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"Specification of use case scenarios and user interface"

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Abstract:

First in this document use cases, divided into common scenarios and scenarios specific to each test bed, will be presented. The use cases will be outlined separately, for Guidance and Care services on the one hand and Wellness services on the other hand.

The last part of this document addresses the user interface of the system.

Keywords: <use cases ; user interface; scenarios; end-user needs and corresponding services >

Classification and approval

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1 Introduction

1.1 Summary

This document describes the use case scenarios and user interface for the CaMeLi project. The different presented use case scenarios are based upon the needs and requirements communicated by the interviewees of the two test beds which are Orbis Medisch en Zorgconcern (Netherlands) and VIVA (Switzerland). The main task of this deliverable is to guide the technical partners in charge of ICT services in the development of these services according to priorities expressed by the end users. This is done by giving them a preview of what typical interactions between the end users and the system **could be** – how end users intend to use the system, according to what they mentioned in the interviews.

1.2 Structure of the Document

This deliverable is divided into five main parts.

[1] Introduction

   a. Summary
   b. Structure of the document
   c. Relationship with other deliverables
   d. Contributors

[2] Review of user requirements

[3] Guidance and Care services:

   a. Use case scenario common to both VIVA and Orbis (general use-case scenario)
   b. Orbis elderly home use case scenario.
   c. Orbis care apartment use case scenario.
   d. VIVA use case scenario.

[4] Wellness services use case scenario.

[5] User interface review according to user needs.

1.3 Relationship with other Deliverables

The deliverable integrates user requirements from D1.1. The specification of avatar features developed in WP2 should be seen as a complement to the user interface as discussed in this document. It serves as a guide for development of WP3 ICT based services. Regarding WP5, this deliverable is also used as a basis to assess the delivered prototype adequacy with regard to the expected services and interface.

1.4 Contributors

Table 1: Revision History

Version	Date	Reason	Revised by
V1	30-01-2014	Initial version	Emilie Joly (after general meeting in Geneva) (VIVA) Anne-Claude Juillerat Van der Linden (VIVA) Christiana Tsiourti (UNIGE) Cindy Wings (ORBIS) Markus Dubielzig (SAG) Ginger Claassen (SAG)
V2		Updated Version	
V3		Final Version	
V4		Reviewed Version	

Table 2: Contributors

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2 Review of user requirements

2.1 List of services gathered in user surveys and interviews

The main outcome of WP1 is to identify services that meet end user needs and expectations. A series of interviews and paper based surveys were conducted with end users living in three different user contexts: VIVA (Independent elderly living at home in an urban setting, attending activities of the VIVA association), Orbis elderly home and Orbis care apartments. A summary of services gathered in these surveys is provided below in table 3:

An "X" indicates that services were identified in surveys from a particular user environment. For example, daily agenda and reminder functions, brain training or other games, fall detection and call for help were identified as needs in all three user settings, whereas other services appear only in one or two user settings.

An asterisk indicates that this service might require internet access. This is highlighted, because the project scope initially stipulated a standalone system and the implementation of these services would require special considerations.

It should be noted that services that the users do not want were not included in the above list. Example: Users do not feel that they need help from an avatar for dietary or cooking advice; emotion recognition was deemed to be not useful in the absence of a useful associated service (e.g., motivating people, or showing empathy with them).

Full details and results of the user need interviews are reported in D1.1.

Table 3: User surveys and list of services

Services	VIVA	Orbis elderly home	Orbis care apartments
Agenda for daily living activities (wake up)	-	X	X
Breakfast reminder	-	X	-
Medication reminder	X	X	-
Daily schedule reminder	X	X	X
Reminder prior to appointments or activities	X	X	X
Add agenda items themselves	X	X	X
Program of activities nearby or in the city *	X	-	X
Notify OT or family member when running late or cancelling a planned event *	-	X	X
Messages from the system *	-	X	-
Do not forget things when going out	X	-	-
Fall detection + call for help	X	X	X
Call for help in case of an emergency	X	X	X
Noise detection (for security purposes) + call for help	X	X	X
Security alarm follow-up	X	X	X
Behaviour analysis and motivation functionality	X	X	X
Emotion recognition by means of facial expression and speech analysis	X	X	X
Brain training or other games	X	X	X
Playing recorded relaxations, meditations	X	-	-
Stimulation for physical exercise (Yoga or going out)	X	X	X
Finding things detected by the camera	-	X	X
Object storage memory	X	-	-
Dinner menu of the restaurant (read out) *	-	X	-
Shopping list	X	-	-
Skype functionality *	X	X	X
Communication with friends via CaMeLi system messages *	X	X	X
Communication with friends and family via text messages (sms)	X	X	-
Retrieve information online *	X	-	-
Bus/public transport timetables and routes *	X	-	-

2.2 Priority list of features

Based on these surveys and interviews, the user organisations grouped and prioritised the features desired by the end users.

(1= Most important)

1. *It has to be adjustable for each user.* In order to be perceived as comfortable by the elderly, the avatar has to be fully flexible and adjustable to the needs of each person.
   - Modules can be turned on and off
   - Appearance of the avatar: Easy, fluid and pleasurable user interface!
2. *An agenda-system which will remind users of daily activities;* it should also provide information about e.g. events taking place in the area at that time and therefore propose activities with possible routes to take, means of transport and time tables. If such features were not integrated in the system, the users stated that they would clearly prefer to stick to the classic paper / pencil agenda. They are especially interested in informing friends of what they are going to do, and being able to ask to join them.
3. *Common calendar reminder functionality* E.g., daily medication, weekly activities, monthly payments, annual for birthdays ... and occasional reminders related to individual needs such as prospective memory: "When I get out tomorrow, remind me to think of buying milk or a birthday card for Olga".
4. Safety issues (detecting falls). In case of an emergency, caregivers/relatives/ neighbours will be contacted via push SMS sent via the dispatcher, so that they could intervene as quickly as possible.
5. Finding objects (VIVA: remembering the storage place of documents previously entered in a database, long-term storage of items / Orbis: based on object recognition)
6. Food and meals (VIVA: general shopping list, treated as a database / Orbis: menu of the week)
7. Behavioural analysis: the system should be able to detect a lack of activity (e.g. sitting for more than 3 hours), in order to suggest activities to the elderly, incentives to go out or to call friends
8. Skype for communication with friends.

This priority list includes information that is applicable across all services, i.e. flexible and customisable, etc. It is clear that all services identified in the user requirement survey cannot be developed within the CaMeLi project. A further analysis is required for mapping these results to all three user contexts, the technical scope as well as the services outlined in the DOW, e.g., Wellness, Guidance, and Care services.

2.3 User survey results and CaMeLi services roadmap

Table 4 below links the identified services to each user context. The services are also organized according to the CaMeLi service categories: Wellness, Guidance, and Care services outlined in the DOW.

In each category the services that were identified in all three user contexts are always listed first. For example, in the wellness category, services for stimulating physical activity and brain training were identified in all three user contexts. At times, there are overlaps between services identified in the survey and the CaMeLi service categories, e.g., medication reminders may be seen either as a part of

daily activity reminders or of Care services. These questions will be answered in the subsequent sections of this document, where the lead partners will provide a detailed road map for each service category.

For now, Table 3 is a good starting point for the CaMeLi service development that accounts for development priority both in terms of the needs expressed across the different user contexts and the broader needs expressed in the priority list. The development of the detailed roadmap in Table 4 requires a close coordination between work package 1, 2, 3 and 4. This is especially true for the Guidance and Care services where some service overlaps will require further prioritization.

Table 4: CaMeLi services roadmap

Services / Service Categories (Lead Partner)	VIVA	Orbis elderly home	Orbis care apartments
Wellness (NU)			
The Memory Club (A service space for brain wellness)	**X**	**X**	**X**
Guidance services (UNIGE)			
Object storage memory	**-**	**X**	**X**
Shopping list functionality	**-**	**-**	**-**
Activities in the surrounding area	**X**	**-**	**X**
Public transport timetables and routes	**X**	**-**	**-**
Retrieve information online	**X**	**-**	**-**
Care Service (IPN)			
Agenda	**X**	**X**	**X**
Reminder for personal health habits (medication, hygiene, ...)	**X**	**X**	**X**
Security (fall detection)	**X**	**X**	**X**
Security (loud noise detection)	**X**	**X**	**X**
Skype functionality	**X**	**X**	**X**
Messaging Service (messages from the system)	-	X	-
Finding objects	-	X	X
Meal Service	-	X	-

The final list of services to be developed is reported in D3.1a "Design and specification of ICT-based services". This deliverable presents and clearly outlines typical situations where services could be used in the CaMeLi context.

Note that the Care and Guidance services are addressed together because of overlapping features and functionalities, the main component being an Agenda that integrates most of the guidance and Care services. There is also a difference in the presentation of the Care and Guidance services and the Wellness Services.

The use cases for the Guidance and Care services have a more straightforward presentation, as their core feature, namely the Agenda and reminder services, are well understood processes. The Wellness services will contain completely innovative content, which includes recent findings in psychology with regard to memory optimization; the development of a new intervention protocol (process) based on the interplay of human and digital services and interaction design techniques that promote motivation, user engagement, conviviality and ease of use. Thus, the Wellness section will include a more substantial theoretical introduction with a use case scenario that will evolve in step with a more detailed development of the respective service to be reported in the various deliverables to be compiled in workpackage 3.

3 Guidance and Care services

3.1 Theoretical basis for Guidance and Care services

The main task of Guidance and Care services is about the agenda and reminders. Their functions are widely used and their benefits are supported by multiple studies. Some studies have shown that, with age, elderly tend to rely more on external aid and notes than they did when they were younger (see for example Intons-Peterson & Fournier 1986 and Lindenberger & Mayr 2013). These studies also showed that external memory aids, like an agenda, proved useful to remember things to do, but only if they meet some conditions. In fact, a lot of memory slips happen due to the fact that the written information is underspecified (writing too few information to remember afterwards). It is then important to specify what is the purpose of the activity? At what time does it take place? Where? With whom? Etc.

A complementary external help service is the shopping list. It was not identified in the priority list but proves very useful to a lot of elderly. As stated by UNIGE, the shopping list is just a database; easy to integrate in the system. But this shopping list should be combined with the agenda function thus the user can configure a reminder to consult the shopping list before going out. This database should be interactive because the elderly has to tell the system that he/she already bought the item whenever it is the case –it could prove useful if the system could check with the person what has been bought whenever he/she has gone out for shopping.

Another important component of Guidance and Care services concerns communication (via Skype, internal message system or sms) with other people, like friends, family or VIVA's / Orbis staff. In fact, elderly living alone at home often suffer from social isolation. It is thus very important to give them an opportunity to communicate with significant others.

OF IMPORTANCE: the following use cases are divided into: (1) common to both VIVA and Orbis, (2) Specific to Orbis elderly home, (3) specific to Orbis care apartments, and finally (4) specific to VIVA. Because of important overlaps between required services for all 3 user contexts, services expressed in the common use case implicitly apply also to the others. They have been removed from the last 3 use case scenarios to avoid redundancy and to easily identify what services (or variation of common services) are specific to each test site.

3.2 Use case scenario - common to both VIVA and Orbis (general use case scenario)

Michelle Tissot is a 76 year old woman, living alone at home.

She is an independent and active woman. Not only does she engage in several daily activities, but she also undertakes numerous leisure activities. Every Tuesday and Saturday, she has a cup of coffee at the tea room with her friends. She also takes part in various activities related to associations and volunteering and plays sport on a regular basis (hiking, etc.). Besides, she fancies going to exhibitions and a lot of other cultural activities.

With all these various activities, Michelle's calendar is quite full, and sometimes she misses an appointment she had arranged with a friend or her doctor. Therefore she would like the system to remind her of her appointments and show her the daily schedule of activities at meal time.

AGENDA FUNCTIONALITIES:

Step 1: Every morning, when Michelle has breakfast, she turns the system on. There is also an option available to program a wakeup call.

During the night, the system either might have been turned off, in this case, the user has to switch it on, or been put in sleep mode, in this case the user has to give the vocal command to exit the sleep mode.

[Daily schedule reminder]:

Step 2: The Virtual Partner (ViP) welcomes her and shows her the schedule of the day (visual timetable based on the activities registered with the system for this day, see Figure 1.) and provides her with a verbal summary of various appointments in browsing mode. ViP: *"You've got an appointment with Mrs Muller at 5:00 PM at the corner's tea-room to have a cup of tea"*.

When launching the agenda, the ViP moves from the center to the side of the screen.

[Add agenda items themselves]:

Step 3: The ViP asks Michelle if she wants to add another activity to her program.

Step 4: Michelle agrees and enters a new activity into the device by saying "Yes".

Step 5: The ViP then asks, according to a systematic script: *What activity*? *When and for how-long*? *Where?* and *With whom?* Michelle enters the information:

- *What?* Going to see my granddaughter and her newborn child
- *When?* Today, at 4:00 PM.
- *For how long?* It should take me an hour and a half altogether.
- *Where?* At the maternity hospital.
- *With whom?* Alone.

  This can be done either by speech recognition or by touchscreen (virtual keybord) if the former did not work appropriately.

Step 6: She confirms the entry by voicing the respective verbal command or uses the touchscreen again if the speech recognition does not work appropriately.

Additional Step: As she entered an activity at 4:00 PM, while she already had something planned for 5:00 PM, the ViP notifies Michelle that there may be an overlap between the two appointments. It then asks her if she wants to adjust the schedule, she can either delete one of the appointments or modify the starting time of one of them. Michelle decides to let the schedule as it is. She is going to ask Mrs Muller to come with her to visit her granddaughter.

Step 7: The ViP then displays on the screen the updated daily schedule.

Step 8: Finally, Michelle asks the device to program a monthly reminder, so that she will not forget to pay her electricity bill. When creating an event, the agenda interface suggests repeating an event: daily, weekly, monthly, yearly or for *X* repetitions. Like before, the user can enter this information either via speech recognition or via the touchscreen.

Interaction with the agenda will then be a mix of predefined verbal commands ("yes/no", "add/delete activity", etc.), speech (non-semantic) recognition and the touchscreen.

COMMUNICATION WITH FRIENDS AND FAMILY:

Michelle wants to send Mrs Muller an invitation to come with her to the maternity hospital to visit her granddaughter, who just gave birth. As Mrs Muller also has the CaMeLi system at home, Michelle decides to contact her via the internal message tool. Otherwise she would have used the sms option (see Orbis elderly home use case) or just a traditional phone call, since the system can provide her with her friend's number.

Step 1: She verbally asks the system to launch the message tool, and composes her message to Mrs Muller. For this part we can try speech recognition however typing would be easier (at least in French because of all the spelling irregularities).

Step 2: The ViP notifies Michelle that she received a response from her friend (an audio signal sounds and a notification appears on the screen. In case of no response because the Kinect does not detect anybody in the room, it sounds another beep signal as soon as someone is detected by the system).

Step 3: The ViP shows her the response of Mrs Muller via the ViP message box. She will be delighted to come with Michelle to see the baby.

Step 4: Michelle tells her friend that she will come at 3:45 PM to pick her up.

End of the interaction.

After 15 minutes the system automatically switches to stand-by mode.

SKYPE FUNCTIONALITY:

It is 10:00 AM; Michelle wants to call her daughter.

She calls the ViP name: CaMeLi. It comes-out of stand-by mode.

Step 1: Michelle then tells the ViP "launch Skype"

Step 2: The Skype window (classical skype app for windows) appears on the screen. The ViP is in browsing mode. Michelle can see that her daughter is online.

Step 3: She voices "Call *name of the daughter*", if it does not work she presses her daughter's contact icon.

Step 4: After the call, the system gets back to the welcome screen, with the ViP.

SECURITY FUNCTIONALITY (NOISE DETECTION):

Step 1: Michelle decides to get herself a tea. She goes to the kitchen and puts some water to boil. Once hot, she pours the water in the tea pot. When she takes the teapot to go to sit at the table, it slips between her fingers and bursts on the floor. This makes a big noise.

Step 2: The ViP detects this noise as a potential danger or fall and asks: 'Are you alright?'

Step 3: Michelle answers: 'yes'.

Step 4: No further procedure is undertaken by the security module. She then cleans-up the pieces of the tea-pot and decides to cook lunch for herself.

On the contrary, if Michelle is, for example, harmed – cut by a fragment of the teapot, she can ask the device to call for help:

Step 3b: *Michelle answers to the question of the ViP if she is alright 'no'*

Step 4b: *The ViP answers 'Should I call someone for help?'*

Step 5b: *Michelle answers 'Yes'*

Step 6b: A telephone call is initiated with the first person on the emergency telephone list of *Michelle*, her neighbor. If the phone is not answered the next person on the emergency telephone list is called until someone is reached.

Step 7b: The neighbor responds and comes to Michelle to help her

Step 8b: When the neighbor enters the room the avatar switches to multiple-person mode.

If she is unconscious and thus no response is given to the system, it will automatically call for help.

This scenario is described in the security functionality in paragraph 3.4 of Orbis care apartments' use case scenario.

OR

SECURITY FUNCTIONALITY (REQUESTING FOR HELP):

Step 1: Michelle decides to get herself a tea. She goes to the kitchen, and puts some water to boil. Once hot, she pours the water in the tea pot. When she takes the teapot to go to sit at the table, it slips between her fingers and bursts on the floor. Boiling water spurts on Michelle's body, and a fragment of the tea pot cuts Michelle's leg. It begins to bleed.
Step 2: Michelle calls the ViP: "CaMeLi", "Call for help!"
Step 3: The ViP, in communicating mode, asks "is it an emergency?"
Step 4: Michelle answers "Yes!"
Step 5a: A telephone call is launched with the first person on the emergency telephone list of *Michelle*, her neighbor. If the phone is not answered the next person on the emergency telephone list is called until somebody is reached (actually, if this were to happen, it might be more suitable to call the local Emergency Medical Service [112 in Switzerland] right away). For Orbis, the emergency telephone list will include caregivers and staff from the institution (there is no such service at VIVA).
Step 5b: If the ViP uses text messaging, the contact answers if he/she can come quickly or not. If yes, the alarm shuts down, otherwise it sends a message to the next contact until someone answers positively.
Step 6: The neighbor responds and comes to Michelle to help her.
Step 7: When the neighbor enters the room the avatar switches to multiple-person mode. The neighbor takes care of Michelle and takes her to the doctor.

Later on, Michelle comes back since it was not too serious and only needed a bandage.

SHOPPING LIST FUNCTIONALITY

Michelle wants to add a teapot to the shopping list in order to replace the one she broke.
Step 1: She tells the system "launch shopping list", and goes to browsing mode. Michelle can see all the items that are already present in the list (visual support: standard list of items).
Step 2: The ViP asks "Do you want to add something to the list?"
Step 3: Michelle answers "Yes".
Step 4: She can pronounce the items to add to the list and the speech recognition algorithm will transcript what has been recorded. But she can also use the touchscreen and enter the information manually.
Step 5: She either voices the confirmation command or presses the confirmation button. The newly added item appears in the list.
Step 6: The ViP asks her: "do you want me to remind you of the content of the list next time you will go out".
Step 7: Michelle answers "Yes".

BEHAVIORAL ANALYSIS:

Step 1: Michelle is sitting at the table of the living room and begins to make crossword puzzles.
Step 2: Two hours later, she hasn't moved from the sofa; the camera did not detect any substantial movement (she did not walk across the room, etc.).
Step 3: The ViP then suggests her to move, have a little walk or physical exercise.
Step 4: Michelle answers "ok".
As her leg hurts, she only makes a few steps across the room, and extends her arms.

FACIAL EXPRESSION AND PROSODIC EMOTIONAL RECOGNITION:

Michelle stretches her arms **in front of the device**

Step 1: The system detects the sad face of Michelle.

Step 2: The ViP asks, in communicating mode "Michelle, is everything alright?"

Step 3: Michelle answers "No, I feel lonely and sad, and my leg hurts".

Step 4: The system analyses the prosody of her voice in order to try extracting further information about her emotion.

Step 5: The system detects sad prosody. This information confirms the result of the facial expression analysis.

Step 6: The ViP asks "Would you like to call someone?"

Step 7: Michelle answers "No".

Step 8: The ViP asks "Would you like to read a book?"

Step 9: Michelle answers "Yes", good idea!

Step 10: Thank you CaMeLi, please "go into stand-by mode"

These suggestions are delivered by the ViP according to a predefined list of preferences set-up by the user (e.g. 1. call someone, 2. read a book, 3. listen to some music). These suggestions should be delivered in random order.

The screen goes black and the words "Stand-by mode. Call my name to wake me up" appear on the screen

Michelle goes to her bookcase and picks-up a book. She then sits on the sofa and reads.

Further steps: in ulterior stages of development, when the emotion recognition will be successfully implemented, an effort should be made to match suggestions to a particular detected emotion, i.e. not suggesting the same things when the user is sad, angry or happy.

[Agenda reminder prior to appointment/activity]: At 3:15 PM, the system automatically leaves the stand-by mode and the ViP)in message box mode) reminds Michelle that she will have to pick-up Mrs Muller in 30 minutes to visit her granddaughter and tells her not to forget to post the card for her grandson's birthday.

[Do not forget things when going out]:

Just before going out, the ViP can remind Michelle to take her umbrella because showers are expected today.

[Agenda + shopping list]: When Michelle is going to open the door to leave, the ViP reminds Michelle that she wanted to consult the shopping list (for the teapot): "do you want me to show you the shopping list?"

Michelle answers "yes" and the ViP switches from communicating mode to browsing mode, displaying the shopping list.

She thanks the system and says "exit shopping list" and leaves.

After 20 minutes of inactivity, after Michelle left, the system automatically switches to stand-by mode. It will reactivate when it will detect somebody in the room.

[Updating shopping list]:

At 6:30 PM, Michelle returns home.

Step 1: The ViP, in communicating mode, asks her if she went shopping.

Step 2: Michelle answers "Yes"

Step 3: The ViP opens the shopping list and asks "did you buy everything?"

Step 4: "Yes"

Step 5: The ViP clears the list. It is now empty.

Step 4b: "No"

Step 5b: "What do you want to keep in the list?"
Step 6b: "Cheese", if the system does not understand correctly, she can press the screen to select the item to keep in the list.
Step 7: Michelle says "Exit shopping list"
Step 8: The system returns to the home screen

She then asks the device to add a new activity for tomorrow at noon. When walking to the post-office, she met a friend who invited her to have lunch with her tomorrow.

At the end of the day:
The ViP checks if activities or tasks have actually been completed, and proposes to postpone the missed ones.
Michelle then asks the device to go into private mode.
The screen goes black and shows the text and/or symbol private; all services are stopped, except for emergencies and wake-up alarms if needed (for ORBIS).

FALL DETECTION:
In the middle of the night, Michelle wakes-up and stumbles over a bag on the floor on her way to the bathroom. She lies on the floor.
Step 1: Cameras detect the shape of Michelle on the floor. The system determines this case as an emergency.
Step 2: The ViP asks "Michelle, do you need help?"
Step 3: As Michelle is feeling alright, she answers "no"
Step 4: The ViP asks "do you want me to return into private mode?"
Step 5: Michelle agrees "yes"
The system returns into private mode.

If Michelle would have needed help, she would have answered "yes". And the system would have called someone (predefined contacts, in a predefined order of priority) or sent a sms alert/call via the dispatcher system. The system receives a notification when a contact received the information and confirmed (or declined) that he/she is coming to help the user. These different options are described in the security functionality scenario above and in detail in the security functionality in paragraph 3.4 The Orbis care apartments' use-case scenario.

If unconscious, when no response is given to the device, it can automatically call for help. These steps are described in the security functionality in paragraph 3.4 The Orbis care apartments' use-case scenario.

SECURITY ALARM FOLLOW-UP:
If a security alarm has been triggered during the night, on the following morning, the ViP will ask Michelle if she is alright or if it needs to contact someone (family doctor, etc.).
In this case security can be integrated with Skype (to contact someone) and agenda (e.g. to enter a new appointment with the doctor).

3.3 Orbis elderly home's use-case scenario.

Peter Smith is 88 year old. He lives alone in the elderly care center of Orbis Hoogstaete.
He suffers from Chronic Obstructive Pulmonary Disease (COPD) and needs oxygen. For long distances, he uses a mobility scooter.
He feels lonely, especially in the evening, since his wife passed away two years ago. He needs physical and emotional support. He needs help with showering and getting (un)dressed considering his oxygen supply and he needs reminders for taking his medication. Emotionally he needs to be supported by a person in the morning and evening to start and close the day.
He participates in several activities organized in the care center and he loves to play cards and billiard with his friends. He is always looking for social contacts and his daughter visits him twice a week. With all these various activities Peter's calendar is quite full and he sometimes misses some appointments with friends or organized activities. Therefore he would like the device to remind him of his appointments and show him the daily schedule of his activities.

AGENDA FUNCTIONALITY:

[Agenda daily living activities (wake-up)] :

Step 1: Every morning the alarm of the system wakes Peter up at the predefined time he told the ViP the evening before. Today it is at 7:00 AM. During the night the ViP was in stand-by mode.

Step 2: The ViP, in communicating mode, asks Peter if the nurse should be called right away to support him with his daily shower and get dressed.

Step 3: Today Peter prefers to read the newspaper first and answers "No".

[Breakfast reminder]:

Step 4: The ViP, in message box mode, reminds him to take his breakfast.

Step 5: Peter does not respond at all.

Step 6: After 10 minutes the ViP reminds Peter again to have his breakfast.

Step 7: Peter answers "I had my breakfast"/presses the "done" button and the ViP stops reminding him after this confirmation.

Step 8: 30 minutes later the ViP repeats the same question as in step 2. Now, Peter answers "Yes" and the nurse is called.

End of the interaction.

[Medication reminder] At 11:00 AM, the ViP automatically reminds Peter to take his medication. The user profile could contain a detailed list of medication and schedules of administration for each of them. 2 levels of medication reminders could be predefined:

1. Just a reminder to take "your medication", we assume that elderly are enough independent to remember which pill, how many of them and when they have to take them.
2. Give a detailed list of medication (visually, not verbally) for each reminder.

The list of medications can be modified in the user profile for daily medications. For punctual drugs, the user can set-up a simple event in the agenda (as every other appointment).

MESSAGES FROM THE SYSTEM: At 11:30 AM a package is delivered at the reception of Orbis Hoogstaete for Peter.

Step 1: The receptionist sends a text message to the ViP of Peter with the text "A package is waiting for you at the reception please pick it up before 5:00 PM."

Step 2: The ViP sounds a beep sound and the screen lights-up but the avatar does not call the user.

If no response to the beep, the next time, the user will be detected entering the room by the Kinect, there will sound another beep in order to alert the user that he got a notification waiting.

Step 3: Peter responds to the beep sound "Read text message aloud".

Step 4: The ViP reads the message and Peter is going to pick up the package.

DINNER MENU OF RESTAURANT:

After lunch, a message is send to Peter to fill in the menu for the next day. Peter asks the avatar to show the menu service. Peter can use the touchscreen to fill in his choices or the ViP reads them aloud, Peter responds and the ViP fills in the answers. Peter chooses this time to use the buttons. After finishing the list Peter pushes the submit button. The caregiver is notified in order to manage the meals to be cooked during the day or/and to inform the elderly that he/she might not eat certain ingredients.

[Agenda reminder:] At 3:45 PM, the ViP automatically reminds Peter that his appointment with Tom to play billiard is in 15 minutes and tells him not to forget to bring his money and umbrella (because he needs to go outside and the weather forecast announced rain).

FINDING OBJECTS DETECTED BY THE CAMERA:
The ViP reminded Peter that his appointment with Tom was in 15 minutes and that he should remember to bring money and an umbrella with him.
Step 1: Peter tells the ViP: "I can't find my umbrella".
Step 2: The ViP detects with the camera an object similar to an umbrella and sends a picture of the room with the umbrella marked with a circle in the picture and says: "Your umbrella is marked with a circle in this picture of your room."
Step 3: Peter says 'yes, thank you', picks it up and leaves his apartment.
Step 4: After 20 minutes of no movement in the apartment the ViP switches to stand-by mode

At the end of the day:
Step 1: The ViP asks Peter for the time of the wake-up call for the next morning and reminds him that his first appointment is at 8:30 AM.
Step 2: Peter answers that he wants to get up at 7:30 AM the next day.
Step 3: The ViP programs the new wake up time in the system for the next day.
Step 4: Peter then asks the system to switch to stand-by mode.
Step 5: The system is now in stand-by mode.

End of the interaction

3.4 Orbis care apartments' use case scenario.

Martha Peterson is 78 years old. She lives alone in a care apartment close to Orbis Hoogstaete.
She has minor physical impairments caused by a stroke three years ago. She has difficulties in walking and therefore she uses a walker. Furthermore, she is easily confused while planning and performing her daily activities. She likes to participate in several activities taking place in the care center or the city center and she daily plays the game "MindFeud" with her friends, each on their own tablet at home. Three times a week three friends meet to have dinner together. The other evenings she cooks her own meal. She has 3 children and 6 grandchildren who visit her regularly. Two grandchildren live abroad and she keeps in contact with them by Skype.
She would like the system to help her with her daily schedule.

AGENDA FUNCTIONALITY + MEDICATION REMINDER:
Step 1: During the night the ViP is in stand-by mode. Then, every morning, the system wakes up Martha with a sound at the set time to take her medication. For her, this is every day the same time – at 8:00 AM.
Martha is able to dress herself.
Step 2: When Martha arrives in the kitchen for breakfast (where her medication is always stored) the ViP asks Martha after 5 minutes "Did you take your blood pressure medication today?"
Step 3: Martha answers "No".
Step 4: The ViP reminds her after 15 minutes again to take her medication. The reminder contains a complete list of medications to take. This list is directly displayed on the screen[1].
Step 5: Martha confirms now that she has taken her medication.

[1] because people in care apartments are less autonomous than in elderly homes

AGENDA AND ACTIVITIES AT THE ORBIS FACILITY AND SURROUNDINGS:

Step 1: The ViP asks Martha if she would like to see the activity schedule of today or the whole week.
Step 2: The ViP shows her the schedule of the week (visual timetable based on the activities registered on the system for the next seven days).
Step 3: The ViP asks Martha if she would like to register for one of the organized activities.
Step 4: Martha answers "Please register me for the daily market on Thursday in the city"
Step 5: The ViP asks "Would you like to invite a friend to join you?"
Step 6: Martha answers "Yes please invite Lily Trump"
[communication with friends via CaMeLi system messages]
Step 7: The ViP sends an invitation message through the system to the CaMeLi system of Lily Trump.

COMMUNICATION WITH FRIENDS AND FAMILY VIA TEXT MESSAGES:

Talking about Lily, Martha remembers that she invited her for this evening to have dinner, but she needs 2 extra eggs in order to prepare the planned recipe
Step 8: Martha tells the ViP: "send text message to Lily Trump".
Step 9: The ViP opens the text message screen for Lily and asks Martha "what message do you want to send?"
Step 10: Martha says "Lily can you please bring 2 eggs for dinner?"
Step 11: The ViP sends the text message with the question to the mobile phone of her friend.
Step 12: Martha's friend sends back a text message including the promise to bring some eggs. The ViP, in message box mode, reads this message aloud for Martha.

End of interaction

FALL DETECTION:

Step 1: During the night Martha tries to go to the toilet but she stumbles. This also makes a lot of noise.
Step 2: The ViP switches on automatically, in communicating mode, and asks Martha "are you all right? ".
Step 3: Martha says "Help!"
Step 4: An alarm signal is send to the telephone of the nurse in the nursing home close by with the text message "call for help/emergency call" and the option to have a life video screen or a phone call with the person in need.
Step 5: The nurse chooses the option life video screen and sees Martha lying on the floor. The nurse comes immediately and helps Martha to get up, go to the toilet and back to bed again. Fortunately she did not hurt herself.
Step 6: Once the lights are all switched off for the night the ViP switches to private mode again automatically.

End of the day

3.5 VIVA's Use case scenario.

Every Tuesday and Saturday, Catherine has a cup of coffee at the tea-room with her friends. She is also involved in various activities organised by various associations, volunteering and plays sport on a regular basis (hiking, etc.). Besides, she fancies going to exhibitions and a lot of other cultural activities.

LIST OF ACTIVITIES IN THE SURROUNDINGS (SPECIFIC TO VIVA):

During the night the ViP was shut-off (black screen) by Catherine. When she wakes up she turns on the device by pushing the button on the device.

After having looked at her schedule of the day, Catherine then asks the device to check which activities are available in the surroundings. However, the ViP, in communicating mode, can also spontaneously ask Catherine if she wants to look at the proposed events.

Step 1: The ViP, in browsing mode, shows the list of activities (which can be sorted by date, time, place and centres of interest) on the screen.

Step 2: Catherine chooses to go to the inter-generational painting workshop organized by VIVA on Thursday by pressing the button "Add to agenda".

Step 3: She also decides to go to the cinema Pathé Rialto tonight to watch the last Woody Allen. She presses the button to enter this activity to her agenda

RETRIEVING INFORMATION ONLINE:

Step 1: Catherine asks the system to launch google by saying "Launch google".

Step 2: The system displays the google webpage (ViP in browsing mode) and asks Catherine what she is looking for: "What do you want to search for?"

Step 3: Catherine wants to find some cinema critiques for Blue Jasmin of Woody Allen. She can try to ask for it verbally. If the speech recognition is not working well, she will type it in on the touchscreen.

Step 4: The system displays search results and Catherine selects one of the links.

Step 5: The system loads the selected webpage, thus she can read the critique. When she's done, she says "Quit" and the device returns to the home screen.

PUBLIC TRANSPORT TIMETABLE AND ROUTE:

Step 1: Since Catherine does not know how to go to the cinema, she asks the device to launch the bus timetable functionality.

Step 2: She provides he address of the cinema. She has two possibilities to do this: (1) she can go to her agenda, select the cinema activity and ask the device to compute a route to go to this activity (in the RSS flux, the location of an activity should be present), or (2) she manually enters the destination address or bus stop if she knows it.

Step 3: She specifies that she wants to be there for 8:15 PM. *The ViP connects to the public transport app (or maybe just the website – might be easier). The user can specify a starting point (his/her home address), but the default departure point is the closest bus stop to home.*

The device has then to look for the location of the destination (here, Pathé Rialto) and to enter it in the specified field. See print screen of the result in Annexe A.

Step 4: The system displays the result of the search **(see annex)**. Catherine can take the tram 14 at "Les Esserts" at 7:49 pm and get off at "Gare Cornavin". She will arrive at 8:06 PM and will have to walk for 3 minutes in order to arrive at the cinema.

OBJECT STORAGE MEMORY:

Catherine looks into her wallet and sees that she has not got her Pathé Cinema loyalty card in it.

Step 1: She asks the ViP to launch the object storage list. The ViP switches to browsing mode and asks "What are you looking for?"

Step 2: Michelle says "My Movies loyalty card".

Step 3a: By facilitating speech recognition, the object has been located in the list and the system displays its location on the screen.

Step 3b: the ViP says "Sorry I do not find that object. Maybe you did not enter it in the list. But you can look directly into the list."

Step 4b: Michelle can browse the list by touching the screen.

In fact, when she stored her loyalty card, she asked CaMeLi to enter the information in the object location list, she entered What ?– "Pathé cinema royalty card " (she stored) and Where ? – "In the drawer of the shoe cabinet" – (she did actually store it, but under the name "cinema").

End of the interaction.

The question is: where does the activities information come from? (Not mutually exclusive)

1. RSS Flux
2. VIVA's psychologists or Orbis' OT or physiotherapist would propose activities
3. Other: cultural services from the city hall?

It would be interesting if a filter could be created according to the user interests or hobbies.
Note that, for Geneva, the city hall has an RSS flux that is actually classified in numerous categories (culture, cinema, etc.) See: http://www.ville-geneve.ch/flux-rss/

Also note that, at the beginning, we will only test VIVA's program of activities (which will be entered in the intranet by VIVA's staff and which then will be transmitted to users' devices).

4 Wellness Services

Of the three potential wellness services summarized in table 4: promoting physical activities, brain training and meditation, promoting physical activities and brain training services were deemed useful and desirable by potential users at all three CaMeLi pilot sites: VIVA, Orbis elderly home and Orbis care apartments.
Physical activities and "brain training" take priority since they were cited in all three user contexts. Furthermore it is more desirable to promote physical activities with outdoor activities (walking, etc.) and, preferably, also linked with social activities. For this reason, there is more value added in using the agenda service (care and guidance services) for promoting physical activities.
Instead of "brain training", the project developed a strategy for "brain wellness training". This strategy includes specific techniques and clinical goals: 1) Implementation intentions technique, and 2) mental wellness coaching. Further details of this service are reported in D3.1a "Design and Specification of ICT-based services".
Relaxation and meditation services were mainly cited by VIVA pilot users and were not replicated across all three user contexts. Therefore this wellness service is not a priority. Nonetheless, since NetUnion has some audio recordings (MP3) of basic mindfulness meditation ("grain of raisin") and progressive relaxation exercises (Jacobson), available in both French and Dutch; this material is available for use in the CaMeLi project.

4.1 What does Brain-Wellness mean in the CaMeLi project?

Wellness services are an integral part of the CaMeLi project. However, what was expected from them, in comparison to Guidance and Care services, was less clearly defined. End users requested cognitive training games in order to maintain and improve their cognitive capabilities.

The CaMeLi target group is healthy elderly living in autonomy at home. They can suffer from some slight cognitive difficulties, but they do not have important deficits. Accordingly, the brain-wellness service in the CaMeLi project is helping people to maintain a good level of cognitive functioning while giving them the opportunity to develop new abilities – and not compensate for massive deficits.

A lot of elderly living alone express a lack of purpose in life or a daily routine that drives them to boredom and cognitive laziness. This leads to a subjective embarrassment. In this context, the project defines brain-wellness services as having at least some of the following "therapeutic goals":

1. Improving perceived self-efficacy, which is linked to self-esteem and engagement in efforts and activities
2. Improving sense of control over one's life (Locus of control)
3. The sense of identity and personal continuity
4. The capacity to evoke past memories, i.e. happy memories, past successes, nostalgia, i.e. bitter sweet memories, the good old days.
5. The capacity to project oneself into the future (Linked to previous two points)

The interaction of the previous points leads to an improvement of the capacity to set goals and challenges[2], for social integration (within the community), and for developing and maintaining meaningful personal relationships which are of course linked with a global satisfaction of life.
These last aspects mainly relate to social wellness rather than brain-wellness *per se*. However, social engagement and cultural activities are definitively linked to brain wellness. On the one hand, brain wellness and efficient cognition will impact the quality of social interactions and engagement. On the

[2] Be their cognitive or related to social engagement.

other hand, social wellness has been shown to maintain a good level of cognitive functioning. People engaging in more cultural and social activities will be more prone to undertake cognitive demanding tasks and to invest efforts to fulfill these tasks, so it finally improves brain-wellness (see Small, Dixon, McArdle, & Grimm, 2012).
In addition, some so-called meta-cognitive variables – such as perceived self-efficacy or locus of control – will also influence and be influenced by good cognitive functioning. In other words, being able to fulfill everyday cognitive tasks such as remembering to do something, to call someone, etc. will increase the sense of self-efficacy and would therefore reinforce the self-esteem of the elderly which is, in turn, known to predict good cognitive functioning.
It is therefore important to target services that provide opportunities to succeed in various tasks of everyday functioning. Both, small and big, successes will gradually improve the general sense of efficacy and set a virtuous circle in motion that will lead to increased brain-wellness and, by side effect, to a greater social engagement.
The next section will outline in detail services that could help to reach that goal.

4.1.1 Target services and techniques aiming to improve brain-wellness

CaMeLi will design digital services for improving "Brain Wellness" based on psychological intervention techniques designed to optimize normal cognitive functioning or compensate for mild cognitive deficits. We emphasize that these techniques do not target cognitive rehabilitation and intensive training in order to compensate for important cognitive deficits in a clinical or research setting. These interventions will target various systems of memory: prospective memory – the memory for remembering to do things in the future- episodic memory and projections into the past or the future – memory of past events that happened to us in a given spatio-temporal context. This type of memory is highly linked to the sense of continuity of the self, and to the ability to imagine oneself in the future.
Developing the CaMeLi "Brain Wellness" services means that we have to create new simplified procedures based on existing cognitive trainings:

1. Implementation intentions (improves prospective memory and therefore perceived self-efficacy + locus of control).
2. Exercises for recalling important personal events in the past, identifying motivation and goals for the future, i.e. projecting the self into future events[3], etc. (*i.e.* working on the sense of identity and continuity of the self).
3. Meditation-based trainings. The benefits of a regular meditation practice are now well known. (Improves emotional regulation, various cognitive functions, and even physical health - lowers blood pressure and stress markers for ex.)

Of the three techniques, implementation intentions provides an opportunity for developing cognitive training and memory aid strategies that can help elderly users perform important daily tasks without depending on an agenda or other devices. This well complements the features provided by the Guidance and Care services. Furthermore, the implementation intention technique could provide a framework for a service designed to help the elderly – or any individual – improving their prospective memory performances: the memory for remembering things to do in the future. Successes[4] reached by using this technique will improve the sense of self efficacy and locus of control and fulfils one of the wellness goals previously identified. Beyond the clinical and wellness aspects the implementation of the intentions technique has been developed in standard, face to face, individual or group intervention programs, but no work has been done to translate this into a digital health service, thus providing an opportunity for a clinical and market innovation.

[3] Anticipate consequences of actions, emotional reactions, imagine with as much details as possible.
[4] Successfully remembering to do things we intended to do in a particular situation

Therefore the CaMeLi brain wellness service will focus on the implementation intentions technique. Services targeting other brain wellness goals, i.e. sense of continuity of identity, etc. will be considered as a secondary priority. Meditation based services could be included since NetUnion has access to audio meditation exercises that are available both in French and in Dutch from another project.

The remainder of this document will present some theoretical background for the use of implementation intention techniques for the CaMeLi brain wellness service and some indicative use case scenarios.

4.2 Clinical and theoretical background for developing an implementation intentions program

4.2.1 The importance of perceived self-efficacy in "Brain Wellness"

The "Brain Wellness" services described above (and in much more detail in D3.1a "Design and Specification of ICT-based services") aim for an improvement of various factors influencing cognitive well-being. One very well documented influential factor on well-being and good functional outcomes in daily living is perceived self-efficacy.

In fact, Bandura first introduced the concept of self-efficacy in the field of aging studies. He wrote a theorization article in 1994 in which he states: *"The stronger the perceived self-efficacy, the higher the goal challenges people set for themselves and the firmer is their commitment to them. […] Many physical capacities do decrease as people grow older, thus, requiring reappraisals of self-efficacy for activities in which the biological functions have been significantly affected. However, gains in knowledge, skills, and expertise compensate some loss in physical reserve capacity. When the elderly are taught to use their intellectual capabilities, their improvement in cognitive functioning more than offsets the average decrement in performance over two decades. Because people rarely exploit their full potential, elderly persons who invest the necessary effort can function at the higher levels of younger adults. By affecting level of involvement in activities, perceived self- efficacy can contribute to the maintenance of social, physical and intellectual functioning over the adult life span." (Bandura, 1994, pp. 79-80).*

The data of Dawson, Powers, Krestar, Yarry, & Judge (2013) recently came in support of this hypothesis. They found out that the global quality of life was predicted by the perceived difficulties to complete daily life activities and by the perceived self-efficacy. These results must be treated with caution with regard to our project because they were found in a population with cognitive impairments. However, according to the continuum hypothesis in cognitive aging – which states that cognitive mechanisms involved in cognitive difficulties are similar whatever the level of impairment of the person – we can suppose that these results still hold for a population of autonomous elderly with slight memory slips. Furthermore, Singh, Shukla, & Singh (2010) showed that perceived self-efficacy seemed to be an important predictor of mental health among elderly. Their results indicated that elderly who with high perceived self-efficacy reported better mental health than those with low perceived self-efficacy.

Interestingly, Luszczynska, Gutiérrez-Doña, and Schwarzer (2005) were interested in seeing whether the general concept of self-efficacy, as well as the relation between this concept and other well-being outcome variables, was similar across various countries (Costa Rica, Germany, Poland, Turkey, and the USA; total sample of 8796). First, they bring to light that perceived-self efficacy is mostly positively linked to optimisms, self-regulation, and self-esteem; and negatively with anxiety and depression. Second, perceived general self-efficacy appears to be a reproducible construct across cultural samples.

Note that we intend to use the General Self-Efficacy Scale as a baseline and post-intervention measure during the trials to assess if the CaMeLi device did improve the sense of self-efficacy for our test-users sample. (See D5.1 "Trials specification and design").

4.2.2 Memory slips and compensation strategies

One of the main complaints usually reported by elder people about their memory relates to what we call prospective memory – the memory to remember to do things in the future (ex. remembering the appointment with the doctor, remember to pay the bills etc.). Langlois and Belleville wrote about memory complaints in the elderly: "At the subjective level, it has been shown that some of the memory problems included in this component (i.e. forgetting appointments) were reported by middle-aged and older adults to be more serious than other everyday memory failures, even if they occurred less frequently (Bolla, Lindgren, Bonaccorsy, & Bleecker, 1991). This indicates that older adults judged them as more threatening or as an indication that something is wrong with their memory. Importantly, we found a correlation between the level of complaint on this component and a measure of functional autonomy…" (Langlois & Belleville, 2013). This is why we use agenda and external reminders not to forget to do these things. But sometime it's not enough and we finally forget what we had to do, especially when we don't have our calendar or reminder with us, when we are in a non-routine activity, etc.

Some techniques have been elaborated to bypass the problem related to these external methods of remembering. One of these techniques is "Implementation Intentions", first presented by Gollwitzer (1999). This technique benefits from the fact that one no longer needs an external device or notes to remember to do things. Instead, one defines an environmental trigger (that would anyway be present) to remember the thing to do.

Implementation Intentions are done by formulating a sentence on a particular way and, at the same time, visualizing the cue situation and the corresponding action.

The sentence is formulated according to a "When [situation], Then [action]" pattern. The user therefore establishes an automatic link between a cue and a response. In addition to that verbal statement, the user adds a detailed visual image of the situation: he sees himself making the right action in response to the cue.

These very simple processes establish a strong link that will automatically be reactivated when confronted to the cue situation. This is why it does not rely on external aids; the user does not anymore need to check notes or an agenda.

This technique has been proven to be efficient for elderly (see for example McFarland & Glisky, 2011, Schnitzspahn & Kliegel, 2009). Zimmermann and Meier (2010) even showed that when applying implementation intentions technique, the elderly showed good performances on prospective memory tasks, as good as those of young participants.

4.2.3 Complementarity with agenda functionality

With regard to the CaMeLi project, implementing a tutorial of intention implementation could be a successful complement of the agenda function, from the cognitive well-being point of view.

In fact, users were concerned that the tablet "would remember instead of them" and were afraid of becoming completely dependent on the system. End users also complained that the device will not be portable and thus cannot be taken outside of the house. That means that people will be "left alone" when leaving the house, and may forget what they tablet previously remembered them to do when going out.

Therefore, teaching the users a strategy to remember to do things could, on the one hand, reinforce the perceived self-efficacy of subjects, and reduces the feeling of being dependent on the device. On the other hand it could be a successful complement, when outside the house, to the reminder and agenda service of the device! That is, when the avatar displays the program of the day, the user can use the implementation intentions technique to make sure he will remember to do the action when confronted

with the situation. With implementation intentions, there is no more need of reminders, so it's perfectly adapted when the user gets-out!

4.3 Implementation intentions use case scenario

The development of implementation intention techniques is an innovative challenge that integrates recent findings in psychology regarding memory optimisation; the development of a new intervention protocol (process) based on the interplay of human and digital services, and interaction design techniques that promote motivation, user engagement, conviviality and ease of use. The use case scenario below reflects a general direction while providing flexibility for the scenario to evolve in step with more detailed development of the service to be reported in the various deliverables to be developed in work package 3.

Implementation intentions use case scenario, common to both VIVA and Orbis:
Since Michelle has her CaMeLi system installed at home, she's been enjoying the agenda reminder service. She used to take notes about her appointments on papers and to put them in different places (on the fridge, in her handbag, on her desk, etc.). This was usually quite effective, but, sometimes, she did forget to give a look at these notes – or just lose them – and it happened to her more than once to miss an important appointment. Now, the CaMeLi system systematically shows her the planning for the day when she's having breakfast. But what she enjoys the most, is the fact that the tablet reminds her to get ready just before her appointments, so that she's neither late, nor does she forget any meeting anymore.

However, there is a last thing that the tablet cannot help with… when she's outside! In fact, once Michelle leaves home, she no longer has the device to remind her of what she's got to do. Many times the device has reminded her that she absolutely had to go pay her bills at the bank or to post an important letter on her way to another activity ; but once alone outside, she just forget and returned home without having done it.

She discussed it with one member of the staff of VIVA/Orbis that told her a memory training program was available in the device. He also said that it has been done in order to help people remember to do things by themselves, especially when the device is absent! It could also give her an activity when she's bored. He then told Michelle that if she wanted to start the program, they could discuss it after completion of the program so that Michelle could assess the progress that she made completing the program.

When coming home, Michelle looks for the program on the device, she asks the ViP about Implementation Intentions. The ViP launches the introduction to the program. It explains the goal of this program, and that she will watch little movies, have explanations and some question to answer – like a quiz. With such a presentation, she wants to give it a try because it seems to be interactive and gives her the feel of training her memory while having fun! In addition, she can monitor her progression with a little pet that learns new tricks - or a garden that gets more flowers - when she makes progress in the program! This progression marker is very encouraging, and gives her the incentive to engage in the whole program!

She begins by choosing her progression pet – Michelle chooses the dog – and the program starts!
After this she watches a video and starts answering some questions. They were really quite easy. They just consisted of looking at some sentences and choosing the right "when-then" pattern. After several answers, her companion "yelps". Wow, success! What else can this dog do, she wonders? But someone is just ringing the doorbell; she then shuts down the program. The next day, she uses the program again, because there were some questions that she did not try. Soon, her dog starts wagging his tail. This means that she gets to watch another video. This time it is about formulating specific

"when-then" sentences for various situations. She begins to understand that these are actually some basic steps of this memory strategy, and starts to try making some "when-then" sentences for her daily activities.

Gradually Michelle goes through the whole program. She learns a technique to remember to do things that she is planning to do. She learns how she could use it as a complement to the reminder function of the agenda. And, most important, she practices and applies this technique to her daily life to remember to do things when she's outside. With time, she also learns to personnalise the technique, and adapts it to a broad range of situations.

She feels proud of herself, and more confident than before. At first, she slightly feared she would become dependant of the device, but now, knowing she is able to remember to do things by herself, she feels much more self-confident. She can always see her companion in her profile. It will do different tricks that it has learned each time she visits. She can also collect other companions if she wants to redo the program again. One of her friends at VIVA actually collected quite a few companions.

5 User Interface (UI)

This section will address some important questions with regard to the UI.

Rather than giving fixed guidelines, we rather wish to start a reflexion around a set of important notions to take into account. These notions are both based on empirical data about cognitive functioning of the elderly and/or user requirements expressed during the interviews.

5.1 Initial configuration and set-ups

As was mentioned in the priority list, the device must be personalised. This means that each user can choose which services/modules he/she wants to be active (medication reminder, security functions, co-care platform, etc.) and that these options can be modified at any time.

It also could be interesting to build a profile for each individual, including: personal information, prescribed medication, information about family and relatives if desired, phone numbers to contact in case of an emergency. Additionally, users could also add some information related to hobbies, centres of interest (particularly relevant for the service related to program of activities/events in the surroundings), predefined order of suggested activities when feeling sad etc.

5.2 Short guided tour of the device

It also is of importance to set-up a "guided tour" of how to use the device, as well as a presentation of the various functionalities and services available. This could be done in a similar way to what is done for standard tablet devices, but taking into account that our users are not familiar with technology. Thus it is important to "speak" slowly, and use easy language.

5.3 Communication with the elderly: General reflection on how to present information

In general, older people have more difficulties to understand speech, because of bad audition or decreasing speed of treatment that leads to difficulties in understanding complex structured sentences. It is then important to use a sufficiently clear speech: slow, well-articulated, and avoiding complex syntactic structure. However, be careful of not using "elderly speech" which is the equivalent of baby speech: speaking with very basic and childish words, using diminutives "We are going to take a little shower/ to do a little bath, etc." Besides, with aging audition, elderly have more difficulties understanding speech with high-pitched voice than a lower-one.

Another important feature of effective communication with elderly is using visual support. With age, verbal memory tends to decline, so that elderly have more difficulties to maintain a lot of verbal/speech information in memory. It is then useful to present more visual information. E.g. instead of making a verbal list of the appointments of the day, it is much more effective to present a visual agenda grid. Using visual aids such as pictures and diagrams to help clarify and reinforce comprehension of key points is very useful (see Perilli et al., 2013)

On the same logic of decrease of information treatment resources with aging, the less non-relevant information presented the better. With that logic, the avatar should disappear when non central feature of the on-going action.

5.4 When turning the device on

The ViP appears in the centre of the screen and greets the user according to the time of the day (good morning, good afternoon, good evening) if it is the first time of the day that the tablet is turned on or escaped private/stand-by mode (see below in the text for details about each mode). It can also add a small encouraging comment based on the weather if it's great ("What a beautiful sunny day"). If it has

already been turned on previously this day, the avatar could say something like "it's good to see you again, what can I do for you?"

5.5 Going from home screen to an application/service

The ViP is in the centre of the screen. Around him are the different services icons. When the user asks the tablet to launch a service the avatar grabs the icon and launch it. The window for this service then takes the whole screen and the avatar appears in the right upper corner (see ViP browsing below).
The command to launch an application would be based on speech recognition. It could be a set of pre-determined sentences beginning by "launch…" E.g. CaMeLi, launch agenda/ launch program of activities / launch Skype, etc.
If speech recognition algorithms are too bad, we could think of registering these sentences pronounced by the user.
BUT, as the user can transiently lose his/her voice or as a speech recognition deficiency can happen, it is of importance to permit the possibility to choose which application to launch by touching the screen on the corresponding icon.

5.6 The three main types of ViP system interfaces

For the interface design, the 3 following interfaces will be implemented in the system:

1. ViP communicating: It will be an interface where the virtual human will be represented in the middle of the screen with buttons below showing what the user can say or press the button instead.

2. ViP message box: It will be an interface where the virtual human will be represented in the middle of the screen with a text box below showing the message being read or the agenda or other written messages and buttons with regard to messaging.

3. ViP browsing: It will be an interface where the virtual human will be represented right or left of the screen with buttons below. Next to the ViP there is a big screen of the browser to be used by the user.

Furthermore, some other software interfaces (e.g. FaceReader) will not be visible by the user. It will be running in the background. However, there should still be an interface for the carers somehow.
One of these interfaces is for emergencies. In case the elder falls on the ground and does not react, the system has to contact the carers (formal or informal) probably by telephone. The other interface should be more like a social network interface, where the carer logs in via a browser and communicates with the elderly. This communication is mainly needed for the Agenda service (For negotiating and planning an appointment) right now.

5.7 Definition of on, stand-by, private, off and multiple-person mode

5.7.1. On mode

On mode will obviously be the default mode of use. It the mode in which the user interacts with the system. It is characterized by the presence of the avatar on the screen (for all types of interfaces).

5.7.2. Stand-by mode

This mode is selected by default when the user does not interact with the system for more than 20 minutes. All the applications/services keep on running but the screen turns off and the words "Stand-by mode: to Wake me up, call my name" are displayed.

If a notification or a reminder has to be delivered to the user, the screen lights-up and sounds a beep sound or calls the name of the user. If the avatar has to remind the user that he has to prepare to go to

an appointment, it calls the name of the person. It waits for a response "Yes CaMeLi", and then delivers the message. By contrast, for a notification (message from the occupational therapist, etc.), the avatar does not call the user name; a beep sound appears instead of it and the screen lights-up.

If no response to the beep or call of his name, the next time that the person will be detected entering the room by the Kinect, there will be another beep or call of his name to notify the user.

Profile preferences (but this should remain optional) can be set-up. For e.g. every X hours of stand-by mode, even when nothing to broadcast (reminder, notification, message, etc.), the system can automatically turn back on (except during the night) and interact with the user to stimulate him/her.

5.7.3. Private mode

This mode is selected when the user does not want to be disturbed by the avatar or to interact with it. The screen will therefore be black (same as when switching a TV to stand-by mode).

In Private mode, all applications/services are turned off, except those concerning emergencies: security services and other defined "emergencies" (those defined by the user himself in the agenda functionalities. For example: Taking a very important medication/injection that cannot wait).

The wake-up alarm function will also be active in this mode. The user can switch the system to private mode during the night and still have a wake-up alarm in the morning.

As for stand-by mode, the user can predefine a regular interval time after which the systems switches back on (taking into account that it is not allowed to switch back on during the night).

This mode is also activated when the user switches off the lights in his/her apartment for the night or **when he/she notifies the system that he goes out.**

When coming back up, the ViP will show the user all the things that he/she missed (notifications, reminders, etc.) during the time it was switched to private mode.

5.7.4. Turned-off mode

The system is completely shut down (even the security services are switched-off), and has to be restarted by pressing the start button directly on the device. This mode will be preferentially used when the user leaves the apartment for more than one day/night, or by users that don't want to use it on a regular basis. The screen will be completely black, with no reaction to voice commands.

5.7.5. The multiple-person mode

This mode is meant to deal with the presence of another person in the room, detected by the camera. The avatar becomes passive; it does not interact anymore with the user.

This is virtually the exact opposite of the private mode: security services are turned off (because the user is with someone who can hopefully deal with a potential emergency), but other services keep on running. The ViP will not engage in a discussion with the user but it will communicate reminders and messages from the system if need be.

In order to foster learning of device use, or to facilitate observation during the trials, an option/button should be included to go back to normal use, with the exception of keeping the camera turned-off. This would allow a third party to observe the interaction between the user and the device, and to give initial explanations on how to use it properly.

5.7.6. Making everything clear for the user: signalling which mode is currently active

The default "on" mode will be easily identifiable by the presence of the ViP on the screen.

For all other modes, the system will automatically back-up to home screen when coming back to "on" mode. The user can reactivate the device just by calling "CaMeLi /personal name of the ViP". The avatar will then show-up, in the home screen, and ask, "Yes **name of the user**, what can I do for you?"

In order to differentiate the different modes, when the screen goes black, an appropriate symbol will be displayed:

- For stand-by mode: the words *"Stand-by. Call my name to wake me up!"* appear on the black screen.
- For private mode: a different symbol will appear on the black screen to indicate which services are still active and which are not.
    - Emergency (appropriate symbol to be provided by SAG for the pre-trials)
    - Wake-up alarm activated (alarm symbol similar to those on smartphones)
    - Camera still active (symbol of a camera like in a toolbar)
    - Sound detection active (symbol of an ear)
    - Agenda off (symbol of a crossed-out agenda)
- For multiple-person mode: The screen shows the following symbols to indicate that more than one person are detected in the room and that, therefore, the camera is switched-off.

- For Off mode: the screen will be totally black/nothing displayed on it.

It should be kept in mind that the ViP shouldn't be too invasive!

To turn-off the device, an on/off button on the tablet could be used. Vocal command to turn-off the device could be an option, but once spent, we cannot use the vocal command to turn it on.

5.8 General consideration about entering information

Since a lot of elderly users are not familiar with using a keyboard, if the speech recognition is good then we should use it. However, in a lot of situations, the touchscreen could be a much simpler option than speech recognition, especially to enter information in the agenda, various lists or browsing the web. Therefore, even if speech recognition will be used for a lot of commands, touchscreen must remain an option in case of failures/voice problems.

Speech recognition can be divided into two kinds:

1. Command driven (short simple vocal commands). These are predefined.
2. Transcription of words and complete sentences. This will only be based on phonemic/syllabic detection and transcription, not on semantic recognition.

Thus, speech recognition should be used for simple interactions:

- To turn on and off the device: "turn on! / go-private!"
- Launching services/applications, choosing what to do.

- To respond to simple questions of the avatar: "do you want to enter a new appointment", the user can respond "yes/no"
- Simple actions: "Add this activity to the agenda?"
- To end an interaction "Okay"

A complete library of commands will be set-up with technical partners for each suitable service.

Speech recognition can be used to enter short information (e.g. who? When, etc.). But orthographic depth is high in French. That means that one does not write the words as one pronounces them. This is a substantial obstacle for speech recognition without a semantic analysis. Therefore, as long as the interaction requires the user to enter detailed information (details of an appointment), or to select one specific area of the screen, the touchscreen option seems more appropriate!

5.9 Use of various screens

When asked, about half of the elderly said that one device was enough, and the other half would like to have one device for each principal room. The main advantage for multiple devices was especially useful for people with mobility impairments. This also improves the scope of action of the avatar. If the person is in another room, it is simpler for the avatar to remind him/her to prepare for his/her appointment if there are multiple devices connected in the apartment. But a lot of users did not wish to be surrounded by the tablets. They want to interact with the device only when they mean to.

Based on that consideration it seems logical not to divide functionalities between various devices but instead, just too simply duplicate the devices in each room.

5.10 Detailed UI for common services

5.10.1 Agenda and reminders

As stated before. When the user spontaneously wants to launch the agenda, he/she just says "CaMeLi, open/launch Agenda". The system can also ask the user if he/she wants to look at the agenda, when turned on.

The schedule appears (for example: As shown in Figure 1) and the avatar could appear in the right (up or down) corner (ViP browsing interface). At the beginning, the screen shows the whole week, it can help the user to quickly see what is happening next in his/her week. Slowly the screen zooms to the current day.

The agenda, as shown in Figure 1 is just an example and should be modified to match the needs and familiarity with technology of the elderly. It thus should be made clear that the left column is for the hours (this should be explicitly written), because some elderly may be confused. Meanwhile we have to be careful to avoid presenting too many information on the screen; it would be confusing.

Note that in respect to previous versions of this deliverable, the right part of the screen has been removed. Full month agenda and colours to categorize types of activities have been cropped. This helps to avoid the display of too many information and leaves some space for the avatar to appear in Browsing mode.

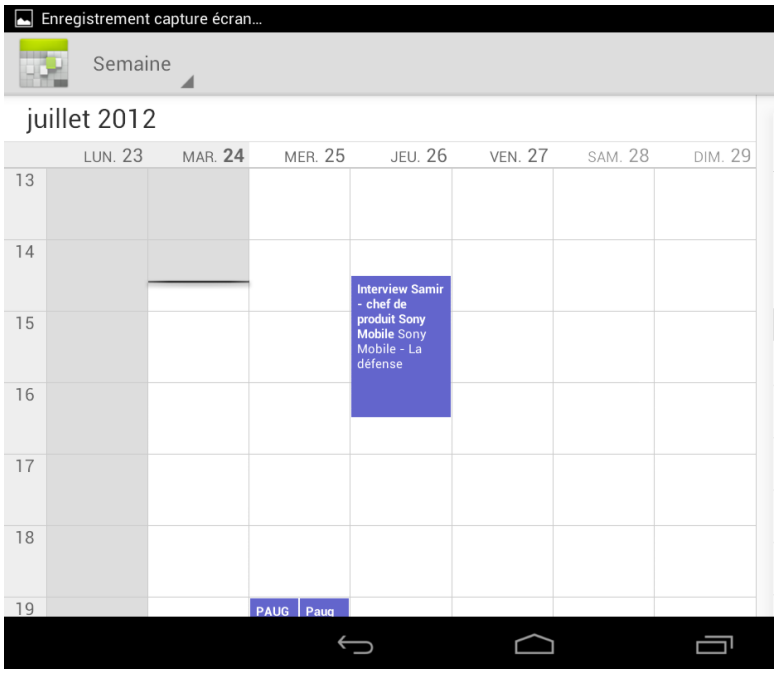

Figure 1: Example of appropriate agenda screen.

When on the current day, the avatar presents a verbal summary of the registered appointments and activities.

When it is done with it, it asks the user if he/she wants to add something new (ViP Browsing and/or ViP communicating). The user can see, below the ViP, the various expected vocal commands he/she can facilitate to interact vocally with the system.

- Adding an activity or task.

If the user answers "yes", then the virtual keyboard appears on the touchscreen and the user can insert proper information (for those very reluctant to keyboards we could also try to test speech recognition…).

The user then inserts, in the appropriate fields, the title of the activity, the time and date, the place, the people involved and how long before the activity he/she wants the avatar to remind him/her of the activity. This is very important, because this is often forgotten (what to do, when etc.). This can also be done based on speech recognition.

An option should be available to choose if the appointment/activity has to be repeated in time (daily, weekly, monthly or yearly, etc.) and how many times/until which date?

A last relevant option is related to the level of importance of the activity. For each new activity entered in the agenda, the user would be able to notify the system that this very important activity (such as taking very important medications in a small timeframe) must be reminded even in private mode. This option enables the user to define him/herself what should be considered as an emergency. In order to address this issue another feature for adding new activities would be to choose between "normal importance" vs. "very high importance – remind me even in private mode".

This information about activities must be modifiable at any time, by the same procedure.

At any moment, the user can ask “show me the whole week/month”.

The use of the touchscreen could help to easily navigate into the agenda (select week-view, month-view, click on the right date and time. Thus, on the same principle, he/she can add any activity he/she wants at any time and date.

The user can end the interaction by saying “go back to home screen/go private” or by saying nothing (and the screen will automatically go black within 15 minutes).

- Reminders:

As the user sets the delay between the reminder and the appointment/activity, the ViP will remind the user when he/she decided to (via the ViP message box interface).

At the notification time, the screen lights-up and the avatar calls the name of the user. The ViP calls 3 times (with a 2 minute interval), if no response, it stops. The same procedure is repeated after a five minute break until the start time of the activity is past.

If the user is present and hears the avatar calling is name he/she answers “Yes CaMeLi” and this is the trigger for the device to deliver the notification. When encountering problems with the speech recognition or pronunciation problems by the user, permit the possibility of touching the screen to receive and confirm the reminder.

The message from the ViP will be delivered both acoustically (ViP reading out the message) and visually (the message will be displayed below the ViP).

- Sum-up of the day in the evening and replanning of activities:

As the system presents the agenda in the morning, it can also propose to take stock in the evening. The ViP (on browsing mode) shows the plan of the day and the user checks the activities/tasks he/she did complete. The simplest would be to touch the boxes corresponding to the completed activities. After that, the ViP can propose to replan the non-completed activities at another time (on the same principle as described above, instead of proposing to add an activity, the modification just moves the registered activity to another chosen day and time).

5.10.2 Program of activities (linked to the agenda)

5.10.2.1 Concerning VIVA

Content is divided into two sources of information:

- Based upon RSS flux: visually presented in an agenda template, activities in the city (see http://www.ville-geneve.ch/flux-rss/)
- VIVA’s activities (we can also create a RSS flux).

As there will be a large amount of activities, it would be interesting to make various tabs corresponding to the centres of interest of the user, or by category of activities (cinema, theatre, expositions, and VIVA’s activities). Here, the ViP can totally disappear (because it is not needed). However it will reappear when the user will add one of the proposed activities to the agenda, into the agenda window, as described before)

For each tab, the proposed activities are shown organized by date and time (in the same format as the agenda), it also shows the address of the event and a ***"How do I go there?"* button** (or search for a public transport route). [If possible, touching the address would show the location on Google maps].

The "how do I go there?" button redirects the user to the public transport route service (see 5.6.3.)

The user browses the program of activities by contents. Here, the touchscreen seems the easiest way to navigate through the program. When the user decides to add an activity to his/her program, he/she clicks on "add to my agenda". All the properties of the event are transferred into the agenda, but the user can modify them as will (adding someone to do the activity with, deciding to go later than the start time, etc.).

5.10.2.2 Concerning ORBIS

Content is divided into three sources of information:

- Activities organized by Orbis

- Activities organized by the elderly themselves

- Activities in the city and surrounding environment (http://sittard.amuseerje.nl/rssfeeds) based upon RSS feed.

The elderly should have the possibility to choose which of these activity overviews are available in their ViP. For example the elderly in the elderly home will mostly only want the activities organized by Orbis and those organize by themselves. The elderly in the care apartment will most likely want all three options.

The activities organized by Orbis are added in the system via the computer of the occupational therapist and uploaded in the system of the elderly via the server or Orbis. Either the ViP reads the overview per day or week aloud or it is shown in the screen. As described in the Use Case scenarios.

The activities the elderly organize themselves are added in the system by the elderly themselves via speech through the ViP or via the virtual keyboard on the tablet. Either the ViP reads the overview aloud or it is shown in the screen. As described in the Use Case scenarios.

The activities in the city and surrounding environment based upon RSS feed should be only available on a screen because of the large amount of activities and various categories of activities (sportive, musical…). The elderly can use the touchscreen to navigate into the overview of these activities.

When the user decides to add an activity to his/her program, he/she clicks on "add to my agenda". All the properties of the event are transferred into the agenda, but the user can freely modify them (adding someone to do the activity with, deciding to go later than the start time, etc.).

5.10.3 Security/fall detection

This section will be outlined in more detail when further information will be available concerning the camera detection of falls.

There are 3 main inputs of information for the security function:

1. Noise detection: the audio sensor of the device will detect and react to noises that could indicate a fall or breaking glass. When detecting such a noise the ViP will automatically show-up and ask if everything is alright
2. Fall detection based on Kinect cameras: if the system detects the shape of the user on the floor, the ViP will also show-up and ask if everything is alright
3. Call for help from the elderly.

When the alarm security is turned off, every interaction is performed by voice control.

The ViP (in communicating mode) will ask the user if he/she is doing well.

- If the user answers "yes", the ViP will ask to confirm to terminate the alarm.
- If the user says "no" or something containing the word "help", the ViP will contact a predefined person by Skype or telephone.
- If the user does not respond, the question will be repeated twice, with a one minute interval. If no response is perceived after that, it will automatically call for help.

See detailed user interface Orbis services for more information.

5.10.4 Recognition of user emotions

As discussed during the Paderborn meeting and in various conference calls, the emotion recognition tool only functions optimally when the user is really in front of the camera relatively close. By allowing the user to facilitate the touchscreen, it will provide various occasions for the user to be in front of the camera.

In addition to facial expression recognition, the system will also integrate a prosodic emotional recognition based on speech. Voice emotional content will be processed in conjunction with facial expression emotional recognition, not alone. In fact, the state of art of the literature shows that it is still hard to identify an emotion solely based on prosodic analysis (see for example Koolagudi & Rao, 2012).

If the ViP detects a sad face, it can first start to ask "are you feeling ok?" If the user responds negatively, the avatar can therefore propose to call a friend, do some activity, etc.

The emotion recognition will most likely only be done by face recognition (via the facereader tool), and the elderly might need to take off their glasses (if using them) for a while, if the recognition algorithm does not manage to identify any emotion. However, note that taking off glasses to be "scanned" can alter the ecological validity of the analysis of the emotion. In other words, even if the user is happy, if the system asks him/her to take off his glasses, he/she might feel upset. Detecting an upset face, the device will ask if everything is alright and he/she might get even more upset.

5.10.5 Communication with friends and family

To allow users to communicate with friends and family, the CaMeLi Architecture provides a communication module. This module allows for sending SMS, initiating a Skype or an alarm call.

For Skype, the interface should be the same as the original Skype application for windows8 (tablet mode).
To launch the service, the user can say "launch Skype"
The user can either choose to directly touch the screen to call someone (typical tablet usage), or use speech recognition with command: "Call *X*"; "end call". "Exit Skype". Etc.

Automated sending of SMS is foreseen in non-critical situations to inform friends and family e.g. if the user is feeling bored or is being nervous. In that case the system sends e.g. a message to carers, friends and/or relatives asking them to get in touch with the user to give him/her moral uplift.
Moreover it can also be used to contact friends and relatives directly by saying "Send a SMS to *X*". Then a new dialog will appear allowing users to enter the text of the SMS by either using the onscreen keyboard or voice input.
Optional sending SMS can also be used in combination with the agenda functionality, e.g. "Yes, I will come" or "I will be there *X* min late".
The third communication channel is a voice based phone call. It is planned that the system will call the nearest informal or formal carer e.g. in case the user falls down. In such a case the module will call the carer in charge using text to speech. To ensure that the called person understands the call and is able to help, the system will ask to press a certain number on the phone keypad. If the called person does not press this number in a certain time, a deputy carer will be called for Orbis. For VIVA, if the called person does not press the key, the operation will be repeated with the next person on the contact list until someone responds.

Each user will have a directory which includes personal information about the contact, hobbies (in order to look for persons with the same interest for sharing activities), etc.

This directory can be set up directly by the user (in Profile options) or by a caregiver/friend/family member.

5.10.6 Wellness services: Implementation Intentions

See D 3.1a "Design and Specification of ICT-based services" for further details.

Service space concept and access: The Wellness Service is delivered via a service space which can be accessed by voice command or by pressing the respective button. Upon access a welcome page appears with a few suggestions that will appear in text and could be read "voice over" by the Avatar, e.g. "Good Day, welcome to the Wellness Service space and feel free to check out the videos and other fun stuff that we have here"

Service space content and organization: The service space will deliver applications, media content linked to the applications, or information linked to progress or activities. For example, users will find in the Wellness space an application for learning implementation intent techniques, some short videos related to the topic, and progress or activity indicators, e.g. scores, visits, reinforcement proxies (visual representation of progress or activity)

The space is organized to offer multiple options for the user to engage the content in varying intensity. For example, the user could look at a small video that is related to brain wellness or access some activities without having to sign up or he/she can choose to participate in more structured activities.

Progressive interactivity: The interface and interactions will, by necessity, be simple and static in the beginning. For example, the welcome page will most likely contain only three main types of information or content:

1. Link to structured activities: Application (s)
2. Link to supporting activity or media content related to the application or the theme of the service space, i.e. Brain wellness
3. Progress or activity indicators

The interface will progressively get more populated, and the interactions more interesting over time keeping in mind the scope of the project and limits of current technologies.

Aesthetics: The interface design follows a minimalistic approach, displaying only the information which are necessary to maintain interest, promote engagement, etc. This is especially important to maintain a clean and uncluttered design, as the service space becomes more interactive.

Design for All: The interface design should adhere to prevailing accessibility guidelines for interface design.

5.11 Detailed UI for services required by VIVA's users

5.11.1 Public transport routes

- Concerning VIVA:
The simplest thing to do is to connect onto www.tpg.ch website (precisely on http://tpg.hafas.de/hafas/tp/query.exe/en?). The user will enter information via the touchscreen.
This transport company has also developed free ios and android applications that allow navigating more easily. If we can integrate one of these into our system, it would be the most comfortable.

5.11.2 Googling things and questions

The user can launch this functionality by asking the device "CaMeLi, open internet".

First we will try capturing the search term via the speech recognition. But if it fails to correctly recognize what was said. The user can then use the touchscreen.

After the research was computed the user selects the link or images by pressing the screen (verbal command would be too complicated in this case).

5.11.3 Wellness services: Meditation (to be addressed in later stages)

As the meditations are audio-recordings, it is a very simple thing to integrate them. The screen can simply go black or show some quiet landscape. But the avatar would be a distractor here.
The Meditation can take place based on prompting from the avatar (linked to emotional recognition or behavioral analysis), or on demand of the user.

Once the meditation is finished, the screen goes back to home screen.
Maybe we can give the user the choice to silent every notification or alarm during the meditation but it comes with the risk of missing a reminder.

5.12 Detailed UI for services required by ORBIS users

5.12.1 Messages from the system

If there is a notification (message from the OT, etc.) it gives a beep sound and the screen lights-up but the avatar does not call the user. If no response to the beep, the next time that the person will be detected entering the room by the Kinect, there will be another beep to notify the user he/she has got a notification waiting.

5.12.2 Finding objects in the house

The "finding objects in the house" is planned to consist of two parts:

1. The object recognition based on the KINECT camera on the tablet / wall. The system will be trained with 4-5 objects which than automatically can be detected (as long as they are in the view of the camera of course). This detection possibly needs markers, a colour or only big objects.
2. The persons profile behaviours is stored in the system like where the person normally stores the wallet for example. Thus the system can suggest places where the elderly normally puts the thing in question. When after time it is stored somewhere else the system automatically

updates this behaviour. Like when the systems suggests to look at the TV (cause normally it is there) but the elderly answers that this time he/she found it on the table the system updates this in the database and next time is able to suggest also the table because it was there the last time when the elderly was searching for it.

5.12.3 Dinner menu of the restaurant (read out)

After the lunch the menu of the restaurant for the next day is send to the elderly as a message (see messages from the system above). The elderly can use the touchscreen to fill in his/her choices or the ViP reads the choices aloud and the elderly responds and the ViP fills in the answers. After finishing the list the elderly can either touch the send button or tells the ViP to send the list. Than the list will be send to the kitchen of the restaurant by email.

5.12.4 Breakfast reminder (nursing home)

There are two different breakfast reminders:

- A reminder likewise the activity reminder. Thus a reminder is send once to the person.

- A reminder which keeps on repeating till it receives confirmation. This reminder is for elderly who need to have a breakfast for health reasons (e.g. diabetics). After the confirmation of the elderly he/she had his breakfast, the systems stops asking (like described in the use case of Peter).

A medication reminder works the same as the second description of the breakfast reminder. This reminder only stops repeating after confirmation of taking the medication.

5.12.5 Give signal to OT or family member when running late or cancel planned event

The OT or a family member can receive a signal either by phone call/ Skype call or by message when running late or cancelling a planned event. The ViP will ask the elderly if the OT or family should be informed by calling or sending a message. When the elderly chooses “calling” the ViP asks if the elderly likes to phone or Skype. When the elderly chooses message the system sends an SMS to the phone of the family member or OT. For cancelling an organized activity of Orbis the activity is unregistered in the activity overview of the elderly and the name of the elderly in the overview of the OT is also removed.

5.13 UI Conclusion

Some important questions concerning the UI have been addressed above. However, some important decisions still need to be taken.

The features described here should be taken as guidelines for further development of the project but remain flexible and adjustable as needed.

A mock-up of the UI used for the pre-trials (task 1.5) is presented in Annexe B to give an idea of how the UI will tend to look like.

6 Conclusion

This document presents use case scenarios and the specification of the UI.

Use case scenarios have been developed according to expressed needs and service priorities that arose from end user interviews. The use cases have thus been written to illustrate quite a complete scope of functionalities that the device should present and how the system should adapt to user needs. As said in the introduction, it is highly important that the system could be adjustable to each client. The services and options will have to be defined for each individual according to their specificities and preferences.

We also addressed the question of UIs. Though a lot of things have already been clarified, a significant amount of work is still to be done to achieve an UI that meets both user needs and technical possibilities. Further work in conjunction with work packages 2, 3, and 4 partners is required to progress in the UI definition.

This deliverable constitutes a basis for further service development; it should be seen as a guideline for technical development and implementation. However, use cases, UI and suggestions described in this document could be slightly modified in ulterior stages of the project to match the actual technological possibilities and users feedback.

Finally, this document will serve as a basis for the pre-trials and trials to see if the prototypes fit the expressed needs and expectations of the users. An updated version will be delivered after the first session of trials. This ulterior version will include technical updates and user feedback both about the expected functionalities of the device and about the UI. Definition of services developed and to be tested may as well change or be slightly modified.

7 Glossary

Table 5: List of terms, abbreviations and acronyms

Cocare-Tool	Collaborative Care (Co-Care) Tool to promote collaboration and communication between the elder and formal/informal carers, but also between formal and informal care. The detailed description and specification of this component is available in deliverable D3.2
COPD	Chronic Obstructive Pulmonary Disease
DOW	Description of work
ICT	Information and Communication Technology
OT	Occupational Therapist
TPG	Transports Publics Genevois (Geneva area public transports)
UI	User Interface
ViP	Virtual Partner
VIVA	Valoriser et Intégrer pour Vieillir Autrement (Valorizing and Integrating for a Better Aging), a local association nearby Geneva
WP	Work Package

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In order of apparition in the text

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Annex A: VIVA's use-case scenario – result of the bus timetable search.

Votre demande d'itinéraire

de: Les Esserts **Date:** Ve, 04.10.13
à: Boulevard James-FAZY 23, 1201 Genève **Heure:** 20:10 (Arrivée)

Modifier cette recherche | Faire une nouvelle recherche | Retour

Vue d'ensemble « plus tôt | plus tard »

Détails	Arrêt/gare	Parcours/Carte	Date	Heure	Durée	Chang.	Moyen de transport
☐	Les Esserts Gare Cornavin	Parcours à pied 3 min.	04.10.13	dép. 19:44 arr. 20:01	0:20	0	
☐	Les Esserts Genève	Parcours à pied 4 min.	04.10.13	dép. 19:48 arr. 19:59	0:15	1	
☑	Les Esserts Gare Cornavin	Parcours à pied 3 min.	04.10.13	dép. 19:49 arr. 20:06	0:20	0	
☐	Les Esserts Gare Cornavin	Parcours à pied 3 min.	04.10.13	dép. 19:54 arr. 20:11	0:20	0	

Détailler la sélection | Tout détailler | Imprimer cette page

Vue détaillée

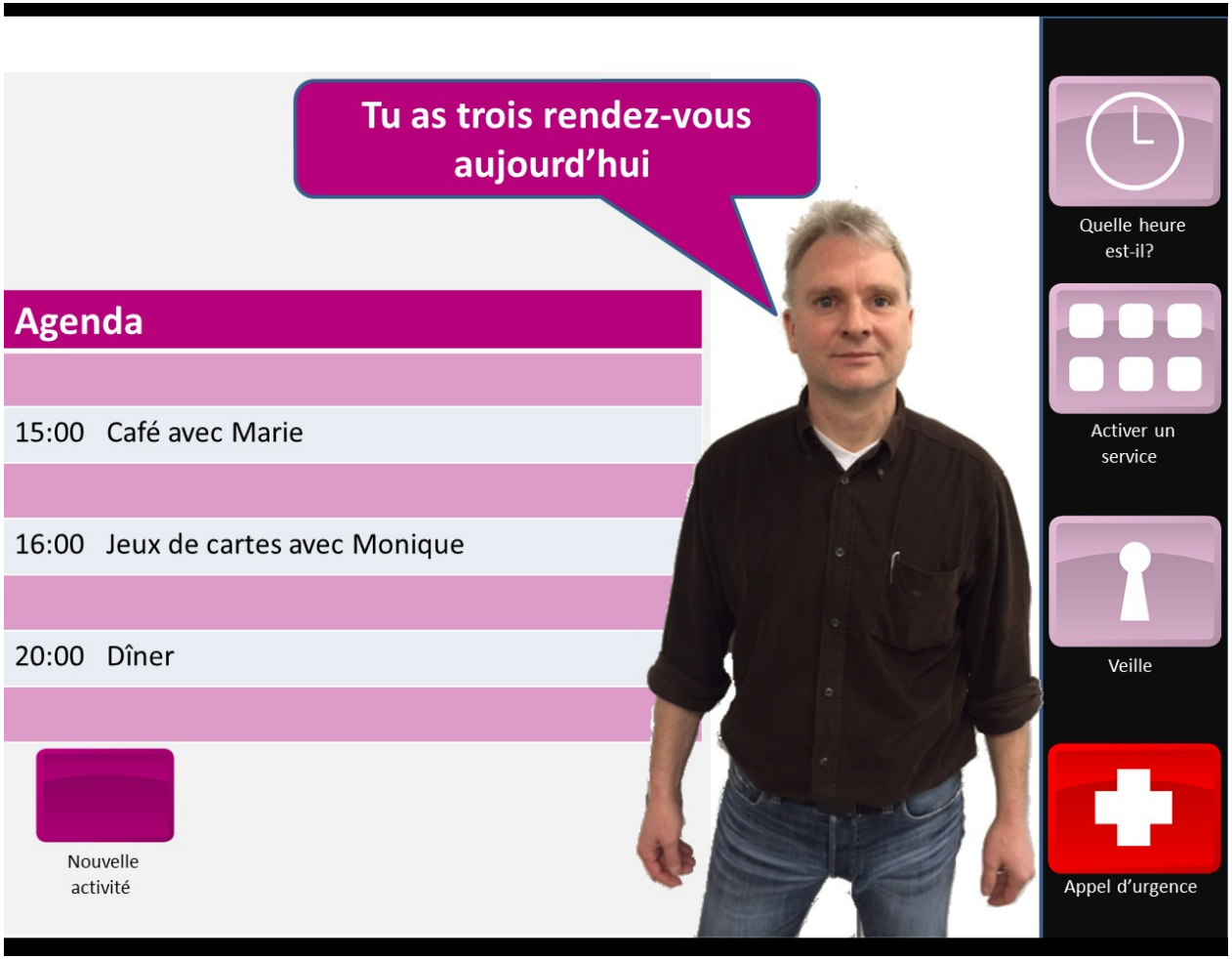
Arrêt/gare	Date	Arr.	Dép.	Moyen de transport	Remarques
Les Esserts	04.10.13		19:49	Trm 14	Trm Direction: Meyrin-Gravière
Gare Cornavin		20:06			
Gare Cornavin				Parcours à pied	3 min.
Boulevard James-FAZY 23, 1201 Genève					

Durée: 0:20, circule 4. jusqu'au 11. Oct 2013 Lu - Ve
Indication: Départ/destination remplacé(e)(s) par une gare équivalente

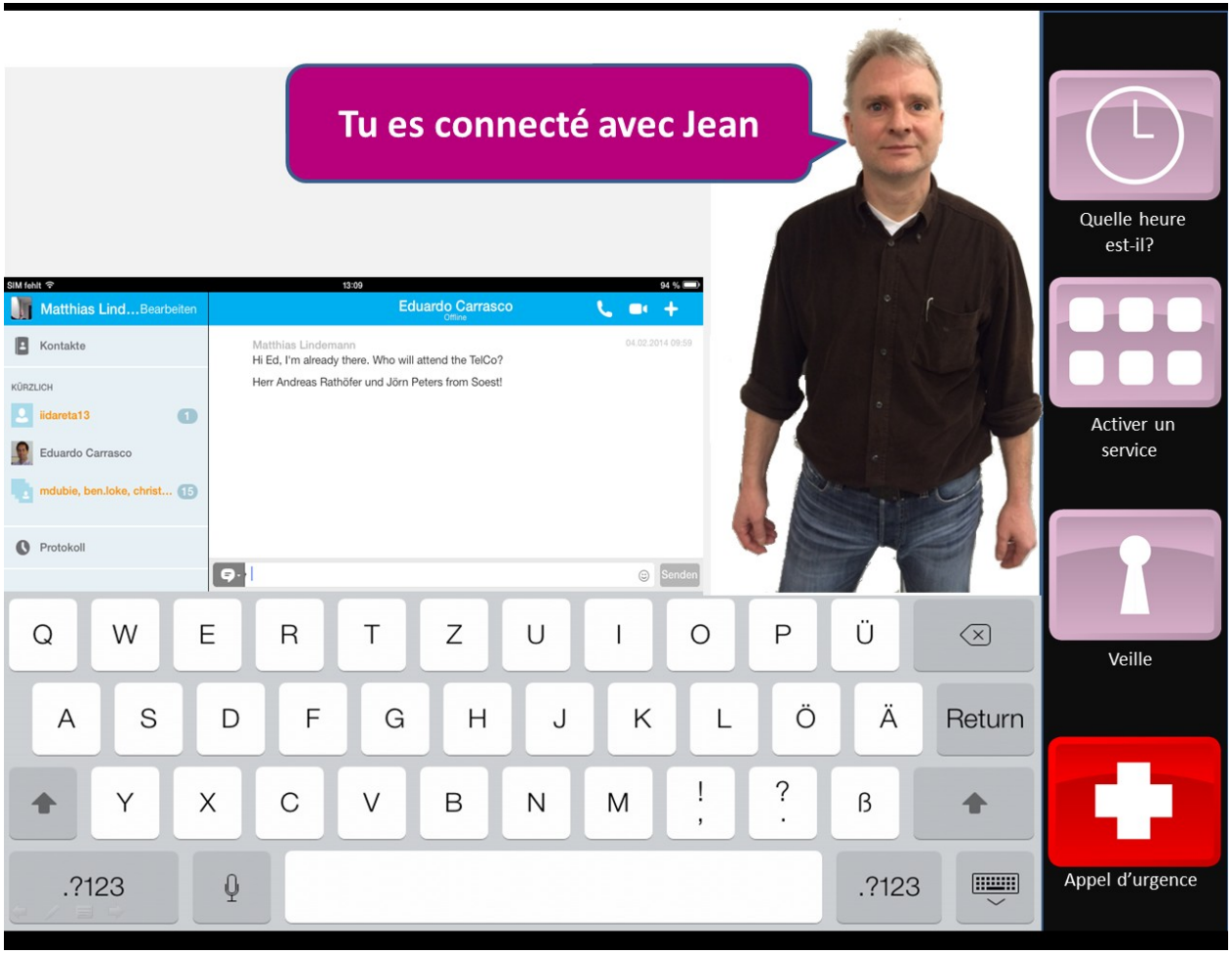
Montrer les arrêts intermédiaires | Imprimer vue détaillée

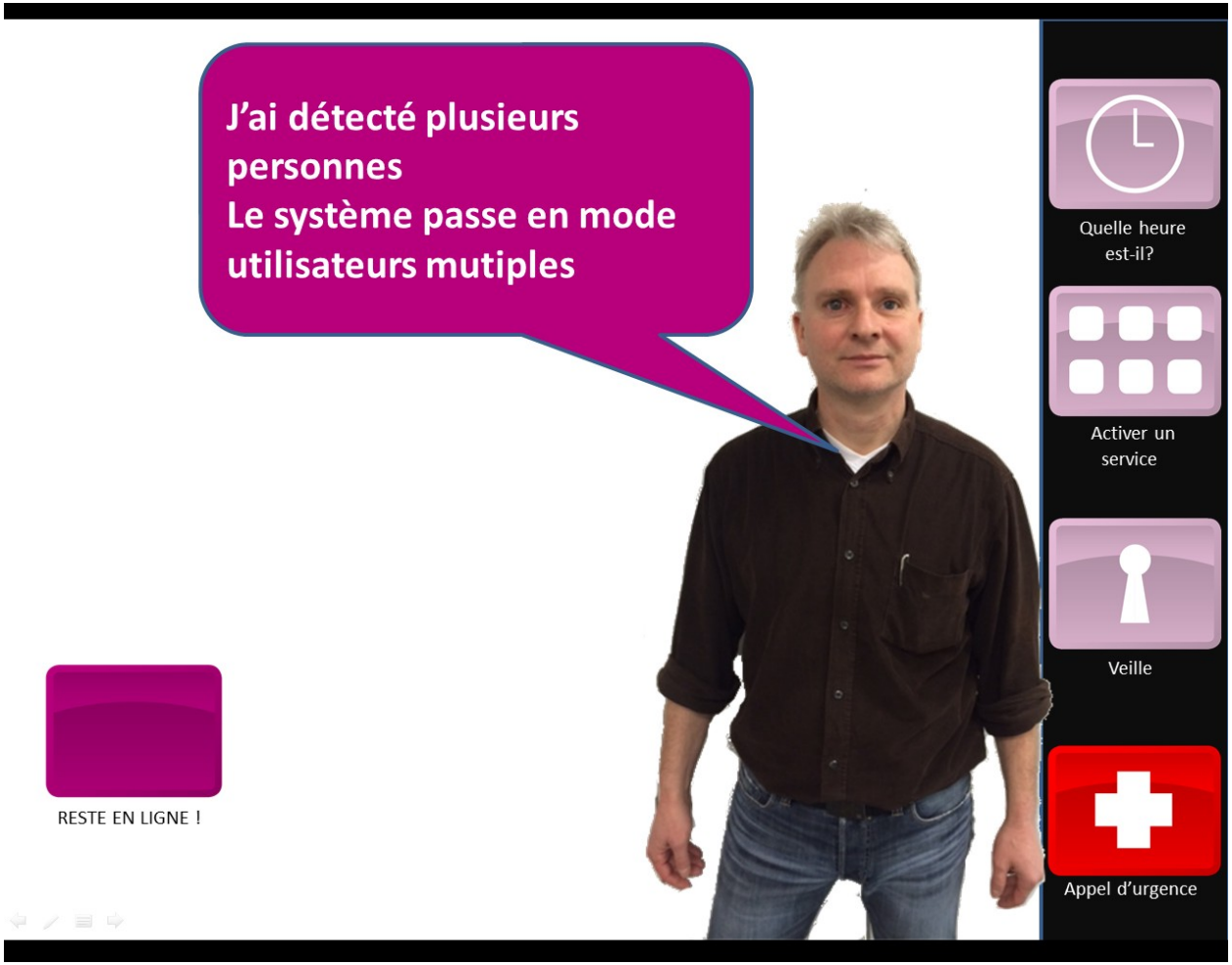
Annex B: Pre-trials mock-ups for user interface (UI), French version.

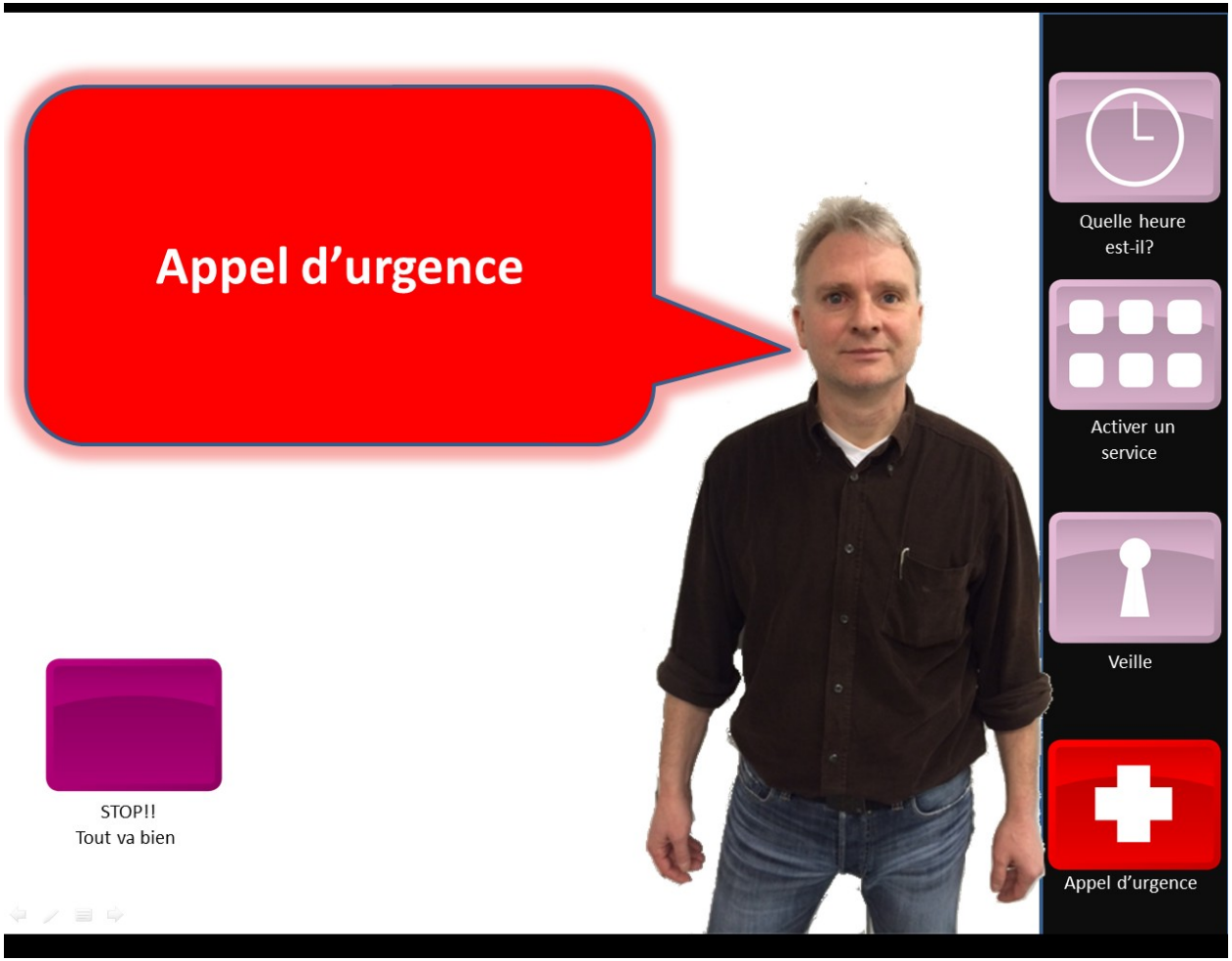

Les services CaMeLi suivants sont disponibles ...
skype
Skype
March
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31
Agenda
Shopping list
Liste de courses
Quelle heure est-il?
Activer un service
Veille
Appel d'urgence


Tu as trois rendez-vous aujourd'hui
Agenda
15:00 Café avec Marie
16:00 Jeux de cartes avec Monique
20:00 Dîner
Nouvelle activité
Quelle heure est-il?
Activer un service
Veille
Appel d'urgence


Ajoute les détails s'il te plaît.
Nouvelle activité
Quand:
Demain
Où:
Café Rose
Quoi:
Prendre un thé avec Jon
Rappelle-moi
Non
Quelle heure est-il?
Activer un service
Veille
Appel d'urgence
Return
.?123
.?123


Tu es connecté avec Jean
Matthias Lind...Bearbeiten
Eduardo Carrasco
Offline
Kontakte
KÜRZLICH
iidareta13
Eduardo Carrasco
mdubie, ben.loke, christ...
Protokoll
Matthias Lindemann
Hi Ed, I'm already there. Who will attend the TelCo?
Herr Andreas Rathöfer und Jörn Peters from Soest!
Senden
Quelle heure est-il?
Activer un service
Veille
Appel d'urgence
Return
.?123


J'ai détecté plusieurs personnes
Le système passe en mode utilisateurs mutiples
Quelle heure est-il?
Activer un service
Veille
Appel d'urgence
RESTE EN LIGNE !


Appel d'urgence
Quelle heure est-il?
Activer un service
Veille
Appel d'urgence
STOP!!
Tout va bien