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Miraculous-Life Miraculous-Life for Elderly Independent Living

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Table of Contents

<i>Miraculous-Life Miraculous-Life for Elderly Independent Living</i>	<i>I</i>
<i>Release History</i>	<i>III</i>
<i>Miraculous-Life Consortium</i>	<i>IV</i>
<i>Table of Contents</i>	<i>V</i>
<i>Table of Figures</i>	<i>VII</i>
<i>List of Tables</i>	<i>VIII</i>
<i>Abbreviations</i>	<i>IX</i>
<i>Executive Summary</i>	<i>10</i>
<i>1 About this Document</i>	<i>11</i>
1.1 Role of the deliverable	11
1.2 Relationship to other Miraculous-Life deliverables	11
1.3 What's new in D6.3c?	11
<i>2 Changes to previous deliverable version</i>	<i>12</i>
<i>3 Pre-Trial and Trials test environments</i>	<i>13</i>
<i>4 Second Pre-Trial (stage 2) and Trials Use Case Scenario</i>	<i>24</i>
<i>5 Pre-Trial and Trials Hardware Equipment and Physical Setup</i>	<i>49</i>
5.1 Equipment	49
5.2 Physical Setup	50
5.2.1 Pre-Trials	50
5.2.2 Trials	50
<i>6 Second Pre-Trial second stage and Trials Software</i>	<i>52</i>
6.1 Software Testables	53
6.1.1 Knowledge Base	53
6.1.2 User Interface and HCI	53
6.1.3 Services	55
6.2 Software Installation	59
<i>7 Second Pre-Trial second stage and Trials procedure</i>	<i>60</i>
7.1 Preparation	60
7.1.1 ORBIS	60
7.1.2 MRPS	60
7.2 Technical support	60
7.3 Trials training	62

7.4	Procedure of the second Pre-Trial second stage and instruction provided to participants	63
	Procedure of the Trials and instruction provided to participants	65
8	<i>Further Work</i>	66

Table of Figures

Figure 1 ORBIS Hoogstate – Elderly Home	14
Figure 2 ORBIS HOOGSTASTE Greenparc, Springfield and Silverstaete – Care Apartments	14
Figure 3 example of a care apartment (Greenparc)	15
Figure 4 example of a room in the elderly home (Hoogstaete)	16
Figure 5 ORBIS De Egthe – elderly home and care apartments	17
Figure 6 ORBIS De Egthe – care apartments	17
Figure 7 example of an elderly home department (DE EGTHE)	18
Figure 8 example of a care apartment (DE EGTHE)	19
Figure 9 Colladon Residences: Buildings ‘Les Frênes’, ‘Les Hortensias’: 47 m2 (x55)	20
Figure 10 Colladon Residences: Buildings ‘Les Frênes’, ‘Les Hortensias’: 52 m2 (x15)	21
Figure 11 Colladon Residences: Buildings ‘Les Frênes’, ‘Les Hortensias’: 54 m2 (x28)	22
Figure 12 Colladon Residences: Buildings ‘Les Frênes’, ‘Les Hortensias’: 77 m2 (x13)	23
Figure 13 Trembley Residences: Buildings ‘Les Azalées’, ‘Les Erables’: 28m2	23
Figure 14 ML investigator UI: triggering first interaction of social bonding	25
Figure 15 ML investigator UI: triggering missed appointment reminder of social bonding	28
Figure 16 ML investigator UI: triggering reaction on persisting blame affective state of social bonding	30
Figure 17 ML investigator UI: triggering dangerous object advisor	40
Figure 18 Contact list in the Miraculous Life system	45
Figure 19 Details of contact in the Miraculous Life system	45

List of Tables

Table 1: Deliverable changes to previous deliverable version	12
Table 2 Miraculous-Life MRPS and ORBIS Trials hardware equipment.	49
Table 3: Active vs. passive mode.	58
Table 4: Additional system components for the second Pre-Trial and their requirements.	59

Abbreviations

<i>Abbrev.</i>	<i>Description</i>
API	Application Programming Interface
Co-Net	Collaborative Care Network
KB	Knowledge Base
Mbps	Mega bit per second
MP	MegaPixel
MRPS	Maison de Retraite du Petit Saconnex
SSD	Solid State Drive
VCT	Virtual collaborative Care Team
VSP	Virtual Support Partner
WIFI	Wireless internet connection

Executive Summary

After the first Pre-Trial in M8, the first stage of the second Pre-Trial took place in M16 (as described in deliverable D6.3b) and the second Pre-Trial second stage took place in M23 and M24. As it is the goal again to attain high quality feedback indicators and a greater acceptance from the users of the Miraculous Life system, the second Pre-Trial includes more features in number and more robust features compared to the first Pre-Trial.

This deliverable describes specifically the second Pre-Trial second stage, the final trials, the test environments, the use cases, the equipment and how the system is set up, what software is used, what is actually tested and finally, how the system will be installed and how the users are trained to use the system.

1 About this Document

1.1 Role of the deliverable

The main goal of the Pre-Trials and Trials that is discussed in this document is to test specific components in real conditions in order to assess and improve their functionality before the actual trial takes place. This deliverable describes the procedure of setting up the system for the Pre-Trials and the Trials, mention the active components in this setup, describe the deviations from the overall system setup and present the installation guidelines for the setup.

1.2 Relationship to other Miraculous-Life deliverables

The deliverable is related to the following Miraculous-Life deliverables:

<i>Deliv:</i>	<i>Relation</i>
D1.2 REV	Specification of use case scenarios and User Interface: This document presents the use case scenarios and also an analysis of the interaction requirements needed to specify the Human-Computer interface. D6.3 uses several use cases provided by D1.2 REV
D5.3	Specification of the Miraculous-Life system integration: This document describes the setup of the general system. Since D5.3 serves as a reference for D6.3, only deviations are addressed in D6.3.
D6.1b	Trials specification and design. This document provides the design of the trials examining issues like how the trial sites are organized, what kind of training will be needed, and how the evaluation data will be collected. D6.3 provides the technical setup of the system that supports this design.
D6.3b	Pilot setup and deployments. This document describes the setup of the second Pre-Trial (stage 1), including equipment, software components, and training. As the second and second Pre-Trial second stage will have much overlap with the first Pre-Trial, D6.3c will refer to D6.3b when appropriate.

1.3 What's new in D6.3c?

D6.3c differs significantly from D6.3b, as it describes the setup of the Pre-Trials as well as the Trials that will be performed after the second Pre-Trial. As there are some resemblances between the first and second stage (discussed in this deliverable) of the second Pre-Trial, the text will refer to D6.3b whenever appropriate. The use case scenarios for the second Pre-Trial are derived from the use case scenarios of D1.2b REV but adapted to test the modules and services that are currently available. Hence, this adapted use case scenarios are described completely. To show the procedure and the instructions provided to the participant, a new section is added compared to D6.3b, namely Section 6.3.

2 Changes to previous deliverable version

The following table provides an overview of the content changes of this deliverable version (D6.3c) from version D6.3b.

Table 1: Deliverable changes to previous deliverable version

Deliverable changes	
Action	Title
Add	Chapter 2 Changes to previous deliverable version
Update	Shifted chapter numbers due to addition of chapter 2
Update	Split up second Pre-Trials to first stage and second stage of the second Pre-Trials
Update	Chapter 1, 3, 4, 5, 6, 7, 8; updated content

3 Pre-Trial and Trials test environments

The test environments for the second stage of the second Pre-Trials at both ORBIS and MRPS are identical to the test environments for the first stage Pre-Trial. Hence, the detailed description of the test environments can be found in Chapter 2 of D6.3b.

Contrary to the first, second and third pre-trial, the trial phase will be performed in a realistic user environment, described here below.

Trials ORBIS

Concerning ORBIS the trials will be held in 2 care centres namely Hoogstaete and de Egthe. ORBIS Hoogstaete, is an elderly home which is located in the city of Sittard-Geleen, the Netherlands. ORBIS de Egthe also an elderly home, is located in the municipality of Echt-Susteren, about 15 kilometres north from Sittard. The municipality of Echt-Susteren is more rural than the city of Sittard.

ORBIS Hoogstaete and de Egthe are both part of the ORBIS Medical and Healthcare group in the province of Limburg, The Netherlands.

ORBIS Hoogstaete is divided in an elderly home (capacity of 106 clients), a small scale living block (capacity of 46 clients) and 3 apartment blocks (hosting 80 clients independent living/homecare and elderly home). The elderly home and small scale living block are controlled and supervised environments with 24/7 availability with the presence of specialized staff. Care in the apartment blocks is divided in homecare on demand and 24/7 care like an elderly home.

ORBIS de Egthe is divided in an elderly home (hosting 111 clients), a nursing home geriatric and somatic (hosting 85 clients) and apartments for independent living (hosting 57 clients). The elderly and nursing home are controlled and supervised environments with 24/7 availability with the presence of specialized staff. Care in the apartment blocks is divided in homecare on demand and 24/7 care like an elderly home. All the rooms and apartments are suitable for couples and/or singles.

Moreover, the following rooms within both complexes will be used during the trials:

- Ten rooms (10) of the elderly in the elderly home
- Ten care apartments (10) of the elderly

Some sample maps can be found at the end of this chapter.

The trial will be performed in both the elderly homes (Hoogstaete and de Egthe) with the main focus in ORBIS de Egthe and a smaller amount in ORBIS Hoogstaete.

The rooms of the elderly in the elderly home (which will be used during this project) have an average size of 24 square meters and consist of 3 rooms: a living room including a small open kitchen, a bedroom and a bathroom.

The apartment blocks of ORBIS Hoogstaete and de Egthe have an average size of 50-60 square meters and consist of a living room including an open kitchen, two bedrooms, a bathroom and a balcony.

Pictures and maps ORBIS Hoogstaete, Sittard



Figure 1 ORBIS Hoogstate – Elderly Home



Figure 2 ORBIS HOOGSTASTE Greenparc, Springfield and Silverstaete – Care Apartments

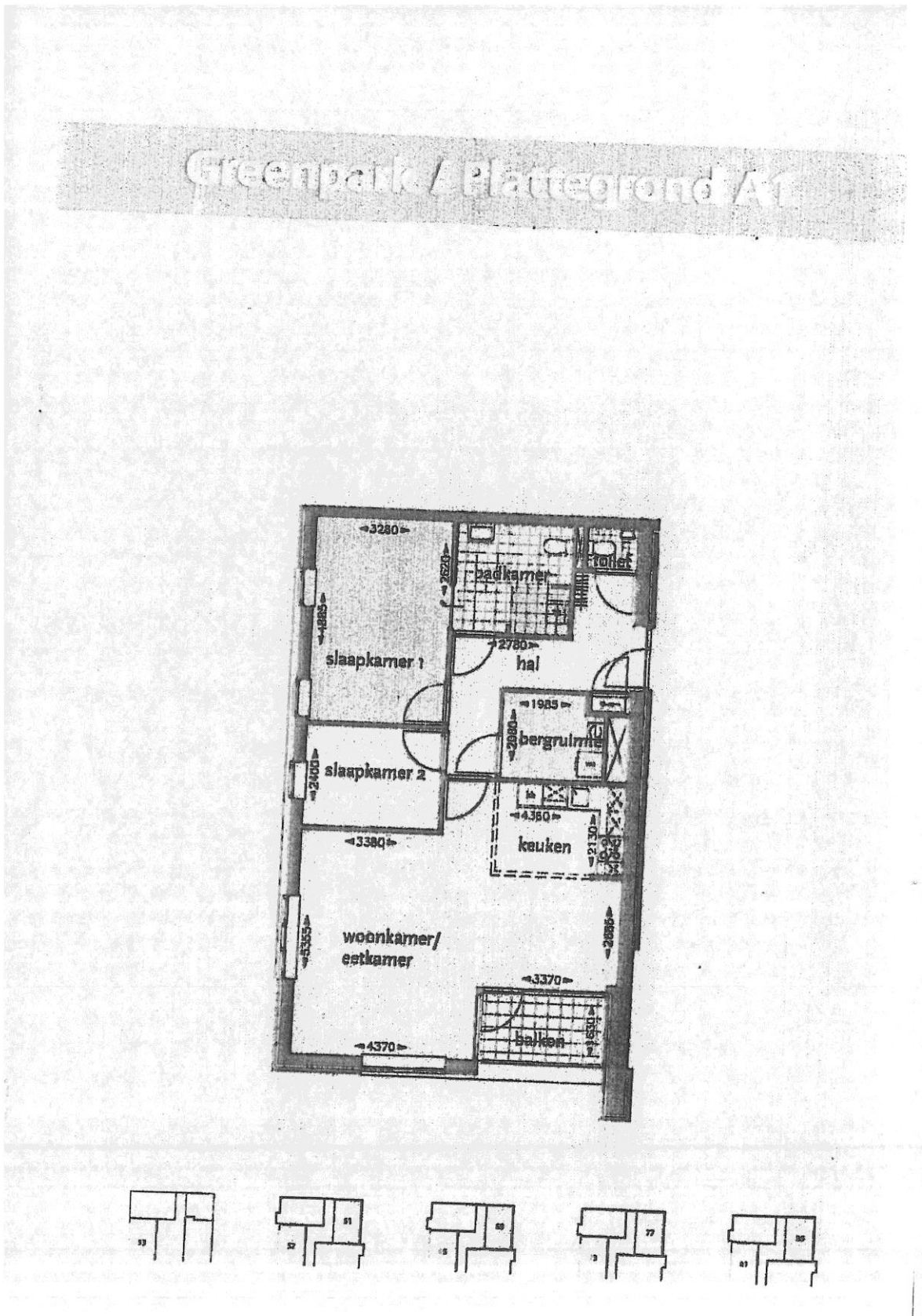


Figure 3 example of a care apartment (Greenparc)

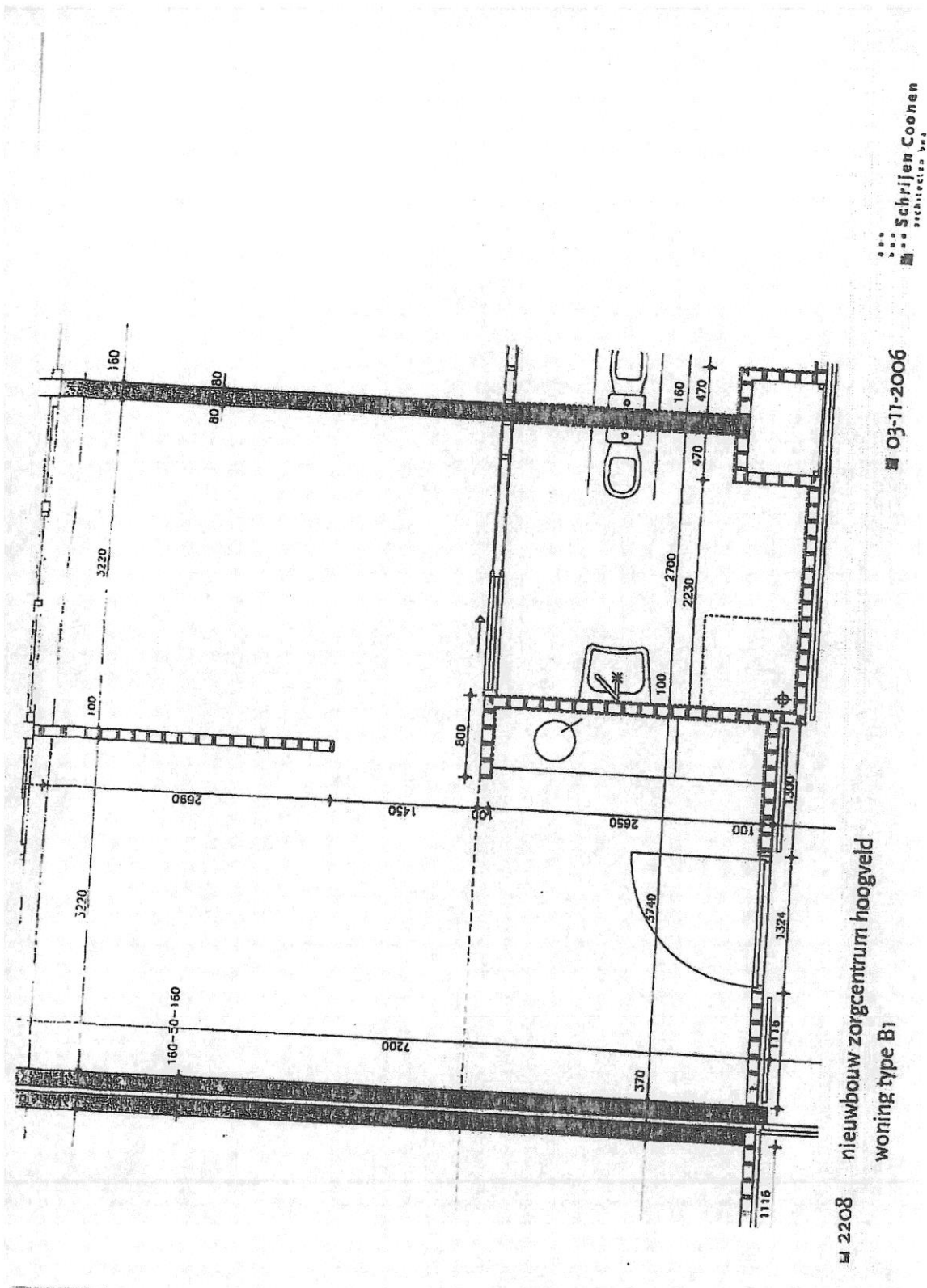


Figure 4 example of a room in the elderly home (Hoogstaete)

Pictures and maps ORBIS De Egthe, Echt



Figure 5 ORBIS De Egthe – elderly home and care apartments



Figure 6 ORBIS De Egthe – care apartments

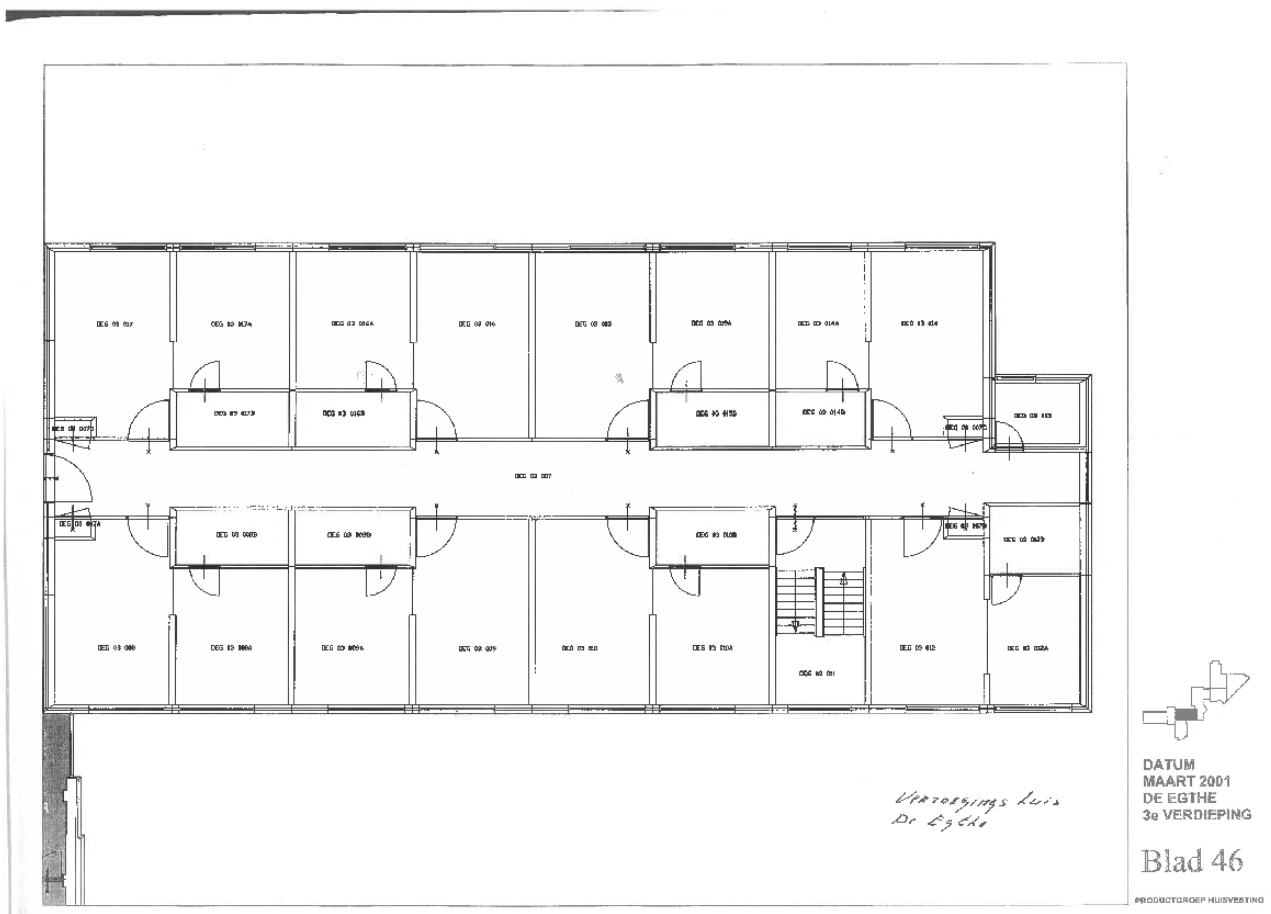


Figure 7 example of an elderly home department (DE EGTHE)

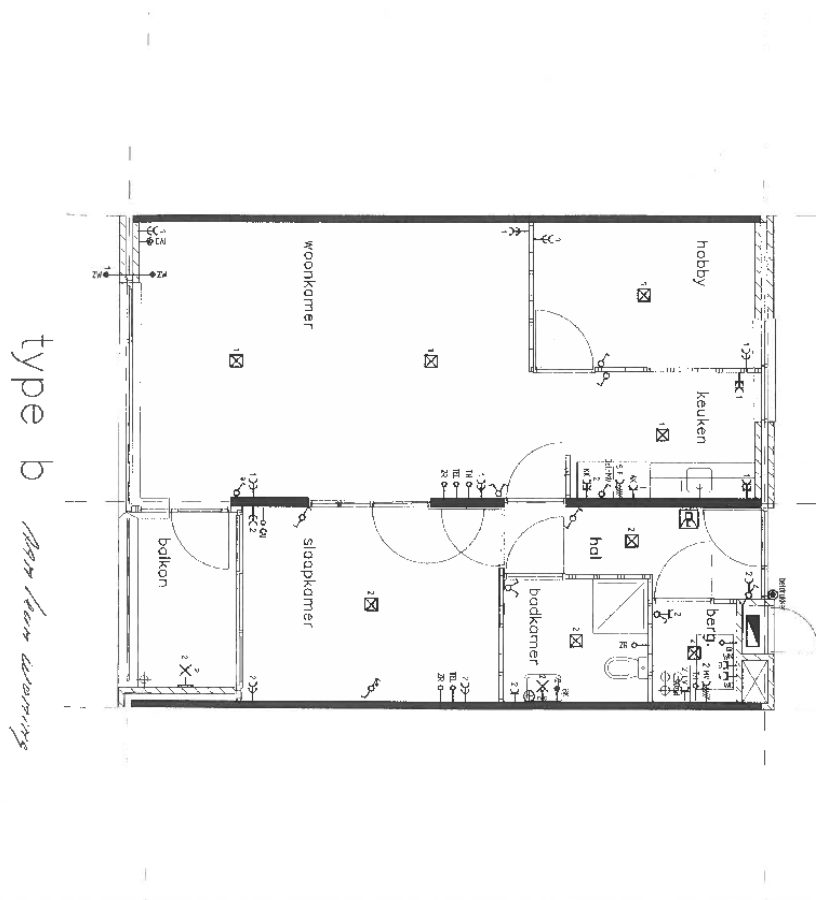


Figure 8 example of a care apartment (DE EGTHE)

Trials MRPS

Founded in 1849, the Maison de Retraite du Petit-Saconnex (MRPS), is the oldest and largest elderly care institution in the canton of Geneva. MRPS is the only institution in the Geneva canton offering to its residents the possibility to preserve their life style in spite their advanced age, facilitating at the same time their transition to a nursing home when their health condition requires so. MRPS is composed of: (1) a high quality nursing home for the elderly, housing 196 residents and (2) specialized residences, hosting up to 220 elderly residents and supporting their independent and semi-independent living needs.

In MRPS, the final version of the Miraculous-Life technology will be performed in the specialized residences.

The independent and semi-independent senior apartments are located in the Colladon Residence (Les Frênes, Les Hortensias) and in the Tremblay Residence (Les Azalées, Les Erables). The Tremblay Residence consists of 100 studio and apartments: one-person studios are 28 square meters with or without Kitchenette; while one-bedroom apartments (56 square meters) are available for couples. The Colladon Residence consists of 107 standing apartments for one person or a couple. Apartments for single person are 47 square meters, including a kitchen open on the dining area, a large bedroom, a hall, a bathroom and a balcony. 2-room apartment (54 square meters) and 3-room apartment (77 square meters) are available for couples.

The plans of the apartments are represented in figures 9, 10, 11, 12 and 13.

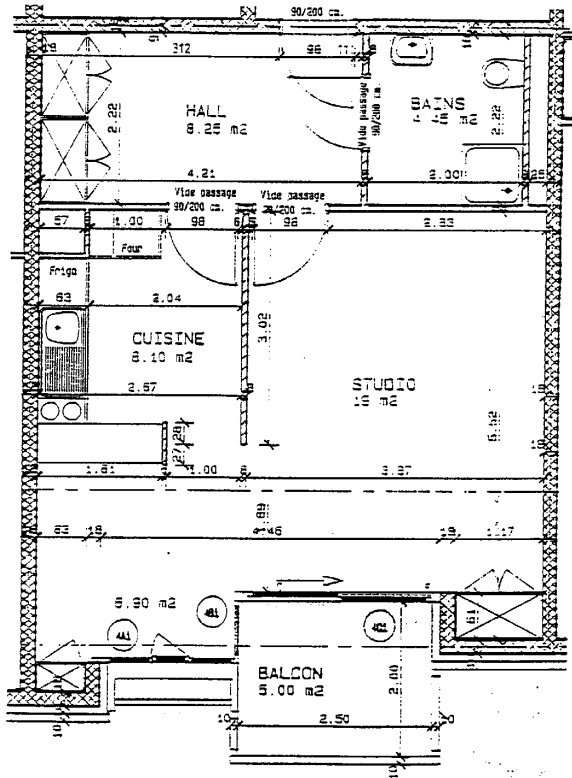


Figure 9 Colladon Residences: Buildings 'Les Frênes', 'Les Hortensias': 47 m² (x55)

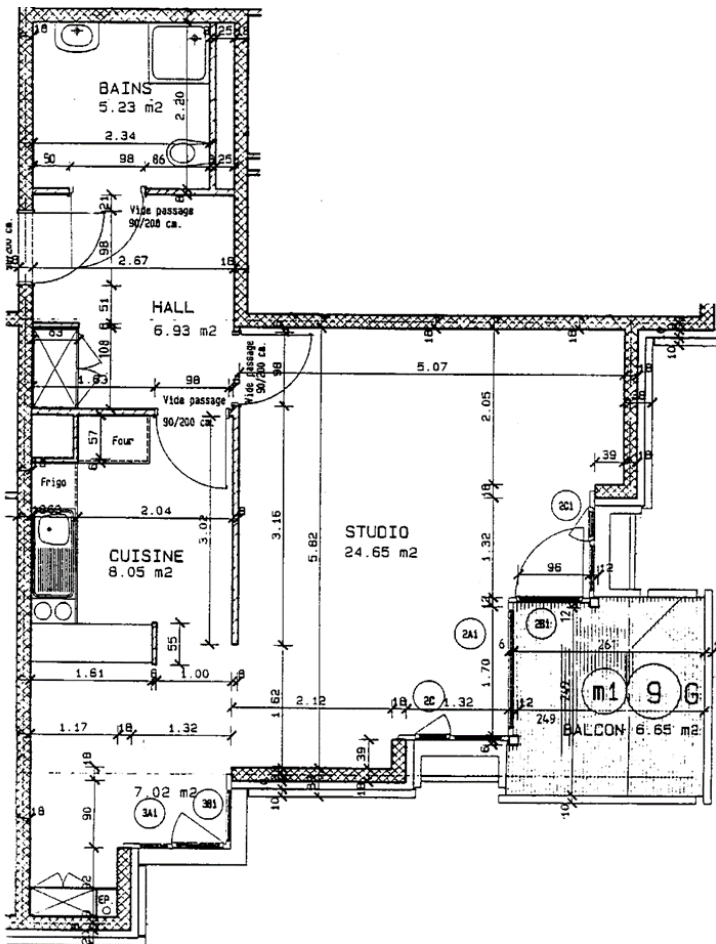


Figure 10 Colladon Residences: Buildings 'Les Frères', 'Les Hortensias': 52 m² (x15)

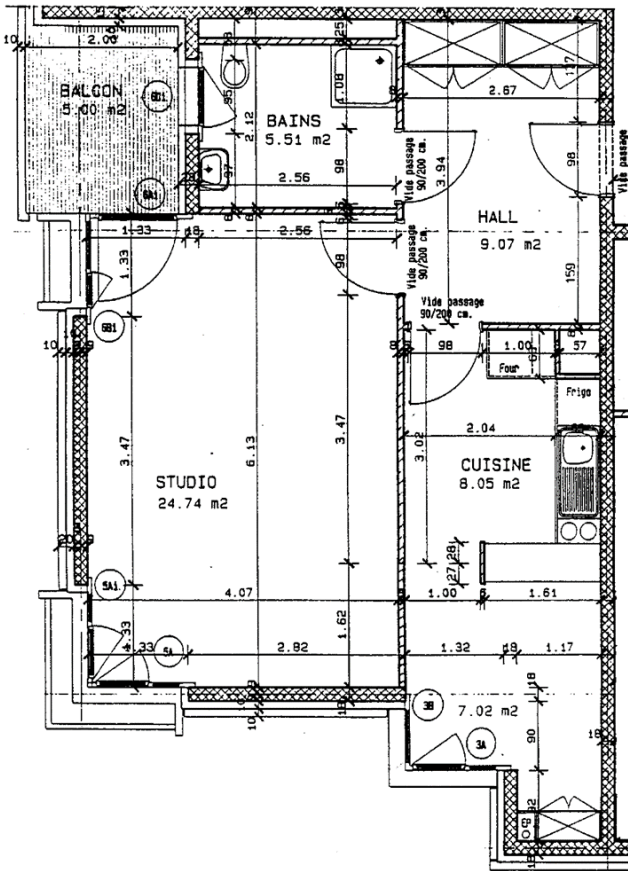


Figure 11 Colladon Residences: Buildings 'Les Frênes', 'Les Hortensias': 54 m2 (x28)

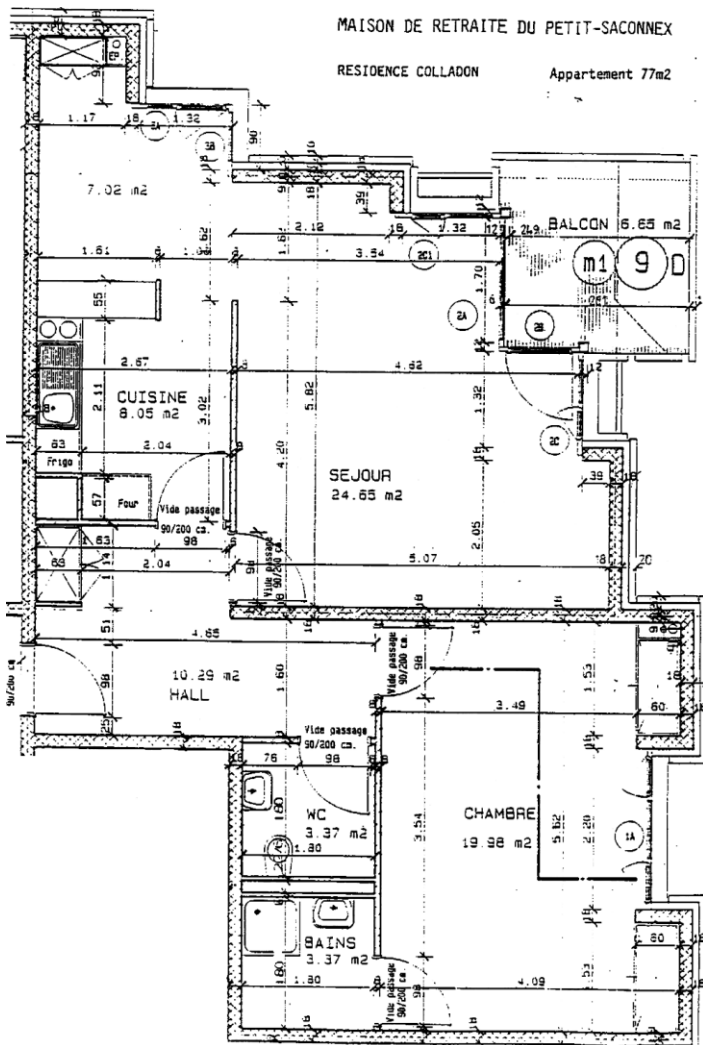


Figure 12 Colladon Residences: Buildings 'Les Frènes', 'Les Hortensias': 77 m2 (x13)

ERABLES - STUDIO TYPE 28 m2 - Avec cuisinette

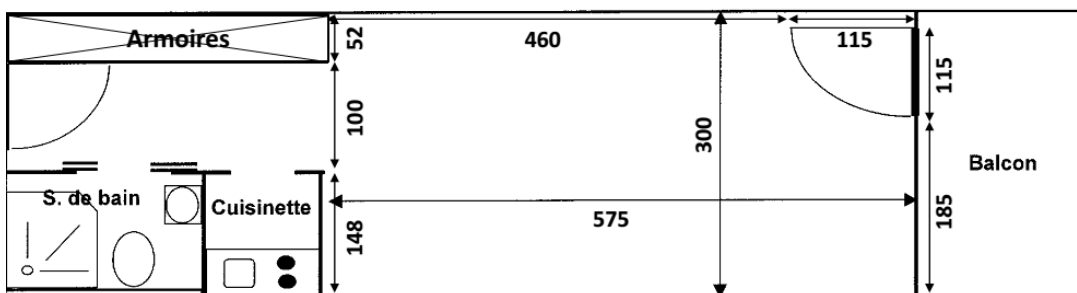


Figure 13 Trembley Residences: Buildings 'Les Azalées', 'Les Erables': 28m2

4 Second Pre-Trial (stage 2) and Trials Use Case Scenario

Second pre-trial stage 2

Although the use case scenarios described in D1.2b form the basis for the second Pre-Trial (stage 2) use case scenarios, we present here the full modified use case scenario to show exactly what is being tested. Note that the numbering of the use cases is the same numbering used in D1.2b for easier referencing.

Since each user test last for one hour and a half (90 minutes); testing all the twenty-three use cases (see D1.2b) with the users is not doable. For each group of users, we selected a restraint number of use cases to be tested. Specifically, the consortium selected, per each group of users, the use case with the higher benefit score for both carers and seniors (for the benefit analyse, please consult the revised version of the D1.2b) and use cases which were not tested in the first or second pre-trial or which has undergone significant revisions.

Use cases tested by elderly:

1. Social Bonding (2.5.3)
2. Call for help (2.2.7)
3. Fall detection (2.2.4)
4. Dangerous object advisor (2.2.5)
5. Oven and stove reminder (2.2.6)
6. Physical Activity service (2.5.2)

Use cases tested by caregivers:

1. Call for help (2.2.7)
2. Fall detection (2.2.4)
3. Contact list (2.1.1)
4. Oven and stove reminder (2.2.6)
5. Message system (2.1.2)

The caregiver UI was used to send messages from the caregiver to the elderly.

The investigator UI was used to trigger some of the use cases at the time of the pre-trial. As we will test on specific moments on a day per elderly and not a whole day we need to trigger some services to happen at the correct time when the pre-trial is planned. E.g. first interaction of the day is triggered at 03.00 pm when the pre-trial starts at this time. Specifically, the investigator UI was used to trigger: (1) the first interaction of the day (social bonding), (2) the reaction of the VSP on persisting affective states (blaming, stressful and sadness), and (3) the dangerous objects adviser situation.

Contrary the first stage of the second pre-trial, during this 2nd pre-trial, fall detection was triggered by the investigator simulating a fall.

2.5.3 Use case: Social Bonding

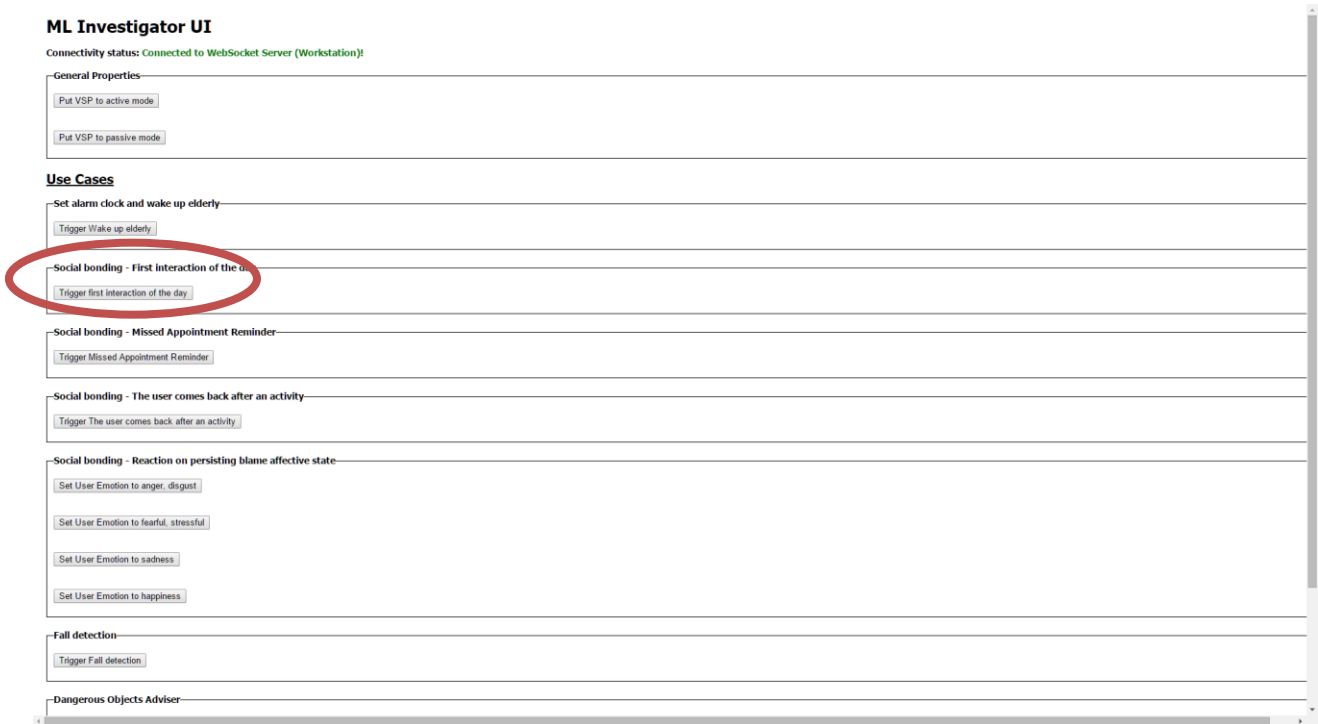


Figure 14 ML investigator UI: triggering first interaction of social bonding

Situation: First interaction of the morning (‘how are you today?’)

State 1: The VSP is in the ‘passive mode’. Gunter just woke up either by the wakeup call or otherwise. He approaches the VSP for the first interaction of the morning. The VSP starts the interaction: “Good morning Gunter. It’s Friday 16 November. How are you today?” *Go to state 2 or 4.*

Component	Action
Emotion	The avatar looks happy

State 2: Gunter: “I am fine, thanks”. *Go to the next state.*

State 3: The VSP looks happy: “I am happy to hear that, Gunter”. *Go to the second interaction of the morning.*

Component	Action
Emotion	The avatar looks happy

State 4: Gunter: “I don’t feel well”. *Go to the next state.*

State 5: The VSP appears worried: “I hope it's not anything serious. Is everything okay with your health? *Go to state 6 or 12.*

Component	Action
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Emotion	The avatar looks worried
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State 6: Gunter answers: “No, it isn’t”. *Go to the next state.*

State 7: The VSP looks worried: “Shall I ask help from your caregivers?” *Go to state 8 or 10.*

Component	Action
Emotion	The avatar looks worried

State 8: Gunter answers: “Yes”. *Go to the next state.*

State 9: *The VSP performed the “Call for Help” procedure as described in 0. STOP*

State 10: Gunter: “No, that’s just okay for now”. *Go to the next state.*

State 11: The VSP appears worried and slightly suspicious: “Ok, Gunter. Let me know if you will need support from your caregivers.” *Go to the second interaction of the morning. At 11:00, the situation “the VSP checks the health status of the elderly (‘do you feel better now?’), will be also triggered.*

Component	Action
Emotion	The avatar looks worried

State 12: The system makes the hypothesis that the user feels bad “emotionally”. *Go to the situation “Reaction on persisting sadness state” and then to the second interaction of the morning.*

Situation: Second interaction of the morning (exercises against pain)

State 1: This interaction is triggered only for the users who suffer from pain. The VSP continue the interaction: “I think it would be a good idea to start the day with some exercises against pain. Would you like to start these exercises now?” *Go to the state 2*

State 2: Gunter: “Yes”. *Go to use case 2.5.2, state 4. Then, go to the third interaction of the day.*

State 3: Gunter: “No”. *Go to state 5.*

State 4: Gunter: “Remind me later”. *After 15 minutes, go to state 1.*

State 5: VSP: “Okay you can always start these exercises yourself by using the physical activity service.” *Then, go to the third interaction of the day.*

Situation: Third interaction of the morning (agenda)

State 1: The third interaction of the morning starts immediately after the previous one. The VSP: “You have three activities in your agenda for today. Do you want to have a look, Gunter?” *Go to state 2 or 3.*

State 2: Gunter answers: “Yes”. *Go to state 2 of the use case 2.3.1. Once the elderly consulted his agenda, go to the fourth interaction of the morning.*

State 3: Gunter answers: “Maybe, I will do later”. *Go to the fourth interaction of the morning.*

Situation: Fourth interaction of the morning (notifications)

State 1: The fourth interaction of the morning starts immediately after the second one and shows the user all the notifications (agenda, missed phone calls, custom reminders, etc.) and says: “Gunter, you received 2 notifications during the last night. Do you want to have a look?” *Go to state 2 or 3.*

State 2: Gunter answers: “Yes”. The VSP shows sequentially all the notifications received by the end-user. *Once this iterative process is completed, go to state 4.*

State 3: Gunter answers: “No”. *Go to state 4.*

State 4: The VSP concludes the first interaction of the morning: “Okay Gunter, have a nice day!”.

Component	Action
Emotion	The avatar looks happy

Situation: The VSP checks the health status of the elderly (‘do you feel better now?’)

This situation is triggered if during the first interaction of the morning the user reported having health problems and chose not calling caregivers. In this case this interaction is triggered at 11:00.

Component	Action
Memory	Occurrence of not feeling well today

State 1: It’s 11:08. Gunter approaches to the system. The system detects the user in front of the tablet, the VSP starts the interaction: “Welcome back, Gunter. How are you feeling now? Do you feel better?” *Go to state 2 or 4.*

State 2: Gunter: “Yes, I feel better”.

Component	Action
Emotion	The avatar looks happy

State 3: The VSP looks relieved: “Great! I am happy to hear that.” **STOP.**

State 4: Gunter: “I still don’t feel well”. *Go to the next state.*

Component	Action
Emotion	The avatar looks worried

State 5: The VSP looks worried: “Shall I ask help to your caregivers?” *Go to state 6 or 8.*

State 6: Gunter answers: “Yes”. *Go to the next state.*

State 7: The VSP performed the “Call for Help” procedure as described in 0. **STOP**

State 8: Gunter: “No, that’s just okay for now”. *Go to the next state.*

Component	Action
Emotion	The avatar looks relieved

State 9: The VSP appears worried and slightly suspicious: “Ok, Gunter. Let me know if you will need support from your caregivers.” **STOP.**

Situation: Missed Appointment Reminder

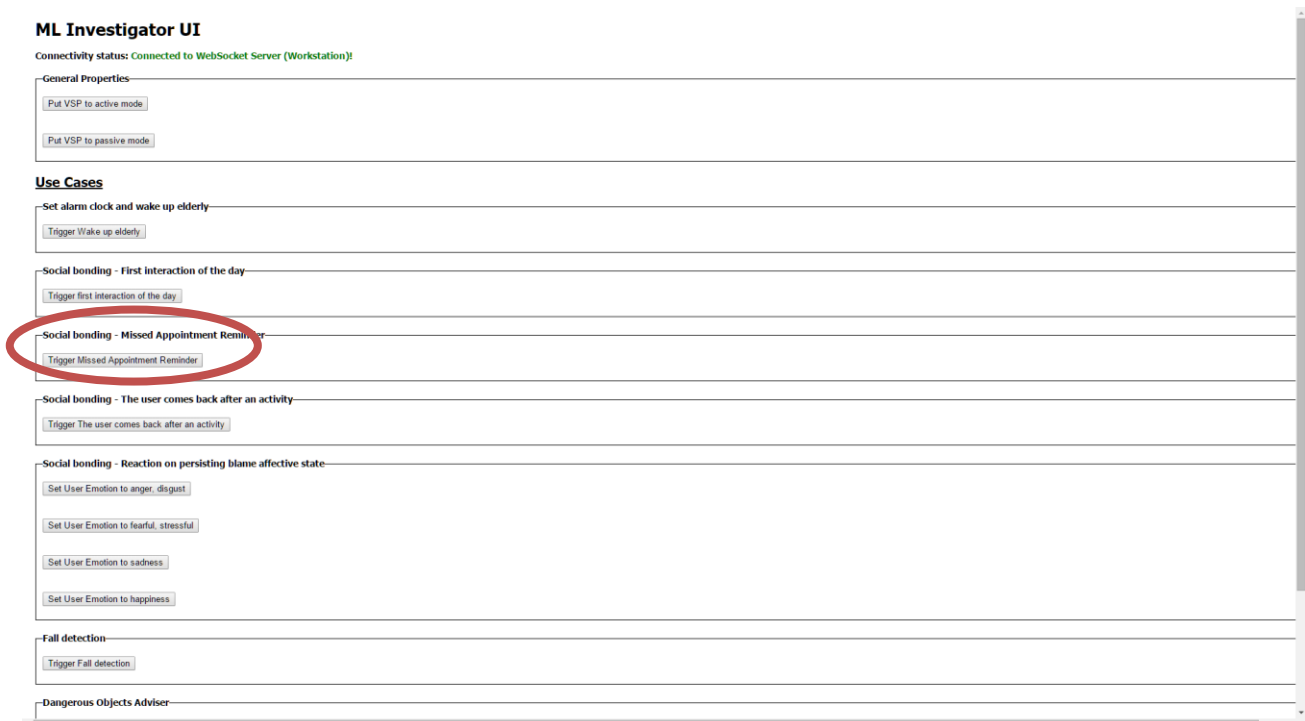


Figure 15 ML investigator UI: triggering missed appointment reminder of social bonding

State 1: During the morning, Gunter did not react to an appointment reminder. Its 12:30, Gunter approaches to the system. The VSP starts the interaction: “Welcome back Gunter. You have a missed appointment reminder. What would you like to do with it?” *Go to state 2, 4, 6 or 14.*

State 2: Gunter answers “Show me the reminder” *Go to the next state.*

State 3a (Conditional): The missed appointment was a group activity. The VSP answers: “Today at 11:00 you had the activity Card games. Did you participate?” At the same time a text bubble in the screen is shown the following text:

Activity: Card games

Time: 11:00-12:00 hrs.

Location: Restaurant

Price: 0

Accessories: Cards

Go to state 4, 6 or 14.

State 3b (Conditional): The missed appointment was an invitation made by another elderly. The VSP answers: “Today at 10:00 you had the activity “going for a walk”. Your friend Cindy invited to join. Did you participate?” At the same time a text bubble in the screen is shown the following text:

Activity: going for a walk

Date: 13.11.2014

Time: 10:00-11:00 hrs.

Location: ORBIS park

Participants: Cindy, Gunter

Go to state 4, 6 or 14.

State 4: Gunter: “I participated to the activity”. *Go to the next state.*

State 5: The VSP deletes the reminder and says: “Great! Nice to hear that you are active”. **STOP.**

Component	Action
Emotion	The avatar looks happy

State 6: Gunter: “I’ve forgot it”. *Go to the next state.*

State 7a (Conditional): The missed appointment was a group activity. The VSP looks slightly sad: “Oh, what a pity! Things like that happen, Gunter.” Now the VSP looks more proactive: “What about looking for a new group activity?” *Go to state 8 or 13.*

Component	Action
Emotion	The avatar looks compassionate

State 7b (Conditional): The missed appointment was an invitation made by another primary end-user. The VSP looks slightly sad: “Oh, what a pity! Things like that happen, Gunter. Don’t you want to write a short message to Cindy to apologize yourself?” *Go to state 9 or 13.*

Component	Action
Emotion	The avatar looks compassionate

State 8: Gunter: “Show me group activities, please”. The Group Activity Service is now activated. **STOP.**

State 9: Gunter: “Write a message to Cindy”. *Go to the next state.*

State 10: The VSP is on the right. The VSP continues the interaction: “Ok Gunter”. *Go to the next state.*

State 11: A form appears on the screen, allowing Gunter to write a message to Cindy via the keyboard of the tablet. *Go to the next state.*

State 12: Gunter sends the message by pressing the “Send Message” button. In this state, a “Cancel” button is also designed, allowing the user to go back to the main screen without sending the message. The VSP becomes happy that Gunter is socially interacting with others. **STOP.**

Component	Action
Emotion	The avatar looks happy

State 13: Gunter: “Maybe, I will do later”. **STOP.**

State 14: Gunter: “Delete the reminder” *Go to the next state.*

State 15: The VSP: “This reminder is deleted now”. **STOP.**

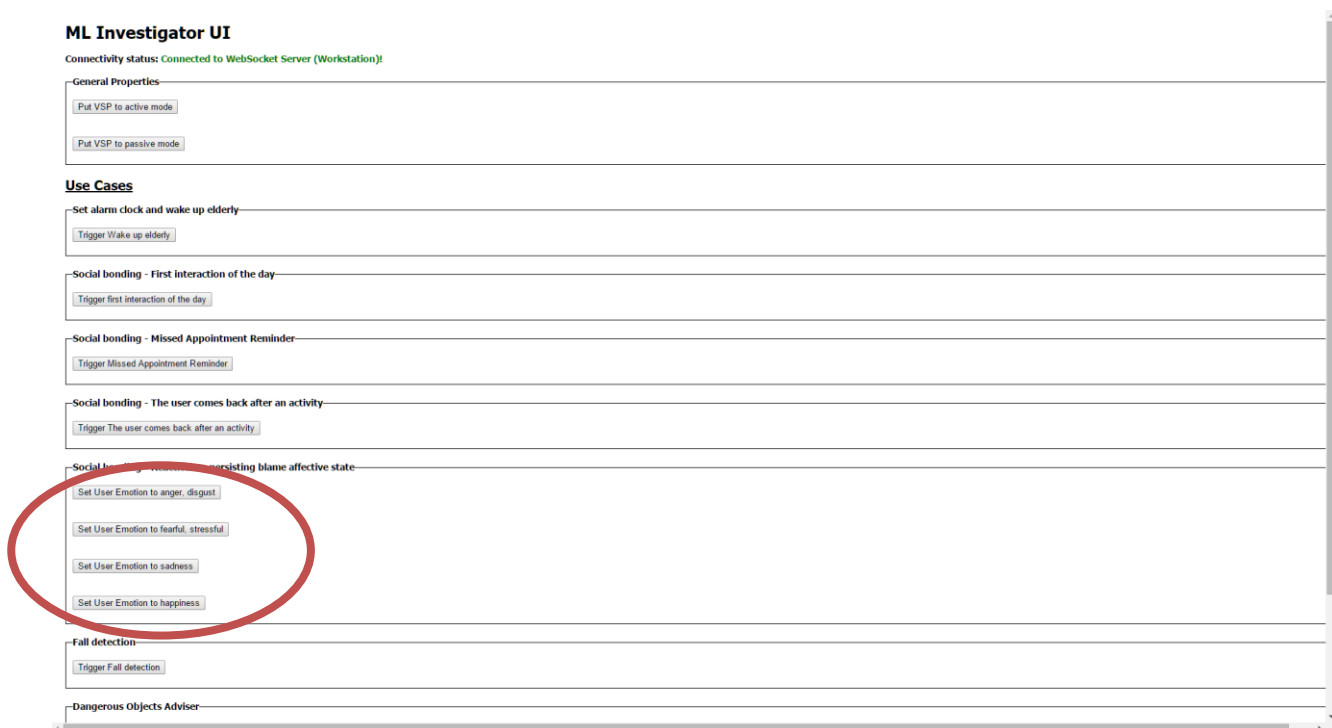


Figure 16 ML investigator UI: triggering reaction on persisting blame affective state of social bonding

Situation: Reaction on persisting blame affective state (anger, disgust)

State 1: The system detects that the user is on a persisting blame affective state. *Go to the next state.*

State 2: Gunter approaches to the system (or he’s already interacting with it). The VSP starts a new interaction: “Gunter, you look upset. Can I do something for you?” *Go to state 3 or 4.*

Component	Action
Emotion	The avatar looks worried

State 3: Gunter: “Yes, please”. *Go to state 6.*

State 4: Gunter: “No Mary, it’s only your impression”. *Go to the next state.*

State 5: The VSP: “Okay Gunter, good for you” **STOP**.

Component	Action
Emotion	The avatar looks relieved

State 6: The VSP looks particularly empathic and compassionate: “Gunter, staying in touch with your friends and family or participating in relaxing activities might help you calm down. Why don’t you plan the activity ‘walking in the park’? Maybe your friend Maria will join you. *Go to state 7, 8, 9, 10, 11 or 12.*

Component	Action
Memory	<ul style="list-style-type: none"> • Activity often created when angry • Friend often invited when angry
Emotion	The avatar expresses sympathy (compassion)

State 7: Gunter: “Call Maria”. A call with Maria is established. **STOP**.

State 8: Gunter: “Call another person” *Go to the Contact List service. The VSP continues the conversation: “Here you are Gunter, who do you want to call?”* **STOP**.

State 9: Gunter: “Invite Maria to visit me”. A new agenda item “Invite a friend” appears on the screen. Note that the activity “invite a friend” will be proposed as a standard activity in the Agenda Service (see Situation: Add Agenda Items and Inviting persons). The system already selected Maria as an invited person. **STOP**.

State 10: Gunter: “Invite someone else” A new agenda item “Invite a friend” appears on the screen. Note that the activity “invite a friend” will be proposed as a standard activity in the Agenda Service (see Situation: Add Agenda Items and Inviting persons). Contrary to the state 9, the system didn’t select Maria as an invited person. Gunter will choose thus the person to invite. **STOP**.

State 11: Gunter: “Create activity ‘walking in the park’”. A new agenda item “walking in the park” appears on the screen. Note that the activity “walking in the park” will be proposed as a standard activity in the Agenda Service (see Situation: Add Agenda Items and Inviting persons). **STOP**.

State 12: Gunter: “Maybe, I will do later”. **STOP**.

The system knows that Gunter often invites Luc to the relaxing activity “walking in the park”. Maria could be a friend or a member of the Gunter’s family.

Situation: Reaction on persisting fearful/stressful affective state

State 1: The system detects that the user is on a persisting fearful/stressful affective state. *Go to the next state.*

State 2: Gunter approaches to the system (or he's already interacting with it). The VSP starts a new interaction: "Gunter, you look worried about something. May I do something for you?" *Go to state 3 or 4.*

Component	Action
Emotion	The avatar looks worried

State 3: Gunter: "Yes, please". *Go to state 6.*

State 4: Gunter: "No Mary, it's only your impression". *Go to the next state.*

State 5: The VSP: "Okay Gunter, good to hear that you are ok!" **STOP.**

State 6: The VSP looks particularly empathic and compassionate: "Gunter, I don't know why you are stressed. But I am sure that Maria or André can support you and make you feel better." *Go to state 7, 8, 9 or 10.*

Component	Action
Memory	Friend often invited when fearful
Emotion	The avatar expresses sympathy (compassion)

State 7: Gunter: "Call Maria". A call with Maria is established. **STOP**

State 8: Gunter: "Call André". A call with André is established. **STOP**

State 9: Gunter: "Call another person" *Go to the Contact List service. The VSP continues the conversation: "Here you are Gunter, who do you want to call?"* **STOP.**

State 10: "Maybe, I will do later". **STOP.**

Maria could be a friend or a member of the Gunter's family; while André is a formal caregiver.

Situation: Reaction on persisting sadness state

State 1: The system detects that the user is on a persisting sadness state. *Go to the next state.*

State 2: Gunter approaches to the system (or he's already interacting with it). The VSP starts a new interaction: "Oh Gunter, It seems that you are feeling sad. Can I do something for you?" *Go to state 3 or 4.*

Component	Action
Emotion	The avatar expresses sympathy (compassion)

State 3: Gunter: “Yes, please”. *Go to state 6.*

State 4: Gunter: “No Mary, it’s only your impression”. *Go to the next state.*

State 5: The VSP: “Okay Gunter, good to hear that you are ok!” **STOP.**

Component	Action
Emotion	The avatar looks relieved

State 6a (Conditional): The VSP realises that Gunter (1) subscribed in all group activities proposed today by caregivers and (2) accepted all the invitations made by others primary end-users for today. The VSP looks particularly empathic and compassionate: “I am sorry that you are feeling sad, Gunter. Staying in touch with your friends and family might help you feel better. Why don’t you call or invite your friend Maria? I am sure that she will cheer you up”. *Go to state 9, 10, 11, 12 or 13.*

Component	Action
Memory	Friend often invited when sad
Emotion	The avatar expresses sympathy (compassion)

State 6b (Conditional): The VSP realises that Gunter subscribed in all group activities proposed today by caregivers but didn’t accept all the invitations made by others primary end-users for today. The VSP looks particularly empathic and compassionate: “I am sorry that you are feeling sad, Gunter. I am sure that participating in social activities or speaking with a friend will cheer you up. Yesterday Miguel invited you to the activity “going for a walk”. Why don’t you participate? Or maybe do you prefer to call or invite someone? Maybe speaking with Maria will help you feel better. *Go to state 8, 9, 10, 11, 12 or 13.*

Component	Action
Emotion	The avatar expresses sympathy (compassion)

State 6c (Conditional): The VSP realises that Gunter didn’t subscribe in all group activities proposed today by caregivers but accepted all the invitations made by others primary end-users for today. The VSP looks particularly empathic and compassionate: “I am sorry that you are feeling sad, Gunter. Maybe staying in touch with your family or participating in group activities will make you feel better. Today at 4:00 pm the group activity “Thai Chi”, will take place. Why don’t you participate? Or what about calling, or inviting Maria? I am sure that she will cheer you up”. *Go to state 7, 9, 10, 11, 12 or 13.*

Component	Action
Emotion	The avatar expresses sympathy (compassion)

State 6d (Conditional): The VSP realises that Gunter (1) didn’t subscribe in all group activities proposed today by caregivers and (2) didn’t accept all the invitations made by others primary end-users for today. The VSP looks particularly empathic and

compassionate: “I am sorry that you are feeling sad, Gunter. I am sure that participating in social activities or speaking with a friend will cheer you up. Yesterday Miguel invited you to the activity “going for a walk”. In addition today at 4:00 pm the group activity “Thai Chi”, will take place. Why don’t you participate in one of those activities? Or what about calling Maria? I am sure that she will cheer you up. *Go to state 7, 8, 9, 10, 11, 12 or 13.*

Component	Action
Emotion	The avatar expresses sympathy (compassion)

State 7: Gunter: “Show Group Activities”. *Go to the Group Activity Service.* **STOP.**

State 8: Gunter: “Show Invitations”. *Go to the “Message Service” and filter the Invitations.* **STOP.**

State 9: Gunter: “Call Maria”. A call with Maria is established. **STOP.**

State 10: Gunter: “Call another person”. *Go to the Contact List service. The VSP continues the conversation: “Here you are Gunter, who do you want to call?”* **STOP**

State 11: Gunter: “Invite Maria to visit me”. A new agenda item “Invite a friend” appears on the screen. Note that the activity “invite a friend” will be proposed as a standard activity in the Agenda Service (see Situation: Add Agenda Items and Inviting persons). The system already selected Maria as an invited person. **STOP.**

State 12: Gunter: “Invite someone else”. A new agenda item “Invite a friend” appears on the screen. Note that the activity “invite a friend” will be proposed as a standard activity in the Agenda Service (see Situation: Add Agenda Items and Inviting persons). Contrary to state 11, the system didn’t select Maria as an invited person. Gunter will choose thus the person to invite. **STOP.**

State 13: Gunter: “Maybe, I will do later”. **STOP.**

Note that Maria could be a friend or a member of the Gunter’s family.

Situation: Reaction on persisting positive affective state (happiness)

If the system detects a positive affective state on the user, the VSP will express the same emotional state, and this in every state of every use case (mimicry). Thus, if the end-user is happy, the VSP should appear happy too. This should reinforce positive emotional state in the end-user.

2.2.7 Use case: Call for Help (Safety Service)

ELDELRY ASPECTS

State 1: Nicole doesn’t feel good. She has strong headache and stomach-ache. She asks for help by saying: “Mary, help me”, “Mary, this is an emergency” or “Mary, I am not feeling well”. *Go to the next state.*

State 2: The VSP became worried and asks for a confirmation: “Hey Nicole. Apparently you need help. Shall I call your caregivers?” *Go to state 3, 5 or 6.*

Component	Action
Emotion	The avatar looks worried

State 3: Nicole: “No, I am ok now”. *Go to the next state.*

State 4: The VSP appears relieved and says: “Ok, Nicole. Let me know if you will need support from your caregivers”. **STOP**.

Component	Action
Emotion	The avatar looks relieved

State 5: Nicole answers: “Yes” or “Call for help”. *Go to state 7a.*

State 6: Nicole doesn’t answer to the VSP. After 2 minutes, a new dialogue is triggered by the system: “Nicole, some minute ago you asked for help. Shall I call your caregivers?”. *Go to state 3, 5, 6.1 or 6.2.*

Component	Action
Emotion	The avatar looks worried

State 6.1 (Conditional, preferred solution): During the trial, the system will not trigger an important number of false alarms. Nicole doesn’t answer to the VSP. *After 2 minutes, go to state 7a.*

State 6.2 (Conditional): During the trial, the system will trigger an important number of false alarms. Nicole doesn’t answer to the VSP. **STOP**.

State 7a: The Miraculous Life system automatically makes a call to predefined contacts (in a predefined order of priority). While the system is calling, the elderly hears a ringing tone and sees who is being called in the UI. This is shown and heard to keep the elderly informed that help is being called. The VSP continues the interaction: “Do not worry, Nicole. I am putting you in contact with Sylvie Rousseau” (i.e. the first caregiver contacted by the ML system). *Go to state 8a or 8b.*

State 7b: The Miraculous Life system automatically makes a call to predefined contacts (in a predefined order of priority). While the system is calling, the elderly hears a ringing tone and sees who is being called in the UI. This is shown and heard to keep the elderly informed that help is being called. The VSP continues the interaction: “Sylvie Rousseau cannot assist you at the moment. Do not worry, Nicole. I am putting you in contact with Cindy Wings” (i.e. the next caregiver contacted by the ML system). *Go to state 8a or 8b.*

State 8a (Conditional): In the state 5 the user answered “Yes”, and thus confirmed the need for help. Sylvie Rousseau (or Cindy Wings) answers the call of the Miraculous Life system. An automatic audio message is triggered: “This is a pre-recorded message provided by the Miraculous Life system: Nicole Framboise is in her apartment and she explicitly asked for care assistance. Nicole needs help immediately. Please press 1 to establish a call with Nicole or press 0 if you can’t assist Nicole.” *Go to the state 9 or 11.*

State 8b (Conditional): In the state 6 and 6.1 the user didn't answer to the system, and thus did not confirm the need for help. Sylvie Rousseau (or Cindy Wings) answers the call of the Miraculous Life system. An automatic audio message is triggered: "This is a pre-recorded message provided by the Miraculous Life system: Nicole Framboise is in her apartment and asked for care assistance. I asked a confirmation to Nicole, but Nicole did not answer to me. There are chances that Nicole needs help. Please press 1 to establish a call with Nicole or press 0 if you can't assist Nicole." *Go to the state 9 or 11.*

State 9: The caregiver presses 1 ("yes"). *Go to the next state.*

State 10: A new pre-recorded message is triggered by the system: "Thank you, I will now put you in contact with Nicole". A phone call is established and the caregiver speaks with Nicole. After talking to Nicole and the call ended Sylvie goes to Nicole's apartment (if needed) to assist her. *Go to state 13.*

State 11: The caregiver presses 0 ("No"). *Go to the next state.*

State 12: A new pre-recorded message is triggered by the system: "You aren't able to assist Nicole Framboise. Don't worry, I will call someone else. I will inform you as soon as possible via sms when assistance is provided". The next contact in the predefined list will be called by the system. *Go to the state 7b.*

State 13 (Conditional): In the state 5 the user answered "Yes", and thus confirmed the need for help. Each caregiver contacted by the Miraculous Life system will receive a SMS informing about the issue of the whole process. Three different messages could be sent by the system depending on the recipient:

- SMS sent to the caregiver who pressed 1 in state 9: "Date: 22/08/2015, Time: 12:00 am. Nicole Framboise is in her apartment and she explicitly asked for care assistance. I have put you in contact with Nicole. Thank you for your collaboration. The Miraculous Life System."
- SMS sent to the caregiver(s) who pressed 0 in state 11: "Date: 22/08/2015, Time: 12:00 am. Nicole Framboise is in her apartment and she explicitly asked for care assistance. I have put Nicole in contact with Sylvie Rousseau [i.e. the name of the caregiver who pressed 1 in state 9]. Thank you for your collaboration. The Miraculous Life System."
- SMS sent to all the caregivers if none of them pressed 1 in state 9: "Date: 22/08/2015, Time: 12:00 am. Nicole Framboise is in her apartment and she explicitly asked for care assistance. I tried to put Nicole in touch with the predefined list of caregivers without success. The caregivers contacted were: [insert here the list of the caregivers]. Nicole needs help immediately. I ask you to coordinate your efforts in order to provide help to Nicole. Thank you for your collaboration. The Miraculous Life System."

State 13b (Conditional): In the state 6 and 6.1 the user didn't answer to the system, and thus did not confirm the need for help. Each caregiver contacted by the Miraculous Life system will receive a SMS informing about the issue of the whole process. Three different messages could be sent by the system depending on the recipient:

- SMS sent to the caregiver who pressed 1 in state 9: "Date: 22/08/2015, Time: 12:00 am. Nicole Framboise is in her apartment and asked for care assistance. I asked a confirmation to Nicole, but Nicole did not answer to me. I have put you in contact with Nicole. Thank you for your collaboration. The Miraculous Life System."

- SMS sent to the caregiver(s) who pressed 0 in state 11: “Date: 22/08/2015, Time: 12:00 am. Nicole Framboise is in her apartment and asked for care assistance. I asked a confirmation to Nicole, but Nicole did not answer to me. I have put Nicole in contact with Sylvie Rousseau [i.e. the name of the caregiver who pressed 1 in state 9]. Thank you for your collaboration. The Miraculous Life System.”
- SMS sent to all the caregivers in the case none of them pressed 1 in state 9: “Date: 22/08/2015, Time: 12:00 am. Nicole Framboise is in her apartment and asked for care assistance. I asked a confirmation to Nicole, but Nicole did not answer to me. I tried to put Nicole in touch with the predefined list of caregivers without success. The caregivers contacted were: [insert here the list of the caregivers]. There are chances that Nicole needs help. I ask you to coordinate your efforts in order to provide help to Nicole. Thank you for your collaboration. The Miraculous Life System.

Note Optionally: A sensor will be installed in the bathroom of the seniors. When this sensor detects that the user is in the bathroom and not moving for more than 45 minutes, the system will automatically trigger the use case “call for help”.

2.2.4 Use case: Fall Detection (Safety Service)

Remark: This use-case is active whether the system is in “active mode” or “passive mode”. The system will always collect and process data from sensors for safety concerns.

CAREGIVER AND ELDERLY ASPECTS

State 1: In the middle of the night, Nicole wakes up to go to the toilet. She stumbles and falls on the floor. *Go to the next state.*

State 2: The Miraculous Life system detects the figure of the elderly on the floor. The VSP becomes worried and asks Nicole: “Nicole, it seems that you fell down. Shall I ask help from your caregivers?” *Go to state 3, 5 or 6.*

Component	Action
Emotion	The avatar looks worried

State 3: Nicole stands up. She feels good and answers: “No, I am ok now”. *Go to the next state.*

State 4: The VSP appears relieved and says: “Ok, Nicole. Let me know if you will need support from your caregivers”. **STOP.**

Component	Action
Emotion	The avatar looks relieved

State 5: Nicole answers: “Yes” or “Call for help”. *Go to state 7a.*

State 6: Nicole is lying on the ground and she doesn’t answer to the VSP. After 2 minutes, a new dialogue is triggered by the system: “Nicole, it seems that you fell down. Shall I ask help from your caregivers?” *Go to state 3, 5, 6.1 or 6.2.*

Component	Action
Emotion	The avatar looks worried

State 6.1 (Conditional, preferred solution): During the trial the system will not trigger an important number of false alarms. Nicole is still lying on the ground and she doesn't answer to the VSP. *After 2 minutes, go to state 7a.*

State 6.2 (Conditional): During the trial the system will trigger an important number of false alarms. Nicole is still lying on the ground and she doesn't answer to the VSP. **STOP.**

State 7a: The Miraculous Life system automatically makes a call to predefined contacts (in a predefined order of priority). While the system is calling, the elderly hears a ringing tone and sees who is being called in the UI. This is shown and heard to keep the elderly informed that help is being called. The VSP continues the interaction: "Do not worry, Nicole. I am putting you in contact with Sylvie Rousseau" (i.e. the first caregiver contacted by the ML system). *Go to the state 8a or 8b.*

State 7b: The Miraculous Life system automatically makes a call to predefined contacts (in a predefined order of priority). While the system is calling, the elderly hears a ringing tone and sees who is being called in the UI. This is shown and heard to keep the elderly informed that help is being called. The VSP continues the interaction: "Sylvie Rousseau cannot assist you at the moment. Do not worry, Nicole. I am putting you in contact with Cindy Wings" (i.e. the next caregiver contacted by the ML system). *Go to the state 8a or 8b.*

State 8a (Conditional): In the state 5 the user answered "Yes", and thus confirmed the need for help. Sylvie Rousseau (or Cindy Wings) answers the call of the Miraculous Life system. An automatic audio message is triggered: "This is a pre-recorded message provided by the Miraculous Life system: I detected a fall in the apartment of Nicole Framboise. I asked to Nicole if everything is fine, and Nicole explicitly asked for care assistance. Nicole needs help immediately. Please press 1 to establish a call with Nicole or press 0 if you can't assist Nicole." *Go to the state 9 or 11.*

State 8b (Conditional): In the state 6 and 6.1 the user didn't answer to the system, and thus did not confirm the need for help. Sylvie Rousseau (or Cindy Wings) answers the call of the Miraculous Life system. An automatic audio message is triggered: "This is a pre-recorded message provided by the Miraculous Life system: I detected a fall in the apartment of Nicole Framboise. I asked to Nicole if everything is fine, but Nicole did not answer to me. There are chances that Nicole needs help. Please press 1 to establish a call with Nicole or press 0 if you can't assist Nicole." *Go to the state 9 or 11.*

State 9: The caregiver presses 1 ("yes"). *Go to the next state.*

State 10: A new pre-recorded message is triggered by the system: "Thank you, I will now put you in contact with Nicole." A phone call is established and the caregiver speaks with Nicole. After talking to Nicole and the call ended Sylvie goes to Nicole's apartment (if needed) to assist her. *Go to state 13a or 13b.*

State 11: The caregiver presses 0 ("No"). *Go to the next state.*

State 12: A new pre-recorded message is triggered by the system: "You aren't able to assist Nicole Framboise. Don't worry, I will call someone else. I will inform you as soon as possible

via sms when assistance is provided”. The next contact in the predefined list will be called by the system. *Go to the state 7b.*

State 13a (Conditional): In the state 5 the user answered “Yes”, and thus confirmed the need for help. Each caregiver contacted by the Miraculous Life system will receive a SMS informing about the issue of the whole process. Three different messages could be sent by the system depending on the recipient:

- SMS sent to the caregiver who pressed 1 in state 9: “Date: 22/08/2015, Time: 12:00 am. I detected a fall in the apartment of Nicole Framboise. I asked to Nicole if everything is fine, and Nicole explicitly asked for care assistance. I have put you in contact with Nicole. Thank you for your collaboration. The Miraculous Life System.”
- SMS sent to the caregiver(s) who pressed 0 in state 11: “Date: 22/08/2015, Time: 12:00 am. I detected a fall in the apartment of Nicole Framboise. I asked to Nicole if everything is fine, and Nicole explicitly asked for care assistance. I have put Nicole in contact with Sylvie Rousseau [i.e. the name of the caregiver who pressed 1 in state 9]. Thank you for your collaboration. The Miraculous Life System.”
- SMS sent to all the caregivers in the case none of them pressed 1 in state 9: “Date: 22/08/2015, Time: 12:00 am. I detected a fall in the apartment of Nicole Framboise. I asked to Nicole if everything is fine, and Nicole explicitly asked for care assistance. I tried to put Nicole in touch with the predefined list of caregivers without success. The caregivers contacted were: [insert here the list of the caregivers]. Nicole needs help immediately. I ask you to coordinate your efforts in order to provide help to Nicole. Thank you for your collaboration. The Miraculous Life System.”

State 13b (Conditional): In the state 6 and 6.1 the user didn’t answer to the system, and thus did not confirm the need for help. Each caregiver contacted by the Miraculous Life system will receive a SMS informing about the issue of the whole process. Three different messages could be sent by the system depending on the recipient:

- SMS sent to the caregiver who pressed 1 in state 9: “Date: 22/08/2015, Time: 12:00 am. I detected a fall in the apartment of Nicole Framboise. I asked to Nicole if everything is fine, but Nicole did not answer to me. I have put you in contact with Nicole. Thank you for your collaboration. The Miraculous Life System.”
- SMS sent to the caregiver(s) who pressed 0 in state 11: “Date: 22/08/2015, Time: 12:00 am. I detected a fall in the apartment of Nicole Framboise. I asked to Nicole if everything is fine, but Nicole did not answer to me. I have put Nicole in contact with Sylvie Rousseau [i.e. the name of the caregiver who pressed 1 in state 9]. Thank you for your collaboration. The Miraculous Life System.”
- SMS sent to all the caregivers in the case none of them pressed 1 in state 9: “Date: 22/08/2015, Time: 12:00 am. I detected a fall in the apartment of Nicole Framboise. I asked to Nicole if everything is fine, but Nicole did not answer to me. I tried to put Nicole in touch with the predefined list of caregivers without success. The caregivers contacted were: [insert here the list of the caregivers]. There are chances that Nicole needs help. I ask you to coordinate your efforts in order to provide help to Nicole. Thank you for your collaboration. The Miraculous Life System.”

2.2.5 Use case: Dangerous Objects Adviser (Safety Service)



Figure 17 ML investigator UI: triggering dangerous object advisor

ELDERLY ASPECTS

State 1: Nicole is in the sitting room. Nicole is preparing to get out the house for a walk. *Go to the next state.*

State 2: The system recognizes an unknown object at the ground in her walking direction and interprets this object as potential danger for the elderly. The VSP appears worried and starts a new interaction: “Nicole, I see an object at the ground in your walking direction. It could be dangerous! I think you should move this object in a safer place.” *Go to the next state or to state 5 or 7.*

Component	Action
Emotion	The avatar looks worried

State 3: Nicole sees the umbrella on the ground. She picks it up and places it on the umbrella stand, by answering to the VSP: “Thank you, I moved it”. *Go to the next state.*

State 4: The Miraculous Life system detects that the potential risk has been raised. The VSP continues the interaction: “You’re welcome Nicole”. **STOP.**

Component	Action
Emotion	The avatar looks relieved

State 5: Nicole did put the umbrella there on purpose. So, she will not forget it and answers to the VSP: “It is ok. I just put it there myself”. *Go to the next state.*

State 6: The Miraculous Life system accepts Nicole’s argument and says “OK Nicole, just be aware not to stumble over it”. **STOP**.

Component	Action
Emotion	The avatar looks neutral

State 7: Nicole does not react to the advice provided by the VSP and she goes to the toilet. *Go to the next state.*

State 8: Nicole comes back to the sitting room. A new advice will be triggered by the system 30 minutes later. Note: the Miraculous Life system will continuously trigger advices until the elderly moves the object. **STOP**.

2.2.6 Use case: Danger Situations Adviser (Safety Service)

To trigger this use case we need to have the meal service use case first:

Meal preparation

Situation: The elderly opens the Meal Preparation Service

State 1: July tells the VSP: “Open Meal Preparation”. *Go to the next state.*

State 2: VSP: “Welcome to the Meal Preparation Service. How can I help you?” The list of all the recipes available appears on the screen. Note that this list is in agreement with his dietary requirements and allergies. *Go to state 3 or 18.*

Situation: The elderly consults a recipe

State 3: July tells the VSP: “Show me omelette with cheese”. *Go to the next state.*

State 4: The VSP is on the right, showing the ingredients needed for the asked recipe:

Omelette with cheese: ingredients

- *large free-range eggs*
- *sea salt*
- *freshly ground black pepper*
- *1 small knob butter*
- *1 small handful Cheddar cheese, grated, optional*

The VSP: “On the screen, you can see the ingredients needed for the recipe omelette with cheese. How can I help you, July?” *Go to state 5, 7, 11, 13, 17, or 18.*

State 5: July asks: “Read me the ingredients”. *Go to the next state.*

State 6: The VSP reads the ingredients shown on the screen aloud. The VSP concludes the list of ingredients by saying: “Anything else?” *Go to state 5, 7, 11, 13, 17, or 18.*

State 7: July asks: “Add an ingredient in the shopping list” *Go to the next state.*

State 8: The VSP: “Which ingredient would you like to add?” *Go to the next state.*

State 9: July: “Sea salt”. *Go to the next state.*

State 10: The VSP: “I just added the ingredient ‘sea salt’ on your shopping list, July. How can I help you?” *Go to state 5, 7, 11, 13, 17, or 18.*

State 11: July asks: “Add all the ingredients in the shopping list” *Go to the next state.*

State 12: The VSP: “I just added all the ingredients of the recipe ‘omelette with cheese’ to your shopping list, July. Anything else?” *Go to state 5, 7, 11, 13, 17, or 18.*

State 13: July asks: “Show me the procedure of the recipe”. *Go to the next state.*

State 14: The VSP is on the right, showing the procedure of the recipe in txt:

“Beat together eggs and water until blended. In a 10-inch omelette pan heat butter until just hot enough to sizzle a drop of water. Pour in egg mixture.”

The VSP: “On the screen, you can see the ingredients needed for the recipe omelette with cheese” *Go to the next state.*

State 15: July: “Go back to the ingredients”. *Go to the next state.*

State 16: The VSP: “Here you are anything else?” *Go to state 5, 7, 11, 13, 17, or 18.*

State 17: July: “Go back to the recipe list”. *Go to state 2.*

Situation: The elderly quits the Meal Preparation Service

State 18: July: “I want to close the Meal Preparation Service” *Go to the next state.*

State 19: The Meal Preparation Service is now closed and the VSP is on the “full screen mode”. **STOP.**

2.2.6 Use case: Danger Situations Adviser/oven and stove reminder

ELDERLY ASPECTS

State 1: Nicole is cooking lunch by consulting a recipe contained in the Meal Preparation Service. *Go to the next state.*

State 2: The recipe of the service “Meal Preparation” was open for more than 1 hour and the elderly didn’t interact with it for more than 1 hour. The system evaluates this situation as being potentially dangerous for the elderly. The VSP starts a new interaction: “Nicole, I could be wrong, but you were preparing a meal. Did you turn off the stove?” *Go to state 3, 5, 7 or 9.*

Component	Action
Emotion	The avatar looks worried

State 3: Nicole: “Yes I turned off the stove. Thank you, Mary”. *Go to the next state.*

State 4: The Miraculous Life system detects that the potential risk has been removed and feels relieved. The VSP continues the interaction: “You’re welcome Nicole.” **STOP.**

Component	Action
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Emotion	The avatar looks relieved
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State 5: Nicole: “I wasn’t cooking”. *Go to the next state.*

State 6: The VSP: “Okay, I’m sorry I bothered you Nicole.” **STOP.**

Component	Action
Emotion	The avatar looks relieved

State 7: Nicole: “I am still cooking”. *Go to the next state.*

State 8: The VSP: “Okay, Nicole. Enjoy your meal.”

Component	Action
Emotion	The avatar looks relieved

State 9: Nicole does not react to the advice. *Go to the next state.*

State 10: Ten minutes later, a new reminder is triggered by the system. Note: the Miraculous Life system will continuously trigger advices until the elderly answers to the advice. **STOP.**

2.5.2 Use case: Physical Activity Service (Guidance Service)

Note: the videos will be recorded in both end-user institutions with an expert assistance, and – potentially – with seniors as demonstrators. The videos will have duration of 4-5 minutes each.

CAREGIVER ASPECTS

Situation: The caregiver assigned the video to the users

State 1: Sylvie Rousseau (caregiver) accesses the caregiver interface and selects the user Gunter. *Go to the next state.*

State 2: Sylvie chooses the videos that are available for Gunter, according to his specific health condition. **STOP.**

ELDERLY ASPECTS

Situation: The service is initiated by the user or after a suggestion like in the use case above (use case 2.5.1)

State 1: The user initiates the “Physical Activity” Service by saying “Open Physical Activity Service”. *Go to the next state.*

State 2: The VSP: “Welcome to the Physical Activity Service, Gunter. Please choose the type of exercise that you would like to perform”. On the screen appears a list of categories (for example: lower body stretches, upper body stretches, posture. The categories and the videos will be identified and recorded by the end-users institutions). *Go to the next state.*

State 3: Gunter selects by voice one of the categories presented on the screen: “Upper body stretches”. *Go to the next state.*

State 4: The list of all videos contained in this category appears on the screen. Each line of the list is composed by (1) a frame (image) of the video, and (2) the name of the video. The VSP continues the interaction: “Here are the available videos for the category ‘upper body stretches’. Please select the video you would like to watch, Gunter”. *Go to state 5 or 6.*

State 5: Gunter: “Select video 4”. *Go to state 7.*

State 6: Gunter: “Go back to the main menu”. *Go to state 2.*

State 7: The VSP gives an introduction about the selected video: “The purpose of this video is to increase the flexibility and range of motion of your hand and fingers. The length of the video is 5 minutes. What do you want to do?” *Go to state 8 or 9.*

State 8: Gunter: “Play the video”. *Go to state 10.*

State 9: Gunter: “Go back to the list of video”, *Go to state 4.*

State 10: The video is played by the system (layout: full-screen). The user is able to pause and stop the video. Note that the system will not track if the user is actually performing some exercise or not. *Once the video is played, go to the next state.*

State 11: The VSP concludes the interaction by motivating the user with some analytics: “Well done, Gunter. This is the fifth time you use this service this week! I hope to use this service again soon”. The VSP is on the “full screen mode”. **STOP.**

Component	Action
Emotion	The avatar looks happy

2.1.1 Use case: Contact list (Co-Net Service)

Note: All the persons listed in the Co-Net Service will be added before the starting of the trial. Only administrators will be able to (1) add new persons in this list and (2) assign persons to the Virtual Care Teams of each primary end-user. A number of predefined Virtual Care Team types (e.g., contact list, friends, emergency contacts, etc.) will be recorded in the KB.

ELDERLY ASPECTS

Situation: Luc opens the Contact List Service

State 1: Luc approaches the device and asks: “Open Contact list”. *Go to the next state.*

State 2: The VSP is on the right, showing the contact list (e.g., see **Error! Reference source not found.**). Each line of the list is composed by (1) the photo of the contact (if available), (2) the first name of the contact, (3) the last name of the contact. The VSP continues the interaction: “Luc, here you are. How can I help you?” *Go to state 3, 7, 11 or 15.*

Situation: Luc wants to see the contact details of his friend Thom

State 3: Luc answers: “See details of Thom”. *Go to the next state.*

State 4: The VSP is on the right. The contact list disappears; while the details of the fourth entry (Thom Bellamy) are shown on the screen (e.g., see **Error! Reference source not found.**). The VSP continues the interaction: “Luc, here you are.” *Go to the next state.*

State 5: Luc now sees on the screen all he wanted to know. Luc says: “Thank you”. *Go to the next state.*

State 6: The VSP says: “Okay” and returns to the main screen of the Contact List Service. *Go back to state 3 and check the details of another member in the Contact list or go to state 7, 11 or 15.*

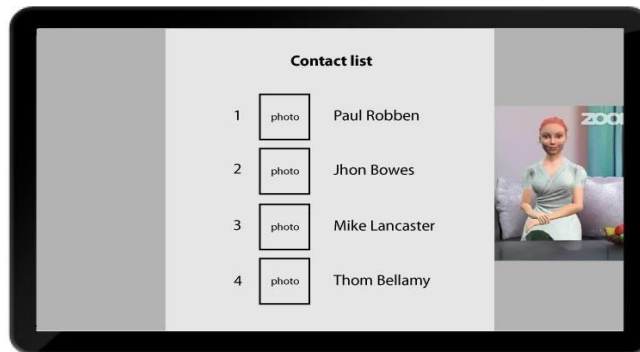


Figure 18 Contact list in the Miraculous Life system

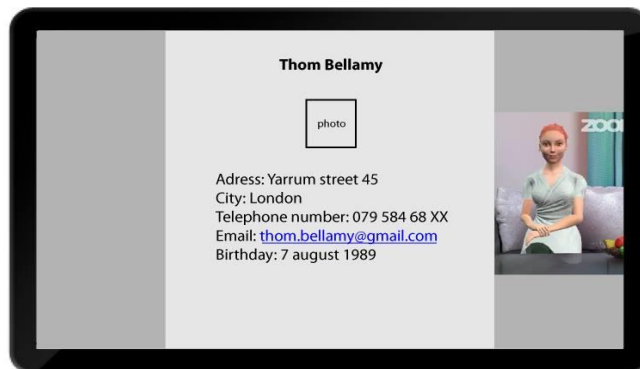


Figure 19 Details of contact in the Miraculous Life system

Situation: Luc wants to call his friend Thom

State 7: Luc answers: “Call Thom”. *Go to the next state.*

State 8: The VSP is on the right. The VSP becomes happy that Luc wants to socially interact with the others and continues the interaction: “Ok Luc, I am calling Thom now”. *Go to the next state.*

Component	Action
Emotion	The avatar looks happy

State 9: The “calling window” appears on the screen, showing the outgoing call. Thom answers to the call: the conversation starts. *Go to the next state.*

State 10: Luc (or Thom) ends the conversation by pressing the “End Call” button. The call window is now closed. The VSP says: “Anything else?” and returns to the main screen of the Contact List Service. *Go to state 3, 7, 11 or 15.*

Situation: Luc wants to send a message to his friend Thom

State 11: Luc answers: “Write a message to Thom”. *Go to the next state.*

State 12: The VSP is on the right. The VSP continues the interaction: “Ok Luc”. *Go to the next state.*

State 13: A form appears on the screen, allowing Luc to write a message to Thom via the keyboard of the tablet. *Go to the next state.*

State 14: Luc sends the message by pressing the “Send Message” button or by saying “Send Message”. In this state, a “Cancel” button is also designed, allowing the user to go back to the main screen of the Contact List service without sending the message. Also a voice command “Cancel Message” to the VSP can be used. The VSP becomes happy that Luc is socially interacting with others and continues the interaction: “Anything else?” and returns to the main screen of the Contact List Service. *Go to state 3, 7, 11 or 15.*

Component	Action
Emotion	The avatar looks happy

Situation: Luc quits the Contact List Service

State 15: Luc answers: “I want to quit the Contact List Service”. The VSP is on the “full screen mode”. **STOP.**

Situation: Luc receives a call

State 16: By default, the ‘Call Software’ runs in the background of the Miraculous Life system, allowing the elderly to receive calls when the Miraculous Life system is turned on. It’s 14.00 PM and Luc receives a call from his daughter Miriam. The “Calling Window” appears on the screen, showing the incoming call. *Go to the next state or to state 19.*

State 17: Luc heard the incoming call ring. Luc approaches the device and presses the button “Answer”. In alternative, Luc tells to the VSP: “Answer”. The conversation starts. *Go to the next state.*

State 18: Luc (or Miriam) ends the conversation by pressing the button “End Call”. The call window is now closed and the VSP is on the “full screen mode”. The VSP concludes the interaction: “I hope you had a nice conversation, Luc. If you ever need anything, don't hesitate to ask me”. **STOP.**

State 19: Luc doesn't hear the incoming call ring, or doesn't want to answer to the call. He continues to read a book (or watch TV). A notification will be triggered by the system, 5 minutes after the missed call. **STOP.**

Situation: Luc receives a new message

State 20: Luc received a new message from Mike. A notification is triggered by the system with a sound. The VSP: “Luc, you have a new message from Mike. Do you want to see it?” *Go to state 21 or 27.*

State 21: Luc answers “Show me the message” *Go to the next state.*

State 22: The VSP says: “Okay, here it is”. The service “Message System” is automatically open and the message written by Mike appears on the screen. *Go to state 23, 24, 25 or 27.*

State 23: Luc: “Answer back to Mike”. *Go to situation: Luc wants to send a message to his friend Thom; Go to state 12.*

State 24: Luc: “Call Mike”. *Go to situation: Luc wants to call his friend Thom; Go to state 8.*

State 25: Luc: “Delete the message”. *Go to the next state.*

State 26: The VSP: “Ok Luc, the message has been deleted. If you need something, don’t hesitate to ask me”. The VSP is on the “full screen mode”. **STOP.**

State 27: Luc: “Remind me later”. *Go to the next state.*

State 28: The VSP: “I will remind you again in **30 minutes**”. **STOP.**

2.1.2 Use case: Message System (Co-Net Service)

Note that a code colour could be used in order to distinguish between (1) the invitations (see use case 2.3.1 Agenda), (2) the notifications (see use case 2.3.5 Notification Service), and (3) the messages sent by others primary end-users (see use case 2.1.1 Contact List). Designers should also consider implementing a filtering tool.

ELDERLY ASPECTS

Situation: The elderly opens the Message System Service

State 1: Luc approaches the device and says: “Open Message System”. *Go to the next state.*

State 2: The VSP is on the right, showing all the messages in chronological order received by the elderly and the possible user actions. The VSP continues the interaction: “Luc, at the screen you see the messages you received. What do you want to do?” *Go to state 3, 9 or 14.*

Situation: The elderly wants to see a message

State 3: Luc answers to the VSP: “Show me message 6”. *Go to the next state.*

State 4: The message written by Mike appears on the screen. The VSP: “Here you are, Luc. Now, what do you want to do?” *Go to state 5, 6 or 7.*

State 5: Luc: “Answer back to Mike”. *Go to situation: Luc wants to send a message to his friend Thom; state 11 of use case 2.1.1.*

State 6: Luc: “Call Mike”. *Go to situation: Luc wants to call his friend Thom; state 7 of use case 2.1.1.*

State 7: Luc: “Delete the message”. *Go to the next state.*

State 8: The VSP: “Ok Luc, the message has been deleted. How can I help you now?” and returns to the main screen of the Message System Service. *Go to the state 3, 9 or 14.*

Situation: The elderly wants to write a new message

State 9: Luc answers to the VSP: “Write a new message”. *Go to the next state.*

State 10: The VSP is on the right: “Ok Luc. To whom would you wish to send the message?” *Go to the next state.*

State 11: The contact list appears on the screen. Luc says: “To Donato”. *Go to the next state.*

State 12: A form appears on the screen, allowing Luc to write a message to Donato via the keyboard of the tablet. *Go to the next state.*

State 13: Luc sends the message by pressing the button “Send Message” or by saying “Send Message” to the VSP. In this state, a “Cancel” button is also designed, allowing the user to come back to the main screen of the Message System Service without sending the message. The VSP says: “Anything else?” and returns to the main screen of the Message System Service. *Go to the state 3, 9 or 14.*

Situation: The elderly quits the service

State 14: Luc answers: “I want to quit the Message System”. The Message System is now closed and the VSP is on the “full screen mode”. **STOP.**

Second pre-trial stage 2

During the trial all use cases will be tested as described in D1.2b REV.

The caregiver UI will be used by the caregivers for:

- Senior management: personal data of the elderly
- Activity and event management: activities organized by the end user organization
- Object management: list of possible objects
- Device management: devices of each elderly
- Elderly actions: information per elderly for the services agenda, medication, object location, periodic advice, physical activity video and notification.
- Messages: in- and outbox of caregiver

5 Pre-Trial and Trials Hardware Equipment and Physical Setup

5.1 Equipment

The hardware equipment for the second Pre-Trial is completely upgraded compared to the first Pre-Trial and it is extended to two systems. Each system consists of a workstation, a tablet device, a Windows Kinect v2 sensor and a mobile phone.

The workstation will act as the processing unit of the system and will be responsible for analysing the sensor data as well as housing the services and the communication medium with the Knowledge Base. Its technical specification was chosen according to internal testing setups, to accommodate the requirements for the Pre-Trials and Trials with regards to processing power and memory performance.

The tablet device will be the main interaction point of the user and the system. A Miraculous-Life android app is used to display the avatar user interface, and provide the text to speech voice output.

The sensory part of the Miraculous Life sensor is provided by the Windows Kinect v2 sensor and the built-in sensors of the tablet. For the gesture and surrounding analysis, the Windows Kinect v2 is exclusively used, but the task of sound acquisition for speech recognition and image capturing for facial expression analysis is performed by both Windows Kinect v2 and the built-in sensors of the tablet, depending on if the user is in view of the Windows Kinect v2 sensor.

Additionally, a mobile phone is used to contact someone for testing the call for help service.

The individual components of the equipment used for the Pre-Trial and Trials in MRPS and ORBIS are described in the table below:

Table 2 Miraculous-Life MRPS and ORBIS Trials hardware equipment.

<i>Equipment</i>	<i>Description</i>	<i>Utility</i>	<i>Notes</i>	<i>Price</i>
Workstation	Dell Inspiron 3000 Intel® Core™ i7-4790 processor 16GB RAM Windows 8.1	Workstation to do all the processing		1211CHF / 1100 euro
Tablet device	Samsung Galaxy Tab 4 10.1 4G (SM-T535) 16GB SSD, Android 4.4.2	Tablet device for user to interact with	Resolution primary camera 3.15 MP (2048 x 1536 pixels) Resolution secondary camera (1.3 MP)	308CHF / 360 euro
Depth sensor	Microsoft Kinect v2 sensor Microsoft Kinect Adapter for Windows	Sensor to collect sound, colour images, depth cues for the surrounding and skeleton movement for human motion analysis.	Additionally, the sensor can also retrieve colour images and depth information, but not in the Pre-Trial.	180CHF / 150 euro 60CHF/ 50 euro
Mobile phone	Samsung S4 Samsung Galaxy SIII	Mobile phone to be called in case of emergency	The type of phone is chosen based on availability, but the system is capable of	Not applicable

			handling similar phones as well	
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5.2 Physical Setup

5.2.1 Pre-Trials

The workstation will be setup on a table in a non-obtrusive area of the Pre-Trial room and will be connected to the network infrastructure available in the complex. The tablet device will also be connected to the same network infrastructure in order to communicate with the workstation. The user will be seated at a table and asked to interact with the tablet device.

The system setup is different for the second Pre-Trials as the Windows Kinect v2 sensor is used for the Fall Detection (Safety Service), which requires the whole person is in the view. Hence, the Windows Kinect v2 sensor is not placed near the screen, but at a position chosen in such a way that this safety service can be tested by persons simulating a fall. As the fall detection used the built-in human motion capturing, the Windows Kinect v2 sensor should be at around eye height, but slightly directed towards the ground. Put the Kinect in a height of ~ 2 meter and let it point downwards by ~ 30° - 40° (with 0° meaning: looking straight ahead). The Windows Kinect v2 sensor cannot be directed towards the window due to the fact that direct sunlight interferes with the active infrared light source.

Another difference in the setup of the system compared to the first Pre-Trial, is that two systems will be used during the second Pre-Trial. One to test all functionalities and one to demonstrate the whole flow of the invitation functionality (i.e. the alpha user sends an invitation to a beta user; the beta user receives a notification and accepts or rejects the invitation made by the alpha user; see situations “Add Agenda Items and Inviting persons”, and “Susan received an invitation” in use case 2.3.1 described in Chapter 3). Also a smart phone will be used in order to test the emergency call functionality (see use cases “Fall detection” and “Call for help” in use cases 2.2.4 and 2.2.7 described in Chapter 3).

In contrast with the second Pre-Trial first stage, emotion recognition was part of the second Pre-Trial second stage. Emotion recognition based on facial expressions has been updated (see D2.1b) after the second Pre-Trial first stage with the introduction of live calibration which should be better in handling images coming from a non-stationary camera, like the one in the tablet.

5.2.2 Trials

For the trials, the workstation will be installed in a non-obtrusive area of the user’s apartment and in close proximity to the Kinect camera such that it can be easily connected with the USB cable. Both the tablet and workstation will be connected to the same network infrastructure available in the user’s apartment so that they can easily communicate with each other.

The Kinect sensor will be installed in an area of the apartment that is most often used by the user (ex. living room) and will be installed at a height of ~2 meters and tilted ~ 30° - 40° towards the ground (with 0° meaning: looking straight ahead). The Kinect sensor will face away from windows as much as possible since direct sunlight can interfere with the active infrared light source of the sensor.

For the installations in the trials sides we will setup two kind of external sensors. Window and door contact sensors (magnetic contact sensors) will be connected through the HOMER

platform to the Miraculous-Life System. The gathered data will be used as additional input for low level safety services. A bed or pressure sensor will be used to get valuable information about the sleeping and resting behaviour of the elderly. This sensor is placed under the mattress and reacts on applied pressure when a person is lying down. This information is further on used by various services as additional input parameter. The bed sensor is also connected to the system via the HOMER platform.

The HOMER framework is an open source project and can be used to integrate sensors and devices from different vendors and with different communication protocols via an international standard. This technology allows the setup of and home platform already provides basic rules for pattern recognition. A detailed description of the HOMER platform can be found in D5.1 chapter 7.

6 Second Pre-Trial second stage and Trials Software

The software used in the second Pre-Trial supports the use cases that will be tested. To summarize chapter 4, the following use cases will be tested in the second Pre-Trial:

Reminders:

2.1.4 Use case: Medication Reminder (Medication Service – Care & Wellness Service)

2.1.5 Use case: Wake-up Calls (Agenda Service – Care & Wellness Service)

2.2.1 Use case: Periodic Advice (Agenda Service – Care & Wellness Service)

2.3.3 Use case: Appointment Reminder (Agenda Service - Care & Wellness Service)

Notification:

2.3.5 Use case: Notification Service (Co-Net Service)

Agenda and Events:

2.3.1 Use case: Agenda (Agenda Service – Care & Wellness Service)

2.3.2 Use case: Events/Group activities (Agenda Service - Care & Wellness Service)

Configuration:

2.2.2 Use case: Mode of the system: Active vs Passive Mode

2.2.3 Use case: Configure the VSP Speech (Dialogue Management)

Security:

2.2.4 Use case: Fall Detection (Safety Service)

2.2.7 Use case: Call for Help (Safety Service)

Guidance:

2.3.4 Use case: Object Location Assistance and Reminder (Guidance Service)

In Section 5.1 the current status of the software testables used for these use cases are discussed and what is it we want to get out of it from the second Pre-Trial.

6.1 Software Testables

6.1.1 Knowledge Base

The Miraculous-Life Knowledge Base (KB) serves as the data management hub for all cooperating services and components of the system. The KB provides a number of typical data management mechanisms (i.e. create, read, update, delete records) as well as specialized query support (e.g. filtering, aggregation) in order to transform low-level data to high quality information. The KB API involves a set of stored procedures that allow services to interact with the data tables and their relationships.

During the second Pre-Trial we will test the supporting database procedures of the following services:

- Care & Wellness Service
 - Medication
 - Medication Reminder
 - Agenda
 - Person Agenda
 - Wake-up Calls
 - Period Advice
 - Events/Group activities
 - Appointment Reminder
- Safety Service
 - Fall Detection (through Co-Net)
 - Call for Help (through Co-Net)
- Guidance Service
 - Object Location Assistance and Reminder
- Co-Net Service
 - Notification

6.1.2 User Interface and HCI

6.1.2.1 User Interface

Although the Miraculous-Life system builds upon speech recognition as the main component for interaction, the user interface is designed in such a way to support the interaction by showing the relevant information on the screen. For example, if the VSP mentions options for the user to select, the options are also displayed on the screen.

The Pre-Trial will include the user interface specification as indicated in D1.2b as much as possible.

Several improvements have been made to the user interface according to the results from the first pre-trials. First of all, the VSP appearance was reworked (according to the end-users feedback from the first Pre-Trial) and is now more prominent in the service view. Additionally, a completely new element was added which enables the user to skip an avatar video or go back one step in the dialogue. Moreover it is now clearly indicated whether the VSP is currently processing, listening or speaking.

6.1.2.2 Avatar

This service will be the identity of the complete system. The avatar is a character shown on the tablet screen, to which the elderly can talk to. It will display emotional gestures to imitate a real human person as close as possible. This approach should motivate the elderly to interact positively with the avatar, to accept the avatar as a mode of communication, and create a pleasant environment when communicating with an emotionally responsive avatar.

In order to adequately deliver information, to adapt to the needs of the elderly, and to react appropriately in the defined use cases, the avatar will be enabled to express the emotions neutral, happy, sorry, worried, directive behaviour, compassionate, and relieved.

6.1.2.3 Text to Speech

The text-to-speech module will provide the verbal communication for the system. For the second Pre-Trial, no changes have been made to this module.

6.1.2.4 Speech Recognition

With speech recognition, we provide the means to have a natural human-like interaction with the system. A command-based speech recognizer is implemented using the Microsoft Speech API for French, Dutch, and English. The Dialogue Manager will provide both French and Dutch dictionaries dedicated to the pre-trial scenario. At each step of the conversation, the dialogue manager automatically generates a dictionary containing the expected utterances to be spoken by the user at that step and sends it to speech recognition. Subsequently, the speech recognition listens to these utterances and notifies the dialogue manager if one of these utterances is detected. The speech recognition can be used with an analog or digital (USB) microphone, as well as with the built-in sensor array in the Kinect sensor for the speech input. More details regarding this module are provided in D3.2.

6.1.2.5 Dialogue Manager

The Dialogue Manager is based on the Conscientia framework developed at the University of Geneva. It is responsible for facilitating the dialogue interactions with the older person. The framework consists of several computational components that together regulate the interaction with the older person such as: belief representation, action selection, emotion simulation, memory, and natural language generation and interpretation. Beliefs are represented as Information States and cover the VSP's beliefs regarding itself, the world and the conversational discourse. The action selection component is based on the Belief-Desire-Intention theory and is responsible for managing the dialogue and interaction with the older person, based on the users and agent's goals, beliefs, and emotions. The conversational AI plans are represented in a hierarchical structure, which is inspired by the Hierarchical Task Network approach but also offering other advanced features such as inheritance between dialogue states and incorporation of affective and cognitive mechanisms of a social agent. The memory component enables the VSP to remember knowledge from past interactions and uses this knowledge in new interactions with the user with the goal of making the interaction more enjoyable and engaging for the user. Human-like autobiographical memory is achieved by affective tagging of memory episodes based on emotions. More details regarding this module are provided in D3.2.

6.1.3 Services

6.1.3.1 Care & Wellness Service

Medication Service

The medication service provides medical information related to a specific elderly. In particular, this service is responsible for providing personal details of medicine associated with an elderly such as name, description and route of medicine; along with medication details such as date that an elderly started and ended a particular medication as well as frequency that a medication should be taken.

The caregiver is responsible to insert/delete/update medication information for a specific elderly in the medication service. The medication information includes details regarding the medicine associated to an elderly, frequency that the medication should be taken and the medication route. In cases where new medication information is added then the medication service automatically creates a new calendar item through the agenda daemon of the Agenda Service. This calendar item will subsequently create a new agenda item. The elderly can also view his/her medication list and details about each medication that s/he is associated to.

During the second Pre-Trial a predefined set the Medication Service API methods will be tested thoroughly through the components involved in the second Pre-Trial. More specifically, the following mechanisms will be tested during the second Pre-Trial:

- Adding new medications for a person (along with all the calendar, agenda and notification items that will be involved)
- Retrieve medication for a specific person
- Retrieve medication reminders

Finally, the second Pre-Trial will provide feedback related to the functionality and completeness of the Medication Service.

Agenda Service

The Miraculous-Life Agenda Service is responsible for maintaining the daily activities of the user in the form of a calendar providing functionality similar to many popular software systems (e.g., Microsoft Outlook, Google Calendar). The Agenda Service stores calendar entries in the KB Calendar data structure. These calendar entries may be events that occur only once or have a recurrence rule for repeating periodically (e.g. daily, monthly, and weekly). The actual recurring entries are generated by the Agenda Daemon and are named as an agenda entry. For example, the Calendar Entry “Play chess every Monday for two months” will generate 8 agenda entries. Similarly to other services, the Agenda Service provides a number of typical data management mechanisms (i.e., create, read, update, and delete calendar and agenda entries) as well as specialized query support (e.g., get daily agenda).

During the second Pre-Trial a predefined set the Agenda Service API methods will be tested thoroughly through the components involved in the second Pre-Trial. More specifically, the following mechanisms will be tested during the second Pre-Trial:

- Person Agenda
- Wake-up Calls
- Period Advice
- Events/Group activities
- Appointment Reminder

Finally, the second Pre-Trial will provide feedback related to the functionality and completeness of the Agenda Service.

6.1.3.2 Guidance Service:

Object Location Assistance and Reminder

The Miraculous-Life Object Location Assistance and Reminder Service has a double functionality. On one hand, it serves as a “memory support” that helps the elderly to remember where certain objects (e.g. wallet, keys) are usually stored around the house (e.g. in the kitchen drawer). This feature relies on an inventory -of objects and their typical storage locations-created and managed by the elderly users themselves, or their caregivers. When an elderly queries the system for an object, its “typical” location is retrieved from the KB Object Location Assistance and Reminder data structure.

On the other hand, the Service allows the elderly to query the system for a specific object at runtime and receive information about its current location in the surrounding environment. The system is able to analyse the environment and recognize a (predefined) set of objects as long as these are visible in the field of the cameras (e.g. Microsoft’s Kinect or other sensors).

Finally, the Object Location Assistance and Reminder Service can detect in real time that an elderly is actively “searching” for an object in the surrounding environment. This information will be used to automatically trigger the VSP to offer support for locating an object, even if the user does not make an implicit query to the system.

During the second Pre-Trial, the aspects of service that will be tested are the following:

- Store a new object to the list of stored objects
- Remove an object from the list of stored objects
- View the list of all the stored objects
- Query the system for an object and receive information about its “typical” location

The second Pre-Trial will provide feedback related to the functionality and completeness of the Service and the interaction patterns used by the elderly when storing and querying for objects.

The runtime detection of (predefined) objects based on cameras (Environment Analysis) and the automatic identification that an elderly is searching (User Behaviour Analysis) for something is not available yet for the second Pre-Trial, but will be integrated and tested in the second Pre-Trial second stage.

6.1.3.3 Co-Net Service

The Collaborative Care Network (Co-Net) service facilitates the management and organization of people around the elderly (i.e. establishes Virtual Care Teams of different types (e.g. Family, Friends, and Care Professionals) and establishes and promotes collaboration between the elderly and formal/informal carers as well as other involved persons included in their Virtual Care Teams to cover personalized support and care provision in the area of daily activities support at home.

More specifically, the Co-Net service:

- Builds around the elderly person Virtual collaborative Care Teams (VCTs) combining different people (of different ages and roles) together as needed and selected by the elderly, that can assist, collaborate and actively communicate with the elderly for continues care provision so as to improve their daily life and support them through their daily activities.
- Maintains unique personalized profiles for the elderly promoting personalized care provision.
- Supports functionality that allows other authorised components/services of the Miraculous-Life system to request and retrieve or manipulate information related to the profile and socialization aspect of the elderly,
- Promotes collaboration, between the elderly and formal/informal carers as well as other members of his/her VCT, in order to better and more efficiently assist the elderly and support him/her through his/her daily activities. Communication between the elderly, the formal/informal carers as well as other members of his/her VCT and other users of the Miraculous-Life system will be facilitated through a message management and a notification management service.

During the second Pre-Trial, the aspects of Co-Net's service that will be tested are described below:

- Regarding the Co-Net's Virtual Care Team Management service:

During the second Pre-trial Mainly the functionality that allows other authorised components/services of the Miraculous-Life system to request and retrieve related to the socialization aspect of the elderly will be tested. For example, retrieving different information regarding the care professionals, emergency contacts, contact list persons, friends, family, etc., of the elderly, information regarding the role of each member in the Virtual Care Team, etc.
- Regarding the Co-Net's Person (User) Profile Management service:

During the second Pre-Trial, mainly the functionality that allows other authorised components/services of the Miraculous-Life system to request and retrieve information related to the profile aspect of the elderly will be tested.
- Regarding the Co-Net's Notification Management service:
 - Almost full functionality of this service will be tested during the second Pre-Trial. More specifically, the functionality of generating, managing and providing alerts, reminders (i.e., medication reminders, appointment reminders,) and other type of notifications (i.e., wake up alarms, missed call notifications, periodic advice notifications, etc.) to users (through the Avatar) will be tested.

Note that provision of alerts, reminders and notifications to the elderly, their formal/informal carers as well as the other members of the elderly VCTs, are provided instantly to them by the Avatar, in order to fulfil the safety needs of the elderly but also support them through their daily life activities.

6.1.3.4 Active vs Passive Mode

The VSP has two modes available, namely an active and a passive mode. The user can set the VSP from one mode to the other at moment during the dialogue. The purpose behind this functionality is that the use can deactivate certain aspects of the VSP when in passive mode. Table 3 shows a comparison between the different services that are activated or deactivated based on the chosen mode.

Table 3: Active vs. passive mode.

Service	Active	Passive
Appointment Reminder	ON	OFF
Danger Situations Adviser	ON	ON
Dangerous Objects Adviser	ON	ON
Fall Detection	ON	ON
Medication Reminder	ON	ON
Motivation for Physical Activity	ON	OFF
Notification Service	ON	OFF
Periodic Advice	ON	OFF
Wake-up Calls	ON	ON

It is noteworthy that certain important services like the “Danger situation adviser” or the “Fall Detection” will remain active even if the system is in passive mode. This ensures that the end user still feels safe even though he does not want to be reminded of appointments at the moment. The speech recognition will still be active when the VSP is in passive mode, so that the user can switch the VSP back to the active mode via a spoken command.

During the second Pre-Trials, the correct functionality of the VSP will be tested depending to the selected mode.

6.1.3.5 Safety Service

The safety services will fulfil safety needs of the elderly while carrying out his/her daily life activities at home. In this regard, two safety services will be tested during the course of the second Pre-Trials.

The first safety service is the fall detection, which automatically calls and informs caregivers when a fall is detected. Since it is not possible to actually test the fall detection with the elderly, this behaviour will be triggered manually by the supervisors. When a fall is detected, the caregiver contacts are retrieved from the KB and called automatically by the system.

The second safety service that will be tested is “call for help”. This service establishes a phone call to a caregiver on behalf of the elderlies wish.

In both cases the end users gets informed by the VSP that a caregiver is informed and will be at the apartment shortly.

6.2 Software Installation

The software for the Pre-Trial will be installed by AIT. However, if necessary, local support is provided by the technical partner responsible for technological support for each of the end-user organizations: Noldus for ORBIS Hoogstaete, and UniGe for MRPS. The installation procedure will have two main steps: the installation of the workstation software, and the installation of the tablet software. The entire procedure is described in detail in D5.3b.

In this deliverable, Table 4 provides additional installation information for the second Pre-Trial with respect to the procedure described in D6.3a. For a detailed installation procedure, please refer to D5.3b.

Table 4: Additional system components for the second Pre-Trial and their requirements.

System Component	Requirement
Operating System	Windows 8.1, 64 Bit
Kinect for Windows v2 sensor	Kinect SDK
Fall detection	Kinect for Windows v2 sensor
	Microsoft Visual C++ 2013 Redistributable (x64)
Call service	Asterisk communication server (running in a virtual machine on the workstation)
	Android Softphone App on Smartphone (e.g. Zoiper or PortGO)
	ML Android App on Elderly tablet
Investigator UI	Standard Web browser

In addition to the ML App configuration screen elements described in D6.3a, a user selection element is added in order to use the system with different users.

The ML system is started the same way as it was in the first Pre-Trial with the StartScripts described in D6.3a.

7 Second Pre-Trial second stage and Trials procedure

7.1 Preparation

7.1.1 ORBIS

To be in line with D6.2 REV, the users will be asked if the data can be used for the purpose of testing the developed components within the project.

Used informative and privacy documents for the Pre-Trial and for the Trials (see *D6.2 REV Privacy Protection Plan*):

- Informative brochure for the Pre-Trials
- Informative brochure for the Trials
- Informed consent form for the Pre-Trials
- Informed consent form for the Trials Form for use of one's image
- Form for use of one's image for both Pre-Trials and Trials
- Form for use of equipment for the Trials

All of these documents are attached in D6.2 REV Privacy Protection Plan and translated to the Dutch language.

7.1.2 MRPS

Used informative and privacy documents for the Pre-Trial and the Trials (see *D6.2 REV Privacy Protection Plan*):

- Informative brochure for the Pre-Trials
- Informative brochure for the Trials
- Informative presentation for the Pre-Trials
- Informed consent form for the Pre-Trials
- Informed consent form for the Trials
- Form for use of one's image for both Pre-Trials and Trials
- Form for use of equipment for Trials

Finally, UNIGE and the ICT department of MRPS will set-up the Miraculous Life system, ensuring the proper functionality.

7.2 Technical support

As the end-user organizations are not technology experts, Noldus and UniGe will provide technical support to ORBIS and MRPS, respectively; and this during the second stage of the second pre-trial and during the trial phase. These technical partners will assist with the installation of the system if necessary, enable a remote connection to the system for software updates (e.g. by TeamViewer) and will provide support on demand in case of emergencies.

Noldus and UniGe are also responsible to train the end-user organizations such that they can operate the system themselves and train the users according to the description in D6.1b.

Trials training ORBIS specific

All the participants (primary and secondary end-users) will be trained to use the Miraculous-Life system before the beginning of the trial.

At ORBIS, because of their experience acquired in earlier projects, they have created special weekly group activities for the elderly in using technical devices like computers, tablet PC's and smart phones. These groups involve students from the nearby high school that helps the elderly to learn how to use these technologies. This approach (students teach elderly) is also available for the training and instructing the participants of the ORBIS trial. Also, technical assistance is arranged continuously during the week and on request.

Firstly, prior to the trial, a series of presentations will be performed both in ORBIS and MRPS in order to introduce the Miraculous-Life solution and explain how the trial will unfold; ensuring that all the participants (primary and secondary end-users) will be able to attend to at least one of them. Similarly to the pre-trial training, during these presentations, researchers will again:

- 1) Explain the main aims of the AAL projects,
- 2) Identify the needs and the requirements of the end-users and test the Miraculous-Life solution,
- 3) Introduce the functionalities and the services proposed by the Miraculous-Life solution (agenda, reminders, safety services, object localization, shopping assistance, etc.),
- 4) Clarify the nature of the participants' involvement and responsibility in the trial,

However, for the trial, they will additionally:

- 5) Explain how to report personal experience while using the Miraculous-Life solution on a daily basis. Participants will be also encouraged to share not only successes and positive experiences; but also failures, problems and negative experiences,
- 6) Illustrate potential benefits, risks and discomforts,
- 7) Clarify the exit strategy concerning the equipment and data (the exit strategy is defined in D6.2 Privacy Protection Plan).

These presentations will be also followed by individual and group training:

- Primary end-users (elderly) will be trained in small groups before the beginning of the trial; with the aim of instructing how to interact with the VSP and the Miraculous-Life system. Individual training at home will be ensured at any time during the trial upon request.
- Secondary end-users (formal caregivers, informal caregivers) will be also trained in small groups before the beginning of the trial. The training of secondary end-users will focus on both the front-end application (elderly interface) and the back-end application (caregiver interface). Individual training will be ensured at any time upon request.

In addition, an easy instruction manual will be provided to all participants. Importantly, ORBIS and MRPS will identify a common strategy to train the participants for the trials.

Finally, Noldus for ORBIS and UniGe for MRPS will participate in the training process for answering any technical questions which may arise during the training. Noldus and UniGe will guide the project professionals of ORBIS and MRPS in this training process. The project professionals will then guide the elderly and caregivers.

7.3 Trials training

All the participants (primary and secondary end-users) will be trained to use the Miraculous-Life system before the beginning of the trial.

At ORBIS, because of their experience acquired in earlier projects, they have created special weekly group activities for the elderly in using technical devices like computers, tablet PC's and smart phones. These groups involve students from the nearby high school that helps the elderly to learn how to use these technologies. This approach (students teach elderly) is also available for the training and instructing the participants of the ORBIS trial. Also, technical assistance is arranged continuously during the week and on request.

Firstly, prior to the trial, a series of presentations will be performed both in ORBIS and MRPS in order to introduce the Miraculous-Life solution and explain how the trial will unfold; ensuring that all the participants (primary and secondary end-users) will be able to attend to at least one of them. Similarly to the pre-trial training, during these presentations, researchers will again:

- 1) Explain the main aims of the AAL projects,
- 2) Identify the needs and the requirements of the end-users and test the Miraculous-Life solution,
- 3) Introduce the functionalities and the services proposed by the Miraculous-Life solution (agenda, reminders, safety services, object localization, shopping assistance, etc.),
- 4) Clarify the nature of the participants' involvement and responsibility in the trial,

However, for the trial, they will additionally:

- 5) Explain how to report personal experience while using the Miraculous-Life solution on a daily basis. Participants will be also encouraged to share not only successes and positive experiences; but also failures, problems and negative experiences,
- 6) Illustrate potential benefits, risks and discomforts,
- 7) Clarify the exit strategy concerning the equipment and data (the exit strategy is defined in D6.2 Privacy Protection Plan).

These presentations will be also followed by individual and group training:

- Primary end-users (elderly) will be trained in small groups before the beginning of the trial; with the aim of instructing how to interact with the VSP and the Miraculous-Life system. Individual training at home will be ensured at any time during the trial upon request.
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In addition, an easy instruction manual will be provided to all participants. Importantly, ORBIS and MRPS will identify a common strategy to train the participants for the trials.

Finally, Noldus for ORBIS and UniGe for MRPS will participate in the training process for answering any technical questions which may arise during the training. Noldus and UniGe will guide the project professionals of ORBIS and MRPS in this training process. The project professionals will then guide the elderly and caregivers.

7.4 Procedure of the second Pre-Trial second stage and instruction provided to participants

The pre-trial consisted of three consecutive phases: welcoming of the participants, the user testing phase, administration of the post-test questionnaire.

The participants (i.e. the seniors and the caregivers) will be welcomed by the researchers individually. Firstly, the researchers will give a brief overview the purpose of the Pre-Trial. The seniors will be also asked to sign two consent forms: the Consent Form for participation in the Pre-Trial and the Consent Form for image rights (see D6.2 REV).

Subsequently, the participants will be provided with the general instructions for the user testing phase:

“We would like to evaluate with you the efficiency and the usefulness of the Miraculous-Life solution. To do this, we ask you to use this system in order to perform small tasks, one after the other. We ask you to say what you are thinking and actions you would take on the Miraculous Life system. During the scenarios, researchers will help you verbalize your thoughts. Remember, the purpose of this workshop is to evaluate the Miraculous Life prototype and not your performance. Remember also that these scenarios are simulations: they do not fit to your personal situation (ex. your personal medications, or your personal activities in the agenda)”

After that, the scenarios/tasks will be presented to the participants in a printed format. The same tasks will be proposed to both elderly and caregivers. In some tasks, the user plays an active role (i.e. he initiates the interaction with the VSP); while in the other tasks, the user plays a passive role (i.e. these tasks are triggered sequentially by the system and for fall detection by simulation of a fall by the investigator).

The tasks proposed to the group of seniors are the following:

1. [The “first interaction of the morning” use case is manually triggered by the investigator]. It’s morning. Mary start the first interaction with the day with you.
2. You are suffering from a strong headache. Use the service “emergency” in order to ask help to caregivers.
3. A caregiver received your ask for help. “Take his/her role” and confirm via the smartphone his/her intervention to your apartment.
4. [The investigator simulates a fall under the view of the Kinect. This will trigger the use case “Fall detection”. In case of non-detection, this use case will be triggered through the investigator UI (like in the second pre-trial)]. The system just detected that you fall down. Ask help to caregivers.
5. A caregiver received your ask for help. “Take his/her role” and confirm via the smart phone his/her intervention to your apartment.

6. [The investigator places an object at the ground under the view of the Kinect. This will trigger the use case “Dangerous objects adviser”. In case of non-detection of the dangerous object, this use case will be triggered through the investigator UI]. The system just recognized an object at the ground which could be potentially dangerous. Wait for the advice made by Mary, and move the object in a safer place.
7. [When the user accesses to a meal preparation in the service, the ‘oven and stove reminder’ use case is automatically triggered after one minute]. It’s midday. You want to prepare a meal by using the Miraculous Life system. Please access to the meal preparation service and consult a recipe. After a while Mary will check if you turn off the stoves. Please, confirm to Mary that you turned off the stove.
8. Open the Physical Activity Service, chose a video and try to do the same exercise proposed in the video.
9. [One or two use cases related to the emotion recognition is triggered manually by the investigator]. Mary sees you are feeling bad. She want to propose you something that could make you feel better. Please, listen to her suggestions.

The tasks proposed to the group of caregivers are the following:

1. You are suffering from a strong headache. Use the service “emergency” in order to ask help to caregivers.
2. A caregiver received your ask for help. “Take his/her role” and confirm via the smartphone his/her intervention to your apartment.
3. [The caregiver is asked to simulate a fall under the view of the Kinect. This will trigger the use case “Fall detection”. In case of non-detection, this use case will be triggered through the investigator UI (like in the second pre-trial)]. The system just detected that you fall down. Ask help to caregivers.
4. A caregiver received your ask for help. “Take his/her role” and confirm via the smart phone his/her intervention to your apartment.
5. Open the “Contacts” services in order to access to the details of your friend “Inge Jochem”.
6. [When the user accesses to a meal preparation in the service, the ‘oven and stove reminder’ use case is automatically triggered after one minute]. It’s midday. You want to prepare a meal by using the Miraculous Life system. Please access to the meal preparation service and consult a recipe. After a while Mary will check if you turn off the stoves. Please, confirm to Mary that you turned off the stove.
7. Use the Message system service in order to (1) check some of the messages you received, (2) write a new message to your friend “Inge Jochem”.

Finally, after the user testing phase, the participant will be asked to fill in the post-test questionnaire. This questionnaire will allow to (1) obtain initial numbers concerning the success indicators of the project; and (2) refine user’s need and requirements related to the functionality of the services tested. The questionnaire and the evaluation grids can be found in D6.1b.

Procedure of the Trials and instruction provided to participants

The trials will consist of elderly (participants) from ORBIS Hoogstaete and De Egthe in assisted living complexes and living in apartment complexes.

- 6 weeks prior to the start of the trial there will be introduction/informative meetings on both ORBIS locations and MRPS for pre-selected elderly (in accordance with criteria). The potential participants will be informed about AAL-projects, the Miraculous-life project, risks, privacy issues and expectations
- 5-4 weeks before the trial the project ORBIS and MRPS staff will make the final selection of participants and inform them
- 4 weeks before start trial there will be made a rollout schedule for placing equipment, introduce the system, support visits and evaluations. 4 weeks before the trial will begin the training procedure with primary and secondary end-users (session groups).
- 2 weeks before start go/no go by local project member deciding to go further with the trial planning
- According to schedule 1 (one) technical project member visits the participant to install the equipment and shuts of everything. The participant signs the loan agreement for the equipment.
- The day after installing the equipment 1 (one) or 2 (two) project members visit the participant and instructs him/her in using the Miraculous-Life system. The participant signs the informed consent. Appointments concerning support visits, privacy and evaluations will be made by the project member including instruction about the “helpdesk”. The system in the apartments will be deactivate until the actual starting of the trial.
- There will be frequent group sessions with all the participants

8 Further Work

To fully prepare for the Trails planned to start from M28, where the Miraculous Life system will be installed at the elderly's homes, we performed a second Pre-Trial second stage in M22 and M23 to test the last developed modules and services to be sure the technology works and we can focus on how the elderly experience the Miraculous Life system.

During the second Pre-Trial second stage tested parts of the system including the supporting database procedures, components and the following services:

- Co-Net Service
 - Contact list
 - Message System
- Care & Wellness Service
 - Meal preparation
 - Household Adviser (Windows and Sleeping reminder)
- Safety Service
 - Dangerous Objects Adviser
- Guidance Service
 - Motivation for Physical Activity
 - Physical Activity Service
 - Object Location Assistance and Reminder (integrated with User Behaviour Analysis and Environment Analysis)
- Education & Leisure
 - Social Bonding

Additionally, the prototype of the VSP in the second Pre-Trails second stage also included emotion recognition from speech and facial expressions such that the system reacted on

- persisting blame affective state (anger, disgust)
- persisting fearful / stressful affective state (fear)
- persisting sadness state (sadness)
- persisting positive affective state (happiness)

as described in D1.2b.

Before the Trials starts the systems for the elderly user must have been prepared and configured. Discussion on this topic, including planning, are still on going and the results will be included in a revised version of this deliverable.

When the Trials starts the system will first enter a learning phase, which is pre-defined time interval, where it builds a profile of the user, as such that in the operation phase the emotion recognition will be adapted to the user and produce better results. Details on this can be read in D6.1b.