section 3 Scenario and use case definition process)*
Specific comments were made for some scenarios were specific hardware equipment (most of the times specific sensors) were needed for the development of the project.	For specific scenario requirements service responsible partners' have been assigned. The aim is to make sure all necessary technical modules will be developed and the necessary equipment can be provided or obtained. *(see section 5 Overall Analysis for the selected scenarios)*

As described in section 3 Scenario and use case definition process, scenarios only allowed for general feasibility check so far. When use cases are defined, after the focus groups session, a specific feasibility check will be run to make sure all use cases are feasible and if found risky, other variants will be included, so that in all cases the scenarios can be developed into meaningful services.

In order to continue with the work a tentative availability of the functional modules was collected. The following table should help scenario and use case developers orient they work, but it's not definitive. A specific feasibility check for each scenario will be carried out after focus groups sessions.

System functionalities	WP	Provided
Localize user	WP2	Yes
Localize robot	WP2	Yes
Go to the user	WP2	Yes
Go to a specific room/place (specify location accuracy)	WP2	Yes, needed and available accuracy to be yet defined.
Follow the user (robot)	WP2	Yes
Remote control of the robot	WP2	Yes
Speech recognition	WP4	Voice commands, not speech recognition. The interaction approach will be voice commands combined with intuitive gesture recognition and tactile interfaces.
Gesture recognition (hands and arms)	WP4	Yes, which gesture recognition will be done, still to be determined.
Facial expression recognition	WP4	No
Tactile interaction	WP4	Yes
Capture images	WP2	Yes
Capture video	WP2	Yes
Project images (e.g. on a wall)	WP4	Not in 1st version
Activity monitoring	WP3	Yes, needs defining
Domotic control	WP2	Yes, which appliances to be controlled to be defined
Communication capabilities – Internet	WP2	yes
Communication capabilities - phone	WP2	yes
Learning about interests of user (cooking, cycling,…)	WP3	Yes, needs focusing on which interests and to do what
Learning type of user needs / preferences (visual or hearing impairments, prefers visual cues in the morning…)	WP3	Yes, needs focusing on which disabilities
Giving information based on user preferences (appropriate media, appropriate timing…)	WP3	Yes, needs focusing
Connection to home environment	WP2	Yes