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PROJECT Nº: AAL-2011-4- 027

D22 – Preliminary User Acceptance Tests Report

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

PROJECT FUNDED BY THE AAL JOINT PROGRAMME	
Due date of deliverable	30 June 2014
Actual submission date	21 January 2015
Organisation name of lead contractor for this deliverable	AGIM
Author(s)	AGIM, CAREYN
Participant(s)	
Work package	WP5
Classification	Internal
Version	2
Total number of pages	143

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Glossary

Acronym	Meaning
AT	**Assistive Technology**
ATC	**Assistive Technology for Cognition**
IS	**Information System**
MCI	**Mild Cognitive Impairments**
MG	**MyGuardian**
QoL	**Quality of Life**
STAM	**Senior Technology Acceptance and Adoption Model**

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1. General introduction

1.1. A preliminary report on the user acceptance of MyGuardian technology

The aim of this deliverable is to provide a preliminary report on the user acceptance of MyGuardian technology.

MyGuardian technology aims to reduce the impact Mild Cognitive Impairments (MCI) have on MCI peoples' daily life, with a focus on outdoor life and mobility, and also considering their caregivers. By reducing this impact, MyGuardian technology aims to improve the quality of life (QoL) of the users, i.e. people with MCI and their informal and formal caregivers.

The QoL can be defined as the general wellbeing of individuals. The World Health Organization Quality Of Life Assessment (WHOQOL) defined more rigorously the concept. For this organization, the quality of life is "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the persons' physical health, psychological state, level of independence, social relationships and their relationship to salient features of their environment" [The WHOQOL Group, 1995].

To improve the QoL, MyGuardian offers a panel of functionalities aiming to optimize the work done within the care network and therefore to reinforce the elderly mobility and independence and to reduce the working load of the caregivers. By doing that, MyGuardian addresses seven items and three domains that the WHOQOL Group [1998] strongly validated as markers of quality of life (in blue in Table 1).

Domain I: Physical
1. Pain and discomfort
2. Energy and fatigue
3. Sleep and rest
Domain II: Psychological
4. Positive feelings
5. Thinking, learning, memory and concentration
6. Self-esteem
7. Bodily image and appearance
8. Negative feelings
Domain III: Level of independence
9. Mobility
10. Activities of daily living
11. Dependence on medicinal substances and medical aids
12. Work capacity
Domain IV: Social relationships
13. Personal relationships
14. Practical social support
15. Sexual activity

Domain V: Environment
16. Freedom, physical safety and security
17. Home environment
18. Financial resources
19. Health and social care: accessibility and quality
20. Opportunities for acquiring new information and skills
21. Participation in and opportunities for recreation/leisure activities
22. Physical environment (pollution, noise, traffic, leisure activities)
23. Transport
Domain VI : Spiritually/religion/personal beliefs
Overall quality of life and general health perceptions

Table 1: WHOQOL group domains and facets of QoL (blue background: domains and facets directly addressed by MyGuardian technology / grey background: domains and facets potentially and indirectly addressed)

But to really have an impact on QoL, MyGuardian technology has to be accepted by the users. Indeed, the relative lack of adherence and confidence in technology expressed by occidental seniors is a major challenge that needs to be overcome. MyGuardian is an assistive technology elaborated to make independent mobility conceivable for as long as possible. Not only the acceptance is an inescapable prerequisite, but also the positive correlation between technology acceptance and the perceived QoL is already well documented in those age groups [Chou *et al.*, 2013; Kurpa *et al.*, 2013]. Therefore, the more the acceptance of MyGuardian is pre tested and optimized upstream, the more the technology will serve its original aim that is a QoL for seniors, and even more so for seniors with MCI.

1.2. The acceptance challenge

1.2.1. The life part within we try to integrate an assistive technology

Establishing ergonomic interface adapted to elderly people is a first step toward this goal. Nevertheless, it may be insufficient to fulfill the acceptance challenge of MyGuardian. Indeed, the concerned population is already dealing with acceptance issues. Moreover, suggesting an assistive technology includes the assumptions that there is, or will be eventually a need for it. Even if we propose the device to an autonomous elderly and only in order to test it, the device functionalities remains assisting functionalities. Therefore, it might echo with psychological constructs that are already there. Specifying that reaching an accepting state of mind for assistance can be compared to one of the lasts stages of mourning is not trivial and needs to be taken into account: our elders deal with the idea of autonomy loss and dependence. The mechanisms behind the acceptance of change are considered in clinical theories to be comparable to the ones found in mourning (see Figure 1) [Kübler-Ross, 1969]. The Kübler-Ross model is a strong model identifying the five stages of grieving and can be applied to any life-changing situation, not just death. Those stages may not all be fulfilled, not necessarily in that order or with the same intensity and they can overlap themselves. These stages were associated by Little, in 2014, with action points: “(1) Create Alignment: formalize why the change is happening, who is affected and what the benefits are; (2) Maximize Communication: use informal communication sessions to establish open and honest dialogue about the change; (3) Spark Motivation: understand what is holding people back from trying new practices. (4) Develop Capability: build deliberate slack time to let people practice new skills. (5) Share Knowledge: encourage persons and teams to learn from each other.” (Little, 2014)

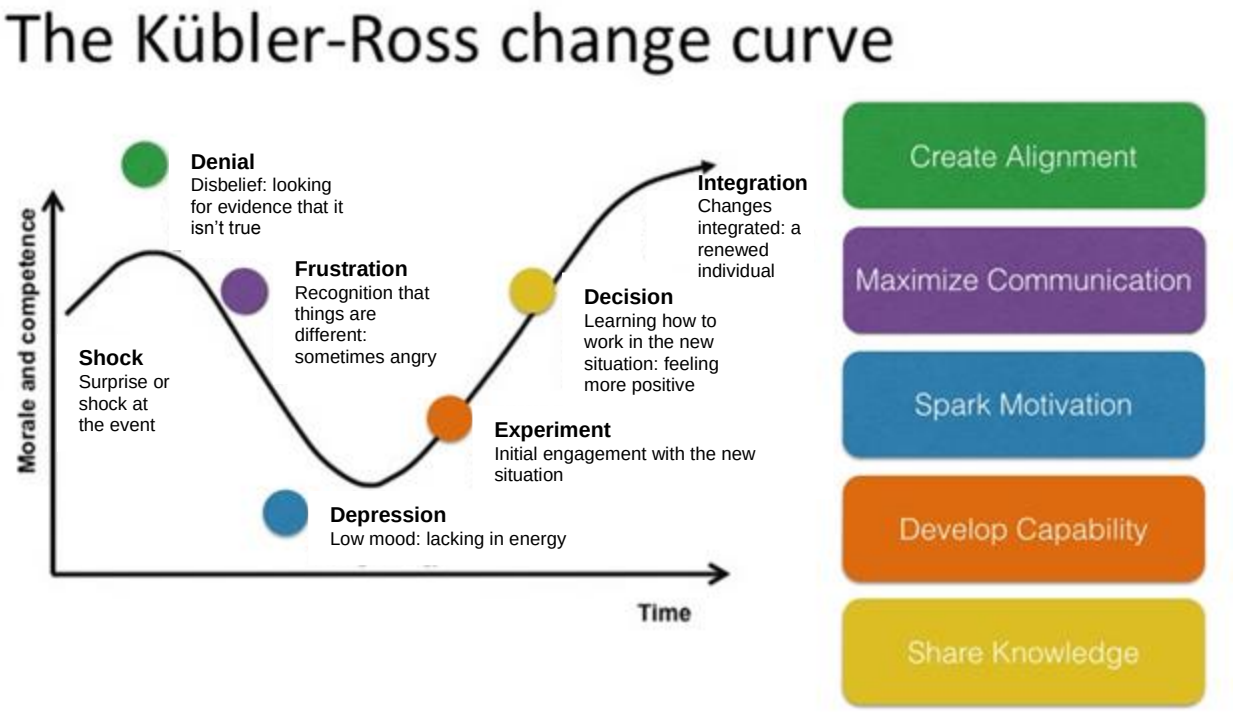


Figure 1: The Kübler-Ross model

1.2.2. The challenge of receiving support

Elderly people have to overcome a certain amount of difficulties. Aging, and all the characteristics of this life part, doesn't stand alone. Among those difficulties, the informal caregiver also needs to adapt himself to the beloved one that increasingly needs care. This part is well documented. By contrast, the fact of receiving support is not clearly assessed as a challenge in it itself. Yet it is a major issue considering our goals. Allen and Wiles [2014] addressed it specifically in their study. It appears that support isn't understood the same way by everybody. In fact, the support may depend on the particular circumstances in which each individual evolves. Allen and Wiles gathered a few thematic that seem to influence the receiving support acceptation. We will pay a particular attention to the importance of the interpersonal dynamics, the management of sensible assumptions in the process of caring like *help-needy*, *dependence*, *incapacity*… Moreover, those authors show the positive impact of being part of "reciprocal exchanges across time" for the elderly. While ones argue that the support receiver's perspective has been muted in the support debate [Fine & Glendinning, 2005; Hughes *et al.* 2005], other explore solutions that may help bypassing elder's resistance toward all kind of assistance. It appears that collaboration, exchange, reciprocity and interdependence may be key concepts [Fine & Glendinning, 2005; Lewinter, 2003; McGee *et al.* 2008; Robertson, 1999]. Those concepts are addressed by MyGuardian, and need to be explored in this deliverable 22 and in the future field trials.

1.3. Technology appropriation, adoption and acceptance process dimension

In Information Systems (IS, term used to qualify the actual academic study of the field), appropriation is defined as the transformation of simple technical means of technical devices to tools that make sense for the individual user [DeSanctis & Poole, 1994; Orlikowski, 1992]. Unlike ownership, appropriation doesn't make reference to the possession of something. Being aware of the possible amalgamation matters in order to master the strong links that exists between those two concepts that can be very close and helpful for "each other" in the field. In her review of the appropriation thematic and from the IS perspective, Christina Tsoni qualifies the nature of the appropriation as a subjective psychological state and an objectively observable behavior (see the different conceptualizations collected by this author in the Table 2). Again, that search field points out the complexity of the appropriation process. In the IS discipline, it is well known that the appropriation is based on two aspects. The first one is the fact that the technology can facilitate or constrain individual action [DeSanctis & Poole, 1994; Orlikowski, 1992; Orlikowski & Robey, 1991]. The second one is that the meaning and the aims of the technology will be differently interpreted across the different users [Vaujauny, 1999]. How the technology will be accepted is therefore difficult to anticipate.

The adoption concept is quite equivalent to the utilization concept. But for minor details, the process toward adoption is standard and similar across individuals. In 2007, Lee (as cited by [Renaud & van Biljon, 2008]) made an identification of users clusters and requirements regarding older adults' user experiences with mobile phone. This author extracted four dimensions that can be understood as the stages of the adoption process (see Table 3). This author, as well as Renaud & van Biljon, mentioned that even if those dimensions are quite stable across individuals, the factors that influence them are subjective. Those factors are presented in a very strong acceptance model: ALMERE (Heerink, Kröse, Evers and Wielinga, 2010). Figure 1 shows the ALMERE model simplified in order to be coherent with MyGuardian specifically (the "irrelevant" constructs are not presented). A more complex presentation of the ALMERE model can be found in Appendix 6.

	Definitions	**Nature of the appropriation**
In philosophy	Mental/psychological state in which the individual is when he voluntarily endorsed an object, in the sense that he feels comfortable with him. (Strong, 1996*; Haumesser, 2004*).	Inner state of mind
In environmental psychology	Control exercise (psychical and/or psychological) on a place (Prohansky *et al*., 1970*; Fischer, 1983*).	Individual process operated through progressive leanings and translated in action
In social psychology	Personal, and thus subjective, appreciation of the individual that he possess in his repertory of knowledge as an idea or a notion (Wicklund *et al*., 1988*)	Psychological state and behavior motivated by personal grounds
In sociology	Process of endorsement and mastery of an object/idea to adapt it to oneself, in such a way that it can become a support for self-expression (Serfaty-Garzon, 2003*)	Internal fulfillment and experience socially mediatized.
In marketing	Recognition of oneself' own mastery through sensorial, perceptive and motor activity (Bonin, 2002*; Carù & Cova, 2003*).	Internal state expressed in the behavior through physical and sensorial sensations
In information systems	Transformation of simple technical means of technical devices to tools that make sense for the individual user (DeSanctis & Poole, 1994*; Orlikowski, 1992*).	Subjective psychological state and an objectively observable behavior

Table 2: Conceptualizations of the appropriation concept in different domains, from [Tsoni, 2012]

Dimension	Description	Examples of potential themes relevant in user experience research
Appropriation	Process of possession or ownership the artifact	Motivation to buy a product. Route to acquire information about a product. Experience when purchasing a product.
Objectification	Process of determining roles product will play	Meaning of a technology. What function will be used in users' life? Where is it placed? How is it carried?
Incorporation	Process of interacting with a product.	Difficulties in using a product (usability problems). Learning process (use of instructional manual).
Conversion	Process of converting technology to intended feature use or interaction.	Unintended use of product features. Unintended way of user interaction. Wish lists for future products.

Table 3: Adoption process dimensions (Lee, 2007, cited by Renaud & van Biljon, 2008)

1.4. Few words on the evaluation issue in the field of assistive technologies

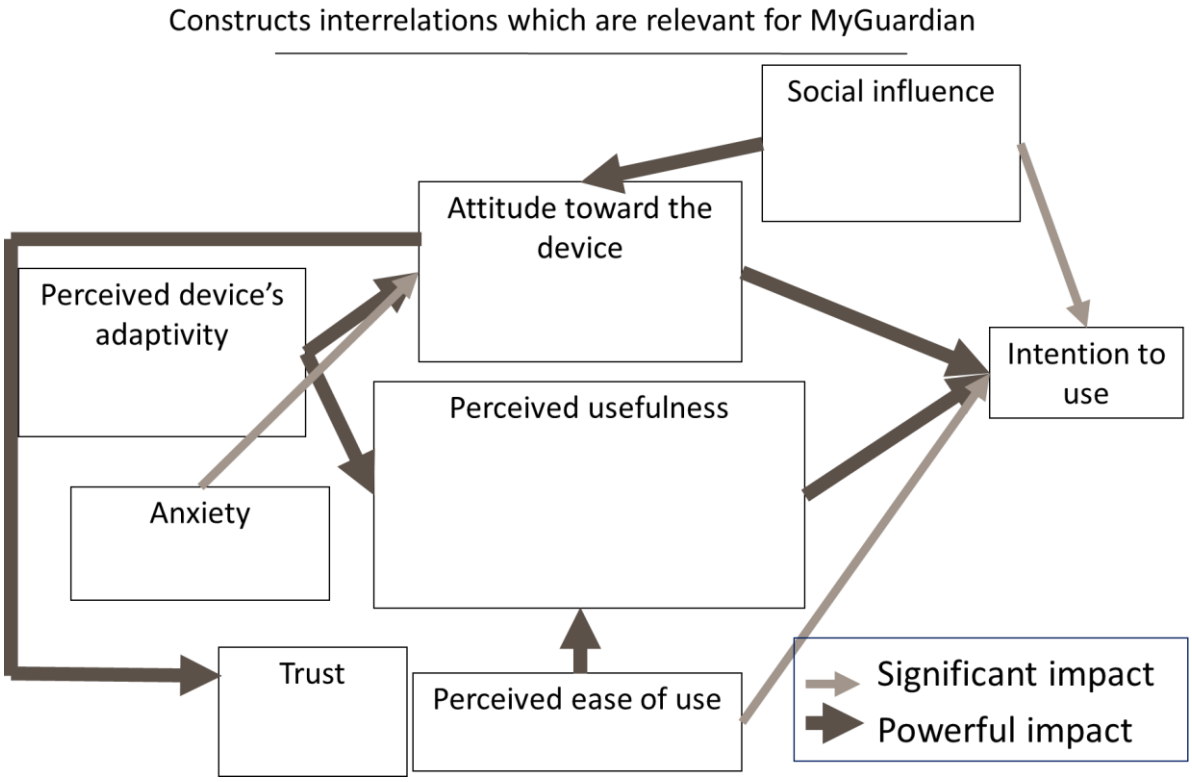


Figure 2: Technology acceptance factors, extracted from the ALMERE model (Heerink, Kröse, Evers and Wielinga, 2010); constructs are relations that are relevant for MyGuardian.

There are two ways to consider the evaluation process in general:

- Evaluation as a formative process: the goal is to get some feedback to improve the technology
- Evaluation as a summative process: the goal is define the value of the technology at a given stage of its development

The two approaches are complementary. The second is mandatory to conclude on the assistive technology value, but the complexity of this research and development field implies preliminary tests to improve the technology. In particular, two facets of the technology can be efficiently improved with preliminary tests:

- The reliability of the technology: is the technology bug-free? Can the technology provide the services it was developed for in a real context of use?
- The usability of the technology: is the relation between the user and the technology efficient? Can the user complete the tasks the technology was developed for? Are the user graphical interfaces understandable, easy to use and easy to learn?

These are the first two dimensions of the TEMSED model. TEMSED is an approach proposed by AGIM Lab. for the evaluation of assistive technology or health-care services or products [Rialle *et al.*, 2010; Rialle *et al.*, 2013]. TEMSED is not a toolbox; TEMSED is a theoretical work on what as to be done to conclude on the global value of one assistive technology. Thus, TEMSED identifies 4 more dimensions that have to be addressed during the assessment process:

- Medical: deals with the impact the service/device has on the user (e.g. in terms of autonomy in activities of daily living) and on the caregivers practice. In our context, this axe no has relation with health values, but with autonomy, independency, self-confidence, reassurance, etc.
- Social: deals with the impact the service/device has on the ecosystem (from the user to the caregivers and the whole health-care system)
- Economics: deals with the service/device economical viability and dissemination capacities
- Deontology: deals with the questions related to the usage of technologies

Some tools exist to address these dimensions during the assessment process. For example, tools from the psychology field can be used for the “Medical” dimension, like the ZARIT scale that is known as the reference scale to evaluate the caregiver burden [Zarit, 1980]. For example, the scale can be used to evaluate the burden before the introduction of the assistive technology. The technology is then given to the users, and a new burden evaluation is done at the end of the use period. A comparison is done to conclude in which extends the technology has an impact on the burden, as expressed by the ZARIT scale results.

1.5. Overview of the deliverable

This deliverable describes all the work that was conducted in Netherlands and in France by end-users partners to evaluate the acceptance of MyGuardian technology. As introduced in the previous sections, acceptance is a complex issue that covers many dimensions. In this deliverable, with reference to the ALMERE model, the focus is on the perceived ease of use and the perceived usefulness of the technology. Considering TEMSED approach, we can say that the work presented here is related to the Technological and the Ergonomics dimensions of the TEMSED approach, i.e. on the technology reliability and the technology usability. Finally, the evaluation work done is formative: the objective is to improve the current prototype. All this approach is in coherence with the stage of development of MyGuardian technology, as the current tests are conducted with the first version of the prototype. Improving the technology and therefore the perceived ease of use and the perceived usability is the first step to go further in the evaluation process and conclude MyGuardian technology value regarding the initial objective to improve the QoL of people with MCI, with a focus on mobility, safety and security issues.

The next section presents the work that was conducted in the Netherlands by CAREYN. Section 3. presents the work that was conducted in France by AGIM. A general conclusion on the preliminary results regarding MyGuardian technology is proposed in Section 4.

2. Preliminary user acceptance tests in the Netherlands

2.1. Overview of the Dutch tests

Seniors with mild cognitive impairments depend (to a certain degree) on carers such as family carers and home care. Support and care enables the seniors to continue living in their own home for as long as possible. However, the seniors might experience barriers towards moving around in outdoor environments when their carers are absent. The MyGuardian project aims to facilitate safe and secure mobility of seniors with mild cognitive impairments. Not only seniors, but also carers are likely to be users of this future product or service.

Previously in the MyGuardian project, these different stakeholders' needs were elicited through probes, interview and focus group research, resulting in user requirements (D6), and use cases (D7). This served to document the business and use process that the project results must support, and to aid the communication between users and technologists throughout the project.

This section presents the Dutch part of the Preliminary User Acceptance tests conducted with prototype 1 of the MyGuardian product-service system. Prototype 1 provides only part of the envisaged functionalities of MyGuardian. Therefore, the Preliminary User Acceptance test consists of meetings in which the stakeholders are guided in enacting (role-playing) scenarios based on the envisaged use cases. Functionalities that the prototype does not yet have, are simulated. This way, the stakeholders are enabled to provide the project group feedback on the context-appropriateness, effectiveness and acceptance of MyGuardian.

The three meetings of the Preliminary User Acceptance test were:

- a meeting of the project team to convert MyGuardian results into scenarios to test
- a meeting with 5 care professionals, all part of Careyn. They were: a care innovation manager, a call desk innovation manager and 3 case managers who organize home care.
- a meeting with 4 informal carers, all recruited by the case managers of Careyn. The informal carers are all children of seniors with MCI and care for them.

This section presents, first, the set-up of the Preliminary User Acceptance test. It then presents a concise summary of the findings (section 2.6), before reporting the findings in more detail (section 2.7. and 2.8).

The Preliminary User acceptance test serves to inform the further development of MyGuardian and provide initial insight into the value and viability of MyGuardian for seniors with MCI and the care network that supports them.

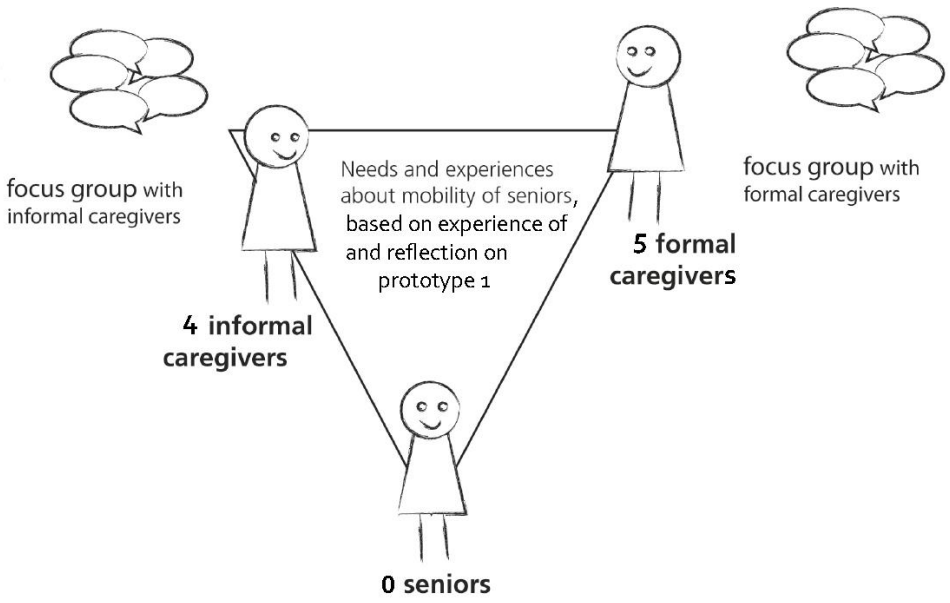


Figure 3: Overview of the meeting held

2.2. Objectives and methodology

2.2.1. Value and viability of MyGuardian

The user acceptance tests are designed to reveal to what extent MyGuardian will have the envisaged value for the respective stakeholders that promotes the acceptance (according to D7):

- for seniors with mild cognitive impairments: safe and secure outdoor mobility, preserving autonomy and dignity, increasing mobility, thereby preserving participation in society. MyGuardian does this via a secure network and environment that assists when needed.
- for informal carers (family members): supports their lifestyle and their reorganisation of work and social life. Increases their confidence and peace of mind, improves their efficiency as carers, thus increasing their freedom. MyGuardian does this by providing information on the senior's whereabouts, advice when something goes wrong, and team support.
- for formal carers and the care organisation: gives them tools to help informal carers have more freedom, provides communication channels to prevent miscommunication. MyGuardian does this by providing a secure and trustworthy system for all actors.

Viability: this value can only be realized if the interaction with MyGuardian is effective and context-appropriate. For example, can the senior actually operate the device he is given? This is the viability.

2.2.2. Research questions

In order to assess to what extent MyGuardian has value for the stakeholders and is viable, the following research questions are formulated:

1. What are the effects on the users of introducing MG into the context? Does it increase mobility and safety?

2. How do the functionalities of MG match with the desired value for the care organization?

Value for the care organization:

- 2a. Senior: safety (uses and values MG)
- 2b. Informal carer: peace of mind (receives and values feedback from MG)
- 2c. Professional carer: supports care goals (provides senior independence and quality of life, MG can be integrated in basic organization of care)
- 2d. Care organization: added value towards existing services, costs and income

3. How does MG score on TEMSED?

4. Which key value points and introduction barriers arise from MG and what are the resulting requirements for MG?

This section provides answers to research questions 1, 2a-c and 4. Research questions 2d and 3 are not answered in this report. The TEMSED tool was not yet available. Also, no measurable assessment of the added value towards existing services, costs and income could yet be made, since the emphasis in this test was still on fine-tuning MyGuardian's basic functionalities.

2.2.3. Building up the test from the use cases

The test set-up takes the user's perspective (the user has to understand what they are being asked to do and how this relates to their own life). This will yield genuine and in-depth insight into the use situation. From the use cases we create scenarios of likely situations the users might find themselves in. We determine which situations are the most critical and which ones occur most often (e.g. daily) for the users. We test these situations with the users.

2.2.4. Role play enactments

Role-play enactments (e.g. [Groeneveld et al, 2013]) are a way to set usage tasks in which these tasks have meaning and realism for the user. It means that the user is asked to enact a certain situation and reflect on it based on their close familiarity with their current situation and those people that are involved in it. For example, for the informal carer: 'let's act through the entire situation that you are going shopping and while you are out, you get a message that your partner is lost'. Or, for the senior: 'let's act out the entire situation that you are going to the bakery and how that would go for you.'

Role-play enactments are often used in the design and development of interactive technologies. They have been found to be effective in creating insight into future use situations, hence bridging the gap between technological development and the user. They have the advantage that they can be conducted throughout the development process, while technological decisions are still going on. With this, they have greater impact on the future success of product-service systems than after-the-fact evaluative user research. Through role-play enactments, users are enabled to

- experience the full complexity of interaction with a new system, which only reveals itself when undergoing the interaction,
- enrich their insights as a group, because participants are assigned roles and work together, and
- observe each other acting out the use of a system. Observing someone else interacting with a system also enables participants to generate insights.

2.2.5. Working with all of MyGuardian

Although not all parts of MyGuardian are finished in this phase of the project, we consider it useful to test all parts that belong to a particular scenario. We will work with the real technology that has

been delivered as far as it is functional, and add simulations (paper prototypes, small tasks, e-mail) for those parts that are not yet functional. With this we aim to test as much as possible of each MyGuardian scenario, and already gather feedback for those parts that are still in development.

2.2.6. Research steps and participants

In this preliminary test phase we are being cautious with numbers and introducing MyGuardian into the field. Part of this phase is to find out what MyGuardian does and will eventually do, and which parts are not yet working perfectly. These were the research steps taken in the Preliminary User Acceptance test:

1: Working group workshop meeting (3 hours)

The testing starts with a working group workshop meeting that serves to bring all the information together and identify the relevant scenarios.

2: Enactment and reflection meeting with care professionals (2.5 hours)

This meeting with 5 care professionals, all part of Careyn, consisted of enactment of, and reflection on three scenarios of MyGuardian use.

3: Enactment and reflection meeting with informal carers (2.5 hours)

This meeting with 4 informal carers, all recruited via case managers at Careyn, consisted of enactment of two scenarios of use, walk-through of the third scenario of use, and reflection on all three scenarios of MyGuardian use.

Given the functionality and stability MyGuardian prototype 1 currently provides, it was decided not to test with seniors with MCI at this time. The prototype would still present too many barriers to use. The test with seniors with MCI should be included in the next round of MyGuardian use testing.

2.2.7. Project team

The project team members are:

Peter Hermans - user lead (Careyn)
Dr. Dipl. Des. Stella Boess - subcontractor lead (TU Delft)
Janna Alberts - testing lead (TU Delft)
Karen Thomson - testing support (TU Delft)
Iris Ploum - testing support (TU Delft)

Janna Alberts, Karen Thomson and Iris Ploum are working on a freelance basis on the project. Stella Boess, Janna Alberts and Karen Thomson will continue to be involved in the testing for the next phases envisaged for September/October 2014 and March/April 2015.

2.3. Research set-up

The set-up of the three parts of the Preliminary User Acceptance Test is described. They were: (1) a working group meeting, (2) a meeting with care professionals and (3) a meeting with informal carers.

2.3.1. Working group workshop meeting to define scenarios

Goal

The goal of the working group meeting was to identify what MyGuardian (MG) does, to review the use cases and requirements, derive scenarios, and to make a plan of what to test (de facto and simula).

Set-up

Project team members Peter Hermans, Stella Boess and Janna Alberts met to collect and compare the use case documents, user requirements documents and the corresponding planned functionalities, and to define three overall scenarios for the user test. With scenarios is meant, a series of likely events in the users' lives, seen from the user's perspective (rather than the system perspective, which the use cases take). The scenarios follow the stakeholders as they master a moment in their lives with the help of MyGuardian. The project group defined likely situations that are the most critical or would occur most often (e.g. daily) for the users. Janna Alberts processed the workshop results and created the scenarios.

Outcome

- Scenarios

The use cases served as a basis for the development of three scenarios. In order to develop the scenarios a scheme was made, in which for each use case the corresponding requirements, services and values were stated (see Appendix VI). Based on this, it became clear which requirements and corresponding story line were developed in prototype 1 and which were not. Therefore part of the storylines and corresponding requirements which were developed in prototype 1 were used to create three scenarios to use in the meetings with users. The three scenarios were chosen according to how critical they were to value and viability of MyGuardian in emergency, introduction and habitual situations. In general, scenario 1 is based on use cases 1 and 4; scenario 2 on use cases 2 and 3; scenario 3 on use case 4. For a more detailed overview of the origin of the scenarios see 4. The scenarios (Figure 13, Figure 14 & Figure 15) served as a basis to test both the usability and effect the functionalities of MG have.

- Two-part session set-up: enacting and reflecting

The goal of assessing value and viability resulted in a two-part session set-up, consisting of

- enactments that can be experienced and observed to assess the effectiveness, and
- a reflective discussion about the value of MyGuardian.

Some of the value of MyGuardian can be only assessed by observing MyGuardian in use. For example, is information on the senior's whereabouts clear and useful? Thus, by enacting the scenarios, users should experience the use of the MyGuardian functionalities.

Some of the value of MyGuardian, such as peace of mind, can only be assessed by reflecting on experienced use and comparing the experience to one's everyday life. Thus, having enacted the scenarios, the users will be asked to reflect on the value of MyGuardian.

- De Facto and Simulated use

Because not all of MyGuardian is developed yet in prototype 1, the emphasis in developing the scenarios was on those use cases corresponding to the functionalities already developed. In

order to create complete scenarios from this that correspond to the users' realistic life experience, some simulated functionalities were added to those already developed. (For an overview, see Appendix IV)

2.3.2. Care professionals meeting to assess value and viability

2.3.2.1. *Goal*

The goal of the care professionals meeting was to assess MyGuardian in terms of its value and viability. This served to derive requirements to optimize MG and embed it in the context after the first phase. Care professionals as expert users provide feedback according to the professionals' perspective. They are also able to envisage and provide feedback on the informal carers' and seniors' perspective.

2.3.2.2. *Set-up and method*

The care professionals meeting took place on 23rd June 2014, 10.00-12.30 at Careyn in Den Hoorn, the Netherlands. Janna Alberts, Karen Thomson and Iris Ploum ran the meeting of approximately 2,5 hours. The meeting was recorded with a high quality video camera. Present were 5 care professionals (Figure 3): Peter Hermans, care innovation manager who has been involved with MyGuardian (MG) from the start, Luc van den Heuvel, innovation manager of the care desk, and 3 case-managers from Careyn.

- Meeting introduction 25 mins

Janna Alberts started the meeting with a short presentation. A quick recap was given on how MG was built from user needs elicitation, followed by an overview and time plan of the rest of the morning. Iris Ploum then gave a 5 minute demonstration of how to enact a situation in role-play.

- Three scenario run-throughs at ca. 30 mins each.

Three different scenarios (based on the use cases) were visualized in storyboards. These print-outs served as a starting point for the role-play (Figure 4). All participants were involved in at least one of the scenario role-play exercises. Props like a shopping bag and a smart phone helped them understand the story and imagine being one of the characters. The role-play exercise proved to be an effective way to assess how MG would work in practice. The case-managers were easily able to adopt the roles.

The set up of all three scenario run-throughs consisted of three steps:

Explaining steps of the scenario, assigning roles to participants (

1. Figure 5)
2. Role-playing a scenario (Figure 6). Scenario 1 was enacted by 2 participants, Scenario 2, by 3 participants, and Scenario 3 by 2 participants.
3. Discussing the scenario, while still in the set-up (Figure 6).

Questions the researchers asked during the discussion of the scenario were for example: 'Is this scenario realistic?', 'What did you notice?', What went well and what didn't? For a more detailed overview of the set-up, see Appendix V.

- Discussion of ca. 25 mins.

The last part of the meeting was a roundtable discussion to reflect on the value of MG according to a set of questions. These questions were derived from the research questions. The question sheets (Figure 8) were presented to the group one by one. Post-its were handed out and the

participants were asked to write down an answer individually. The post its were then read out loud and placed on the A3 paper.

The questions addressed in the roundtable discussion were, each on an A3 sheet (see Appendix VI):

- 'Does MyGuardian give the informal carer peace of mind? Yes, because ... / No, because ....'
- 'Does MyGuardian increase the mobility of the senior? Yes, because ... / No, because ....'
- 'Does MyGuardian give the senior a feeling of safety? Yes, because .../ No, because ...'
- 'To what extent does MyGuardian contribute to the well-being and independence of the senior?
- 'To what extent is the senior able to use MyGuardian? Is the senior able to make a call?'
- 'Who/what ensures that the senior takes MyGuardian along when going out? (consider, for example, form or function such as mobile phone, key chain)'
- 'What is the influence of MyGuardian on the felt autonomy and freedom of the senior?'
- 'If the senior calls the call centre, who should then give the senior directions / help the senior / pick up the senior? Will this work in practice?
- 'What are the pluspoints and minuspoints of the use of MyGuardian'?
- 'To what extent does MyGuardian fit into the current care system? Which recommendations do you have for MyGuardian?'

Figure 4: overview care professionals meeting

Figure 5: explaining different scenarios

Figure 6: role-play scenario

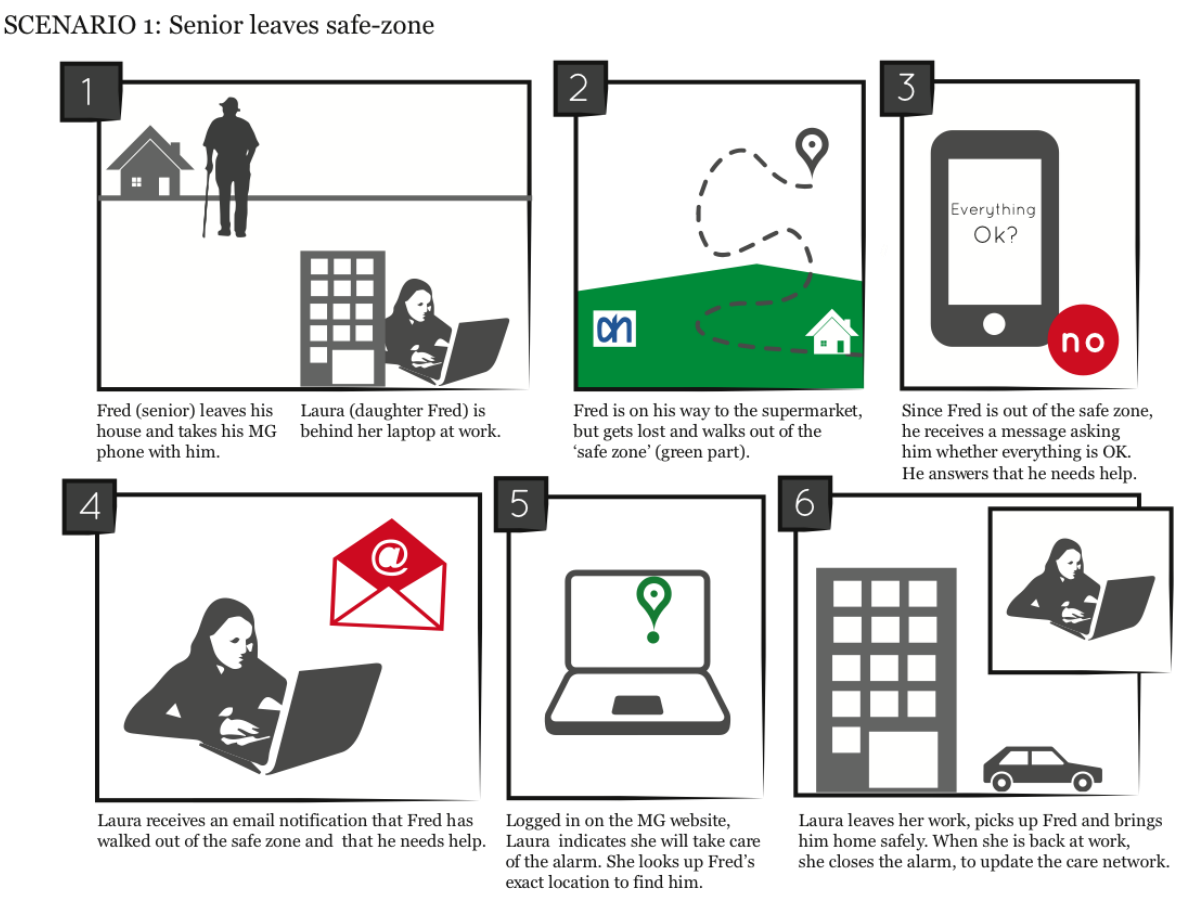


Figure 7: example of how a scenario was presented.

2.3.2.3. *Data analysis*

The data used for the analysis consisted of:

- Notes based on observations during the meeting;
- Film material of the three scenario enactments;
- Post-its with answers on the question sheets.

The data were analyzed by

- reviewing the participants' answers on the value of MyGuardian on the question sheets;
- reviewing the videos and writing down additional relevant observational findings and reflective participant answers on Post- its, adding them to the question sheets. Important actions and quotes were extracted from the videos to enrich and back up the results. The researchers marked these with the letter of their name to distinguish them from participant statements;
- grouping the collected observations and answers according to the research questions;
- transcribing the most relevant quotes and taking screenshots of the most relevant observations.

This was done initially by Karen Thomson and Iris Ploum, and later re-checked by Janna Alberts with additional insights added.

In section 2.6 the answers to the research questions are given. They are based on: section 2.7, results per scenario; Appendix II which describes the reflection of the participants on value of

MyGuardian; and Appendix III which shows the observations from the different scenario enactments.

Figure 8: A3 question sheets with answers produced during the care professionals meeting. On the Post-its: answers given by the care professionals during the session (their reflection on the value of MyGuardian) and observations and quotes made by the researchers while reviewing the video material (marked with the letter of the name of the researcher).

Figure 9: Janna Alberts and Karen Thomson analyzing the results of the care professionals session, using the statements given by partipants on the question sheets and the video.

Figure 10: adding observations from the video.

2.3.3. Informal carers meeting to assess value and viability

2.3.3.1. *Goal*

The goals of the informal carers meeting was to further assess MyGuardian in terms of its value and viability. This served to derive further requirements to optimize MG and embed it in the context after building phase 1. The meeting was held with 4 informal carers (

Figure 11). They draw directly on their own experience to identify values and challenges. They can also envisage the seniors' perspective, which means that feedback can be gained from them on the presumed use by seniors with MCI.

Figure 11: overview simulation test with 4 informal carers.

Figure 12: role-play scenario

2.3.3.2. *Set up and method*

The informal carers meeting took place on the 22nd of July 2014, 15.30-17.00 at Careyn in Den Hoorn, the Netherlands. Janna Alberts and Iris Ploum ran the meeting which took approximately 2,5 hours. Present were 4 informal carers, all recruited via case managers at Careyn who had attended the first MyGuardian evaluation meeting. They were all between 40 and 50 years old, three women and one man, and were the children of the seniors with MCI they cared for.

The meeting was recorded with a high quality video camera. The meeting was conducted with the same set-up and in the same way as the care professionals meeting. The only difference with the set-up of the first session was that Scenario 2 was not enacted by the informal carer participants. It was only run through using the A3 visualisation available. This choice was made because the session was tight in time (three hours would have been preferable), and because the informal carer plays little role in it. However, because the participants had just enacted Scenario 1, they found it easy to engage with Scenario 2, to go through how they would experience it, and to provide comments and reflections. Scenario 3 was again enacted.

No informed consent form was signed.

2.3.3.3. *Data analysis*

The data analysis was conducted with the same set-up as for the care professionals meeting. For the set-up, please see the previous page. The only difference was that the initial main bulk of analysis was done by Janna Alberts alone, and it was not done from scratch. Rather, those results were noted that added new information to the results of session one. Later, the results and video were also checked by Karen Thomson.

2.4. Scenarios

The use cases served as a basis for the development of three scenarios which were used in both sessions. In general, scenario 1 is based on use cases 1 and 4; scenario 2 on use cases 2 and 3; scenario 3 on use case 4. For a more detailed overview of the origin of the scenarios see 4.

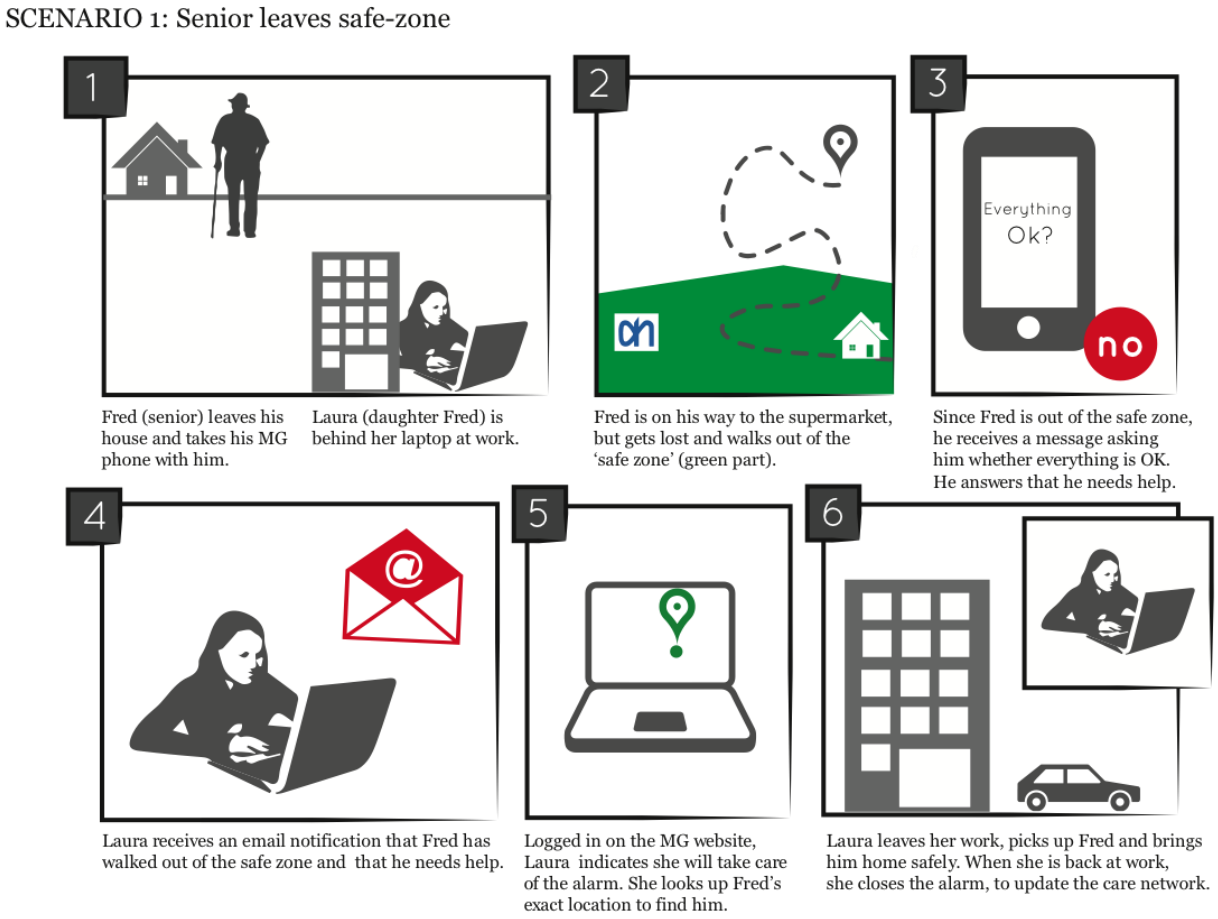


Figure 13: scenario 1, that involves 2 actors. Any direct usability findings are based on two participants per session. However, others watched the events and were able to empathize with the actors. The scenario was enacted in both sessions

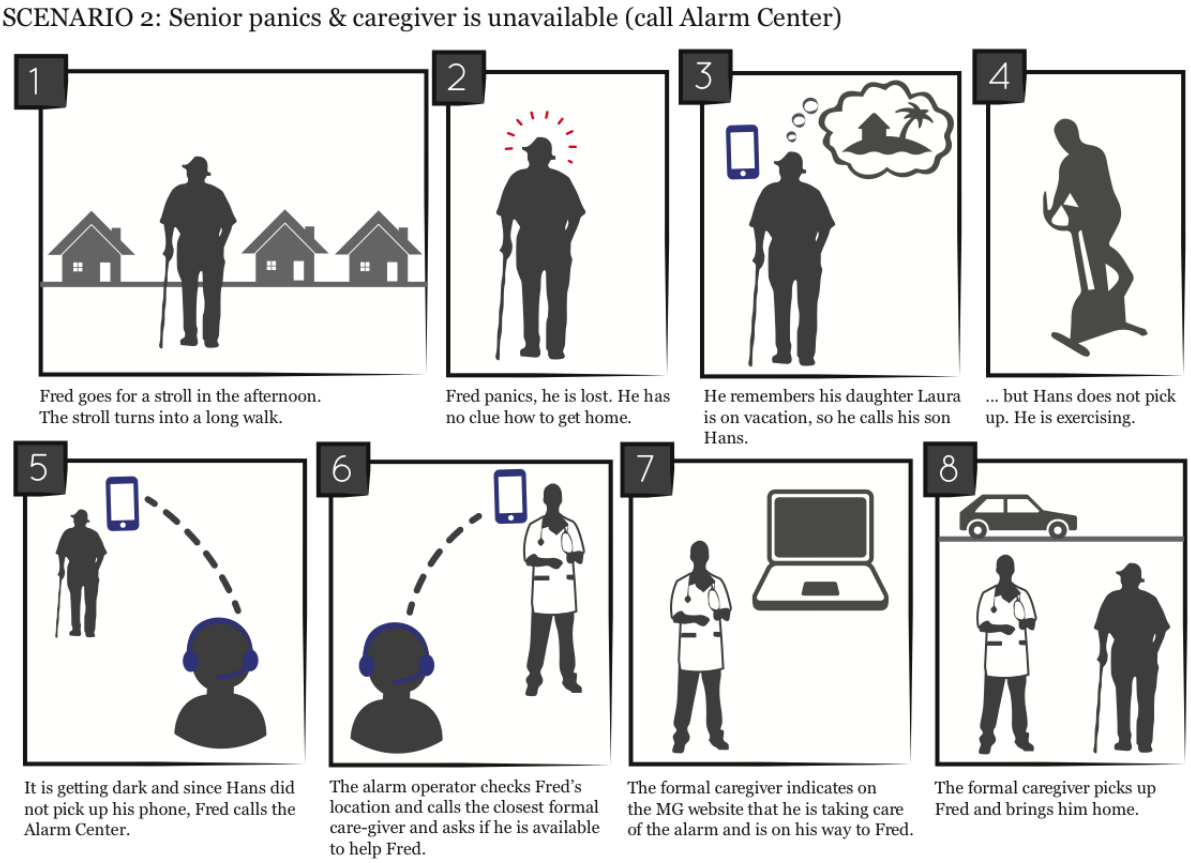


Figure 14: scenario 2, that involves 3 actors. Any direct usability findings are based on three participants. However, others watched the events and were able to empathize with the actors. The scenario was enacted only in session 1 by the care professionals. In session 2 with the informal carers, the participants talked through the scenario as pictured here.

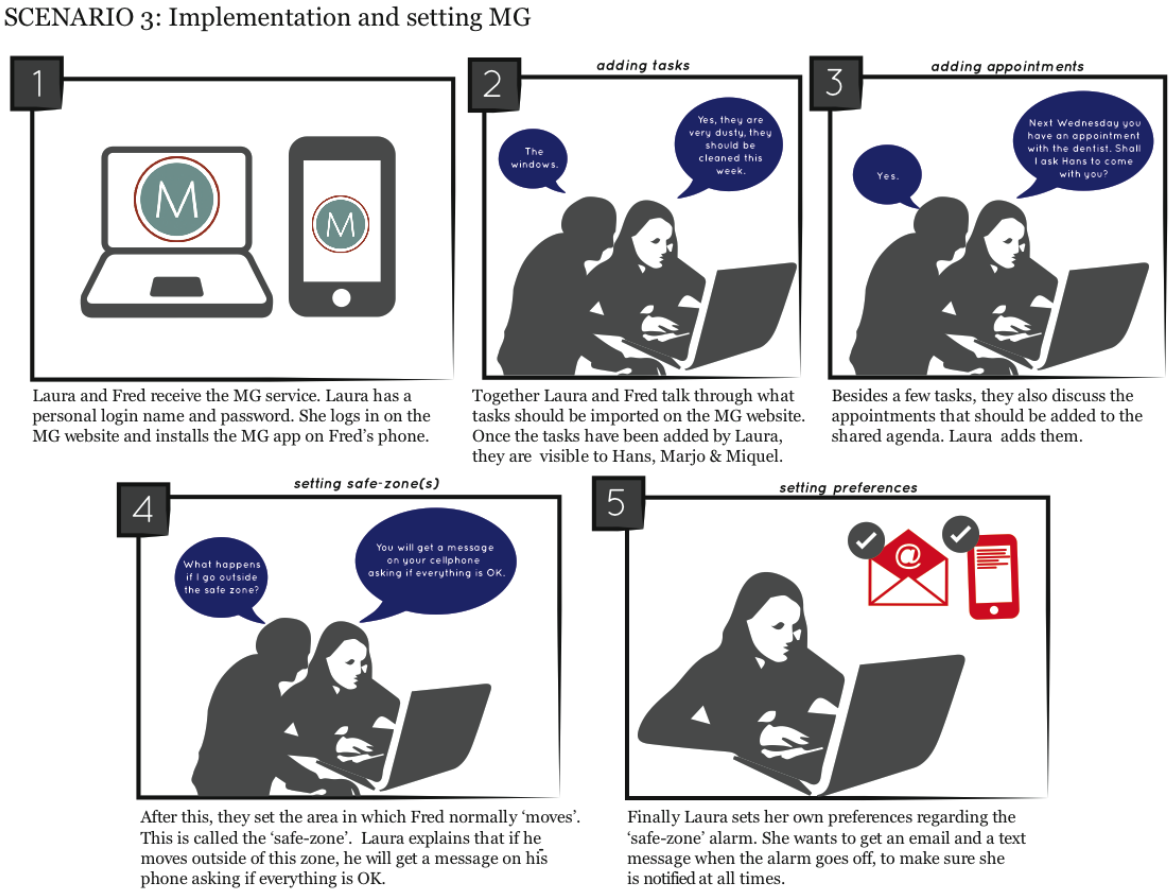


Figure 15: scenario 3, that involves 2 actors. Any direct usability findings are based on two participants per session. However, others watched the events and were able to empathize with the actors. The scenario was enacted in both sessions.

2.5. Prototype effects

Since prototype 1 was just coming together as the Preliminary User Acceptance tests were being set up, some aspects of the prototype worked, some did not work, and some worked but were unstable. Below you will find a list in which the most crucial functionalities are shown which were used during both meetings. This list serves to indicate possible effects of the prototype functioning on the insights from the test. Some functionalities worked during both meetings, some did not work in either meeting, others worked in one or the other of the meetings. Whether the functionalities were working or not seemed to vary by day and hour. Next to these functionalities also the server communications were not always working completely. Sometimes a bug caused the complete functionality to stop working, or the whole website.

To give the most prominent examples of where the working of the functionalities might have influenced the test results:

- the alarm the senior receives when moving out of the safe zone, was not always working properly. Therefore during the simulation we showed a print screen, which might have influenced the participants' understanding of the application;
- during scenario 3, we tested the first time use. However, the participants were not able to add any contacts, which could have given more insights into who they would like to add to their care-network.

Table 4 shows the most crucial functionalities for the sessions. The full list of functionalities can be found in Appendix IV.

Functionalities protoype 1	Working during	Not working during	Simulated during session
Senior mobile			
Get senior location	Session 1 & 2		
Alarms			
Help button alarm		Session 1 & 2	Simulated by calling someone
Comfort area alarm	Session 2	Session 1	
Notifications by senior MG App		Session 1 & 2	Simulated by showing the user a printscreen and explaining that normally the phone would ring at this moment
Notifications by email	It did work just before session 2	Session 1 & 2	Simulated by showing an own created email

Table 4: crucial functionalities for sessions

2.6. Summary answers to research questions

This section gives concise answers to the research questions; the results are reported in more detail in the next section, 'Results per Scenario'.

1. What are the effects on the users of introducing MG into the context? Does it increase mobility and safety?

**Increasing mobility seemed to be a wrong word choice here, since increasing the mobility is not possible. It would be maintaining or extending the mobility of the senior for a longer period of time.*

The mobility of the senior can be maintained for a longer period of time, since he can go outside unaccompanied. On the MG website the (in)formal carers can keep on eye on his whereabouts, creating a safer situation. However, it needs to be taken into acount that the (in)formal carers will need a lot of trust in a service like MG to let him go out unaccompanied. The (in)formal carers have to be certain the senior takes the device with him at all times, which can be a practical problem. They believe it is unlikely the senior will remember to take the device with him when going outside.

Conclusion

MyGuardian increases mobility only if the carers have enough belief and certainty in the senior taking the device with him (charged), and the senior knows how to operate a smartphone (even if he panics). The frequency and ease with which they senior can go out unaccompanied, can be maintained for a longer period of time, creating a more independent, but still safe situation.

Information used: scenario 1, step 2 & scenario 2, step 2 & Appendix II: Reflection participants RQ 1

2. How do the functionalities of MG match with the desired value for the care organization?

a. What are the effects of MG on the senior?

Does MG give the senior a safe feeling?

According to the informal carers the senior might not feel safer when using the device. This is probably due to the fact that using the app is too complex. The device/phone application would currently not give them the security they need in order to feel safe when moving outside. If they could be certain of how to operate the smartphone and the app, even when they are in panic, there is a bigger chance they will feel safe.

The professional carers also stated that a safe feeling will differ between seniors, since it is heavily dependent on their disease insight and their personality. This emerged clearly in enacting scenario 3. There the senior character with no disease insight did not understand why the MG service was needed [1]. However, later in the reflection, the carers also mentioned that the senior with more disease insight could feel supported and safe by using MG.

- 1 -

'Don't be scared I will get lost and won't come home, I know my way!'
(SENIOR CHARACTER)

SCENARIO 3, 2&3 | *β*

Conclusion

MG can give seniors with disease insight a safe feeling, because they know they are being supported. However, for seniors without insight this will not be the case. They do not have the feeling they need help. In a worst case scenario they can feel they are being spied upon. Furthermore, most seniors do not know how to operate a smartphone, giving them an insecure feeling.

What is the influence of MG on the self-esteem and freedom of the senior?

The influence on the self-esteem and freedom of the senior depends on the senior's character, the level of MCI, and the relationship he has with his carers. The worse the dementia gets, the tougher it is to maintain a close, trustful relationship. Trust between senior and carer is essential for a service like MG to work. In a later stage of dementia, there might not be enough trust, since the senior will have less disease insight.

The enactment of scenario 3 during the care professionals meeting illustrated well that the senior felt his freedom was being limited. The senior character was constantly talking about his fears of using the MG service: 'I have a friend that I want to visit once a while, but I do not want my neighbour to know[2]' and 'I do not want everybody to know what I am doing[3]'. Furthermore, the senior might be hesitant to use the application, since he might not know how to operate it - negatively influencing his self-esteem.

In this same scenario it also became clear that the carers' role in comforting the fearful senior is important. During the role play the informal carer character was able to explain to the senior why the MG service was necessary and how it can help him: 'so you really think it is necessary for someone to join me to my dentist appointment [4]? (Senior asking informal carer) 'Yes, sometimes you forget, and two people is better than one, right? (film 0227 - 3:59 min). This comforted the senior visibly.

-2-

I have a friend that I want to visit once a while, but I do not want my neighbour to know'
(SENIOR CHARACTER)

SCENARIO 3 , 2&3 | *u*

-3-

'I do not want everybody to know what I am doing'

(SENIOR CHARACTER)

SCENARIO 3, 2&3 | *v*

-4-

'so you really think it is necessary for someone to join me to my dentist appointment?

(SENIOR CHARACTER)

SCENARIO 3, 2&3 | *y*

Conclusion

A trustful, good relationship in which the carer(s) can comfort the senior. Explaining the reason and advantage of using MG will positively influence the seniors self-esteem and freedom. Mainly because he will be able to live independently at home for a longer period of time[5]. However, if there is not enough trust, the senior might feel controlled. In that case, the senior will not understand that MG is there to help him and will feel limited in his freedom. Furthermore, the seniors' self-esteem will suffer if he does not know how to operate the application and/or smartphone.

-5-

'For my father this would have great impact, since he will be able to live independently for a longer period of time'[IC]

APPENDIX 2. RQ 2A

Information used from scenario 1, step 2 & scenario 2, step 2 & scenario 3, step 2 and 3, Appendix II: Reflection participants RQ 2a

b. Does MG give the informal carer peace of mind?

Most informal carers and care professionals were convinced that if they were able to see where the senior is at each moment they would feel calm - have peace of mind. Currently they lack peace of mind. They worry every day whether their parent is coming home again, hoping he did not get lost. The biggest contribution to their peace of mind would not only be that they are alarmed when the senior moves out of the safe zone, but that they can check at all times the location of the senior and see if he is in direct danger or if he is just wandering around. Because sometimes, if the senior is lost, it is best not to alarm directly or pick him up. They first want to see what the senior will do. They also adress the idea of having a more detailled overview of the whereabouts of the senior of the last few hours. Based on his walking pattern, they will have a better understanding on how he is doing.

However, some care professionals and informal carers think that there is also a downside to always being able to check the location of the senior [6]. They do not want to have to check every second where the senior is, but still want to be certain he is safe. Therefore they suggest it should be possible with the help of MG to make appointments on who watches the senior on what date or time.

They stress the fact that checking the seniors' location on their phone (not only on a computer) will be necessary. If they had that and would receive the alarm message not only on their email, but also on their phone, their peace of mind would increase.

The most crucial barrier at this moment though, is that they do not believe that their father will be able to take the phone with him and respond correctly to the alarm[7]. This was clearly visible in

the enactment of scenario 1 & 2 during the care professionals meeting. The case-managers enacted the senior character forgetting his phone and not knowing how to unlock the smartphone, answer a call or alarm. This is due to the senior not being familiar to the system and to the complexity of using a smartphone.

-6-

'with such as system, I have the feeling that I need to check 24hours a day how he/she is doing'(FC)

SCENARIO 3| 2&3 | γ

-7-

'If you are lucky the senior takes his phone with him and it is charged' (FC)

SCENARIO 1, 2 | e

Conclusion

If the informal carer is sure that the senior takes the phone (fully charged) with him every day, wherever he/she goes, it does create peace of mind. Unfortunately, the question remains if the senior is capable of: taking it with him, being able to operate it and being able to respond adequately to an alarm. The current elderly generation is not familiar with using a smartphone. However, the upcoming elderly generation will be more accustomed to a smartphone. The informal carers should definitely have an application on their phone in which the senior's location can be checked and to which (alarm) messages can be sent. To sum up, MG can give a feeling of control to the informal carers, but it can also be perceived as extra pressure.

Information used from scenario 1, step 2, 4, 5,6 & scenario 3, step 2, 3, 4, 5, Appendix II: Reflection participants RQ 2b

c. Does MG support care goals of professional carer?

To what extent does MyGuardian contribute to the well-being and independence of the senior?

As described in the previous results, MG can ideally contribute to a safer, more mobile and independent situation for the senior. The senior will go out more often (with smarthpone, unaccompanied), therefore exercising more often, contributing to his feeling of freedom and well-being.

However, a senior without disease insight will be hard to convince of the necessity of taking the smartphone with him at all times. And even a senior with disease insight can forget his phone from time to time (in fact, this happens to most people occasionally).

The following example illustrates the possible influence of the text on the seniors app. In scenario 1, when Fred, the senior character, walks out of the safe zone, the alarm goes off and he receives a message on his phone. The message states ´out of comfort zone´. Fred is then suppose to choose between ´I am fine´ or ´I need help´. According to the case managers of the context expert meeting, most seniors will not want to admit they are lost and need help. They would rather choose ´I am fine´ and keep walking until they see something familiar[8]. This means they can keep searching for hours, which can be very strenuous and stressful. This decreases their well-being.

The carers also adress the fact that having different safe zones for different days or activities could be useful. For example on monday the senior normally only goes for a short walk, but on wednesday he goes for a longer bike ride. If this would be possible this wcould increase the independance of the senior.

An aspect that likely will contribute to the well-being of the senior is the ease with which (in)formal carers are able to distribute tasks to one another on the MG website: care tasks and appointments have a higher chance of being executed on time.

-8-

'I would never say 'I need help'. I would rather keep walking until I see something or someone familiar'.

(SENIOR CHARACTER)

SCENARIO 1, 3 | h

Conclusion

Depending on the senior's disease insight, he can feel controlled - negatively influencing his well-being and independence, or supported by MG - positively influencing his well-being and independence. Wrong word choices in the senior application can influence the way the senior reacts. Most seniors do not think or want to admit they need help and will therefore never choose a button: 'I need help'. Chances are higher that the care tasks are being performed on time with MG, contributing to the well-being of the senior.

Can MG be integrated in basic organization of care?*

**Although there is not sufficient information gathered from the meeting to give a complete insight, some first remarks can be made.*

MG can probably be integrated, since it is supplementary to current care information systems and gives a nice overview of care related tasks for formal and informal carers - making it easier to increase the circle of informal carers and involving grandchildren in the care. However, according to the case managers, the MG website does not meet the legal criteria within professional care information systems (check with Luc van den Heuvel?). They also wonder whether it is realistic for a formal carer to pick up or receive a task through the MG website. Maybe, if the formal carers receive an allowance for every picked up task/appointment they execute, it will have a higher chance of succeeding.

There is also a high need for separation of what information on the MG website is visible to the inner, smaller close care circle and outer, bigger care circle. The case managers stated that seniors and the informal carers will want to maintain some privacy by not sharing all information with everyone, but only a selection. Furthermore, it became clear throughout the care professionals meeting that it would be ideal if MG could be adjsuted to the state of MCI of the senior. A senior with mild MCI and with a healthy partner will need a different approach than a senior with severe MCI and without partner.

In scenario 2 another organizational issue arose that affects the senior's safety. When the senior called the care desk and was put on hold (care desk had to call the closest formal carer to come and have a look) he got confused, hung up and started wandering around again [9]. Besides that, the current system does not have an app for the formal carer, making it difficult for him/her to know what senior looks like, what his current situation is etc., when picking him up. This information is needed to find the senior as well as to win the trust of the senior.

-9-

The care desk cannot stay in contact with the senior and at the same time contact the formal carer.

SCENARIO 2, REFLECTION 5.2

Conclusion

First of all MG needs to meet the legal requirements of professional care information systems. Second, the easy distribution of tasks to formal caregviers on the website and being controlled

through a care desk to pick up an alarm, should be integrated in the current organization of formal care. The remuneration situation needs to be clarified. Another important aspect is that the privacy of the senior and close carers should be maintained.

Information used from scenario 1, step 2,3 & scenario 2, step 5, 6, 8 & scenario 3, step 2 and 3. Appendix II: Reflection participants RQ 2c

4. Which key value points and introduction barriers arise from MG and what are the resulting requirements for MG?

Key value points:

- Informal caregvier can keep track of senior's location, creating a safer situation. This gives the informal carer peace of mind.
- Independent mobility of senior in a safe setting can be maintained for a longer period of time.
- Division of tasks between informal carers is easy, increasing the chance they will be executed on time.
- MG can help grandchildren to be more involved in the care of their grandparent.

Introduction barriers:

- Senior can easily forget taking the smartphone with him, or even forget what it is for.
- Senior will not be able to operate and understand smartphone.
- Senior will find using application complex and might reject buttons such as 'I need help'.
- Senior without disease insight will feel controlled by MG instead of supported.
- Senior without disease insight will not understand the benefits of MG.
- Carers can only check current location of senior on MG website. They want to be able to check location of past few hours on their computer as well as their smartphone.
- There is a need for setting different safe zones for certain days and activities.
- The formal carer picking up the senior in an emergency situation, might not know him and therefore will not know what he looks like.
- Unclear how task division would work between informal and formal carers. It is not realistic for a formal carer to pick up or receive a task, without for example renumeration.
- Putting the senior on hold in an emergency situation increases the risk of him hanging up and start wandering around again.

Resulting requirements:

- Consider using other device than smartphone for the senior to take outside and to track his location with. A wearable (something like a bracelet) will always be on.
- A more detailed overview of the whereabouts of the senior of the last few hours. Based on his walking pattern, the carers will have a better understanding of how he is doing.
- Informal carers should be able to receive alarm not only through email but also through text/push messages on their phone.
- The possibility to make appointments on who watches the senior on what date or time.
- Being able to set different safe zones for different moments in time or different activities.
- Formal carers will need a picture, name and precise location of senior on their phone to be able to recognize him and to win his trust when looking for him after an alarm went off.
- Thinking of a care-system/way in which it is realistic for the formal carer to pick up or receive a task through MG.

- Alarm centre should never have to put senior on hold in an emergency situation.
- MG should meet legal requirements (Luc van den Heuvel?).

2.7. Results per scenario

2.7.1. Scenario 1

The requirements (shown in green) correspond to scenario 1 and are linked to the results from the care professionals meeting and informal carers meeting.

1. Senior takes a walk & informal carer is at work

2. Senior moves out of safe zone

Corresponding requirements:

- Easy to use
- Help not to forget the device

Reflections participants

2.1 FC & IC: Most seniors do not have a smartphone and if they have a smartphone, there is always the risk that it is not charged. Seniors have difficulties operating a (smart)phone (Figure 18).

2.2 IC: One of the seniors does have a smartphone and always takes it with him, but he is not always able to operate it.

***2.3 IC*: MyGuardian senior application on the smartphone is too complicated. The seniors are unable to read the buttons (**

Figure 16), unlock the screen, and the senior is not able to make a phone call to his/her carers. The informal carer suggested simplifying the app or replace it by a simple to use product.

2.4 IC & FC: The senior will not always be capable of taking the smartphone outside the house. There is a high risk he will forget it. Therefore they suggest to replace the application by a bracelet or key ring. This bracelet or key ring should be water resistant, easier for the senior to take along (and not forget). It should not be possible for the senior him/herself to switch the device off.

2.5 IC: The senior will not notice the battery level.

Information used to (partly) answer research questions: 1, 2a, 2b, 2c, 4.

-a- 'A mobile phone is complicated, let alone a smartphone.' (FC)
-b-'IC quoting her mother: it doesn't work that stupid thing' (IC)
-c-'he will not be able to turn the phone on' (IC)
-d-'it (the app) should be simplified' (IC)
-e-'If you are lucky the senior takes his phone with him and it is charged' (FC)

3.Senior is warned

Corresponding requirements:

- A warning is send to the patient if he moves out
- Reassurance mechanism

Reflections participants

3.1 FC: Most of the time the senior does know his way around the neighborhood, but when he meets someone or if there is a roadblock, he could get disoriented. In that case, the senior will often keep walking until he/she recognizes something.

3.2 FC: The senior will not show to the outside world that he is lost. The senior does not want the world to know that he/she needs help.

3.3 IC: Seniors will not choose the button on the app that says 'I need help', since the senior thinks he/she can find his/her way back without help (Figure 17).

3.4 IC &FC: The senior will not notice that the phone is ringing, or the senior will hear that the phone is ringing but it will take some time for him/her to realize that it is his/her phone. The senior will not understand how to respond.

3.5 IC&FC: it would be nice if the senior could be directly in contact with one of his carers. The carer than will be able to judge if the senior is in direct need for help.

Information used to (partly) answer research question: 2c

-f- 'the senior knows his way until he meets an acquaintance' (FC)
-g-'there are not a lot of seniors that will admit they need help, it's facade behaviour' (FC)
-h-'I would never say 'I need help'. I would rather keep walking until I see something or someone familiar'. (SENIOR CHARACTER - SCENARIO 1)
-i- 'he will start looking around him (when the phone rings)' (IC)

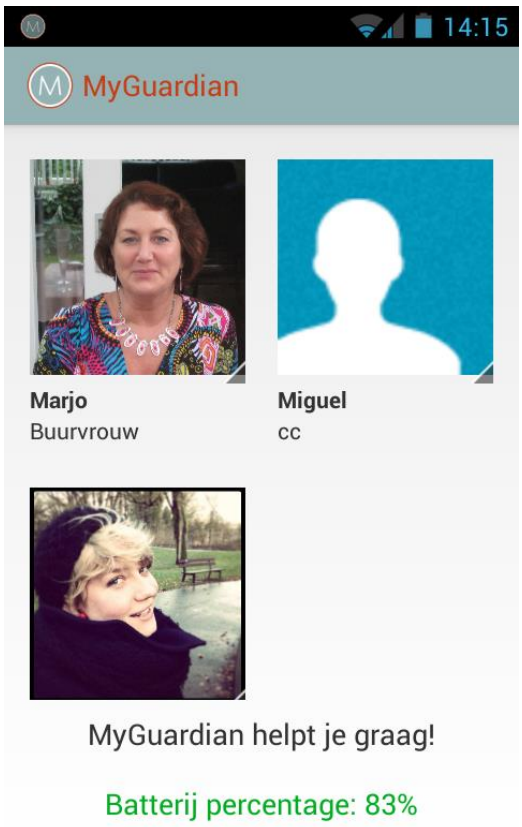


Figure 16: an app for the senior of nowadays will raise practical issues such as - is the phone charged? Does he know how to unlock the screen?

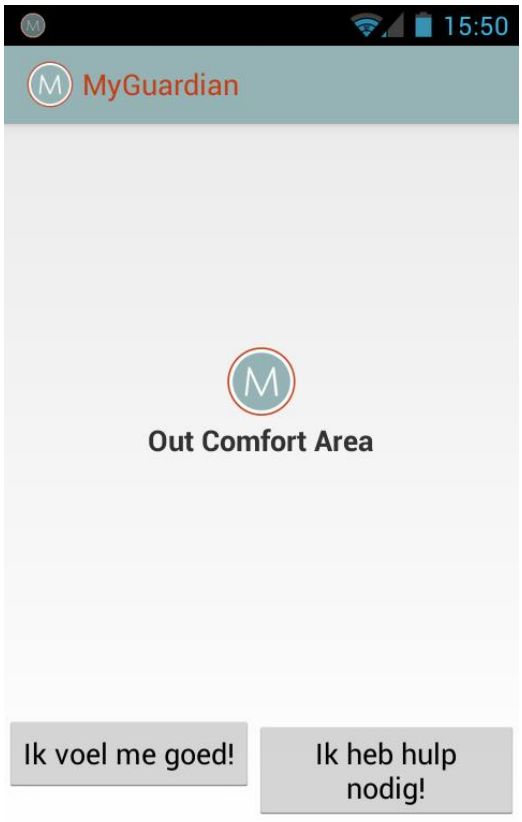


Figure 17: a senior who is unaware of having MCI will never choose the button 'I need help' when he is out of the comfort area/safe zone.

Figure 18: most of the current generation of elderly do not own a smartphone and do not know how to operate one

4. Informal carer receives alarm email

Corresponding requirements:

- Awareness of the potential to be lost & Multiple types of warnings
- Notification to the informal carer about the status or help request.

Reflections participants

4.1 IC & FC: Carers are not always using the computer, therefore an email is not the best way to be notified in case of an emergency (Figure 19). All informal carers mentioned that they have a smartphone and would like to be notified by for example a text message or message via an app.

4.2 IC: The informal carers want to be notified when someone took care of the alarm and they want to know how it was resolved.

4.3 FC: The age of the average informal carer (IC) is between 40-65, though there are also IC (partners of the senior with MCI) that are 90 years old. This older group of IC's will not be able to work with the MG portal.

4.4 IC: If the senior is going out accompanied by family the alarm should be switched off.

Information used to (partly) answer research question: 2b

-j- 'I assume I have a mobile phone, so I can log-in at his home' (FC)
-k-'the moment someone picked up the alarm you should receive a message or something' (FC)

5. Informal carer checks location

Corresponding requirements:

- Real time localization
- Notifications to the informal carer about the status or help requested.

Reflections participants

5.1 FC: The carer should be able to track the location of the senior a smartphone, since the senior will probably not stay on the same spot.

5.2 FC: Even if the senior is lost, sometimes it is best not to alarm directly. The carers first want to see whether the senior is going into the right direction instead of alarming directly or picking him up (Figure 20).

5.3 IC: The carers would like to see a more detailed overview of where the senior has been in the last few hours, based on the walking pattern they can understand how the senior is doing (Figure 21).

5.4 FC: In an ideal situation, the informal carers can leave their work to pick up the senior in case of an emergency. However, the IC's are dependent on their employer/job if suddenly leaving their work is possible.

Information used to (partly) answer research question: 2b

-l-'sometimes you just need to wait, to see what the senior is going to do' (FC)

6. Informal carer closes alarm

Corresponding requirement:

- Set alarms to close the process.

Reflections participants

6.1 FC: Informal carers want to be able to close the alarm on their smartphone, since they want to close the alarm quickly at the seniors home or on their way back to their home/job.

6.2 FC & IC: The process and application needs to adapt to the level of MCI of the senior.

Information used to (partly) answer research question: 2b

-m- 'If someone has MCI, the focus should be more on helping the senior to orient himself. During later stage of CI, the focus should be more on supporting the informal carers (FC)

Usability findings through observation

A casemanager and one informal carer are not sure where to click to take care of the alarm (see Appendix III).

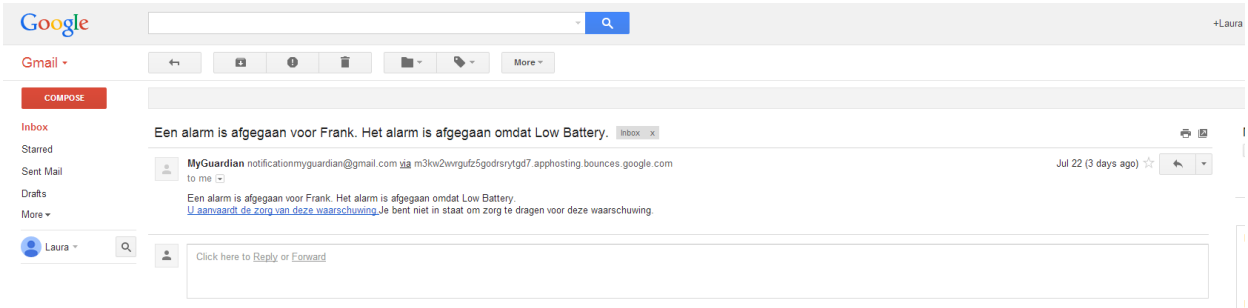


Figure 19: email notification is not the best way to be notified in case of an emergency

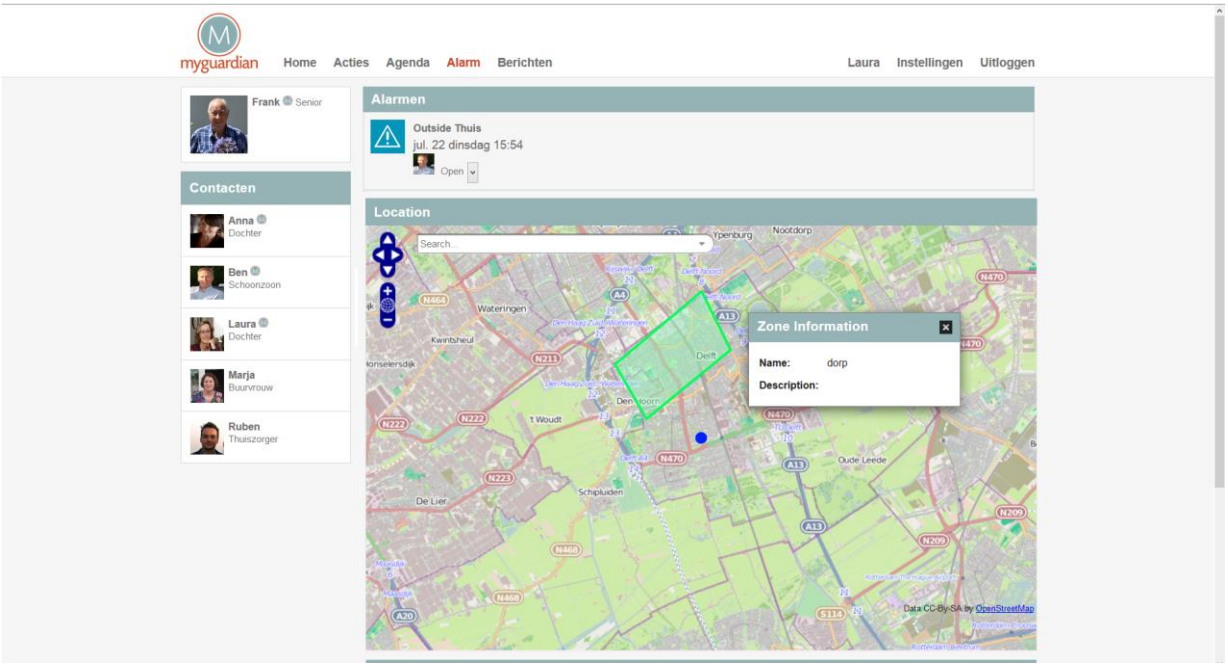


Figure 20: if the alarm goes off, carers first want to see what the senior is doing instead of picking him up immediately

Figure 21: carers would like a more detailed overview of where the senior has been – based on his walking pattern they can estimate how he is doing

2.7.2. Scenario 2

The requirements corresponding to scenario 2 are linked to the results from the care professionals meeting and informal carers meeting.

1. Senior goes for a walk

2. Senior panics

Corresponding requirements:

- Use the device to let carers know where they are up to
- Reassurance mechanism

Reflections participants

2.1 FC: When the senior is panicking he/she might not be able to think straight and use the smartphone to alarm someone (**Erreur ! Source du renvoi introuvable.**).

2.2 FC: Currently many seniors do not press the red alarm button they carry with them. They are not sure in which cases they should press it.

2.3 IC: A senior in panic might be able to contact one person, but if he or she does not pick up, the senior might not be calm enough to try to phone someone else.

2.4 The carers suggest that the phone call should be automatically dispatched to another carer or even dispatched to all five close carers at the same time, until one of the carers picks up the phone.

Information used to (partly) answer research questions: 1, 2a

-n-'he will not be able to think straight.' (FC)
-0- FC quoting senior: 'I thought I should only press the red button if I needed to be reanimated.' (FC)
-p- 'the system should call first all five carers' (IC)
-q- 'the system should call all carers at the same time' (IC)

3. Senior calls his son

4. Son is not available

Corresponding requirement:

- Define your availability as carer (not implemented in prototype 1)

Reflections participants

4.1 FC: Knowing which of the informal carers is on holiday can be helpful for the care desk to dispatch the alarm. Also it can help the formal carer picking up the senior to improve the contact.

5. Senior calls care desk/emergency center

Corresponding requirements:

- Dispatching care activities
- Mechanism to link to a 24/7 care desk
- Mechanism to link to nurses.

Reflections participants

5.1 FC: The care desk must be able to look up the location of the senior and the closest available carer (**Erreur ! Source du renvoi introuvable.**).

5.2 FC: The care desk should be able to let the senior know who is picking him/her up. The care desk cannot stay in contact with the senior and at the same time contact the formal carer. Therefore the senior will be put on hold, and he/she might be confused and start wondering around again.

5.3 IC: The senior should first be put in contact with all close carers, and as a last resort he should be connected to the care desk.

Information used to (partly) answer research question: 2c

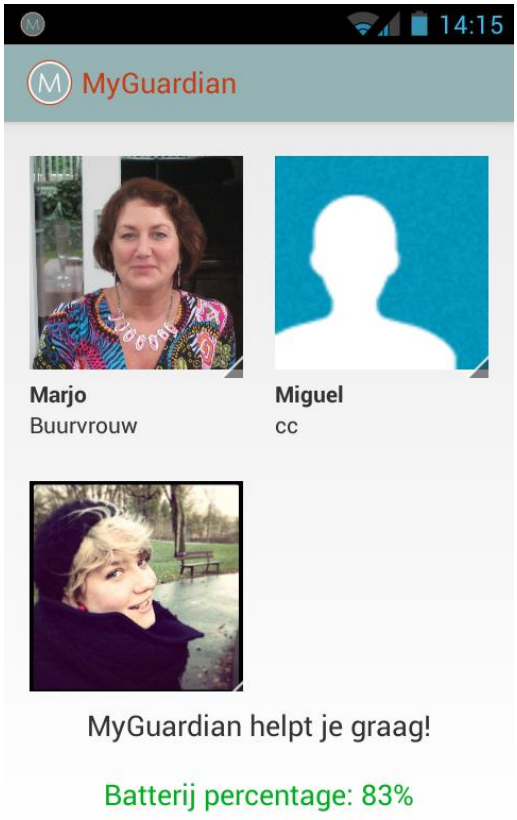


Figure 22: a panicked senior will have even more difficulty calling a carer or pressing the alarm from the application

Figure 23: the care desk must be able to look up the location of the senior to be able to contact the closest available carer.

6. Care desk calls closest formal carer

Corresponding requirement:

- Assign tasks based in their proximity to the patient. (not implemented in prototype 1)

Reflections participants

6.1 FC: The formal carer who is contacted based on his/her proximity should only be contacted by the care desk during the day. During the night different formal carers take care of alarming situations.

Information used to (partly) answer research question: 2c

-r- 'if it is during the working hours of the careteam....(the IC could help the senior) (FC)

7. Formal carer picks up alarm

8. Formal carer picks up senior

Corresponding requirement:

- Preference for filtering information

8.1 FC: The formal carer, who is sent by the care desk to help the senior, needs to know the current situation of the senior. He should be able to see personal information of the senior on his mobile phone. For example: who the senior is, what he/she looks like (a photo), his/her length, where the senior lives, and his/her current location.

This information is needed to find the senior as well as to win the trust of the senior (Figure 24).

Information used to (partly) answer research question: 2c

-s-'you need to know who you are looking for' (FC)
-t-'the carers are trained to earn their trust with the right information' (FC)

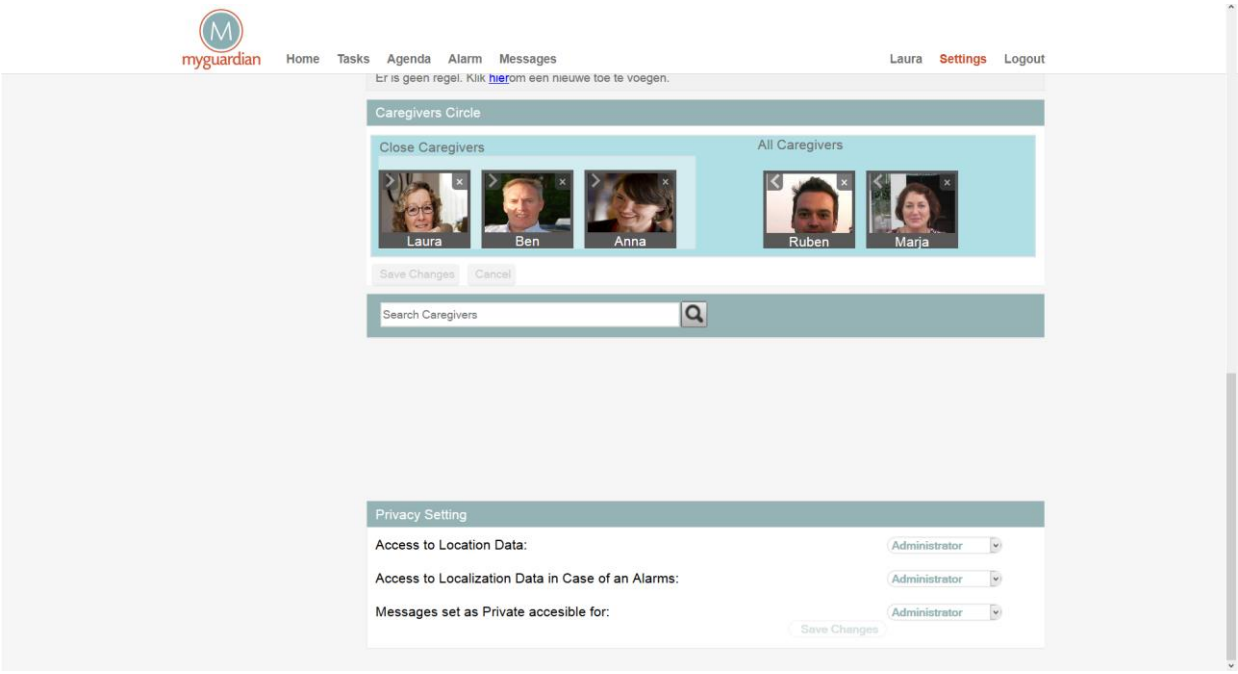


Figure 24: formal carers should be able to look up information on their phone (not only on the website) about the senior and his close carers. This is necessary to win the trust of the senior in case of an emergency

2.7.3. Scenario 3

The requirements corresponding to scenario 3 are linked to the results from the care professionals meeting and informal carers meeting.

1. Senior and informal carer receive MG

2&3. Senior and informal carer set care tasks & appointments

Corresponding requirement:

- Access rights per user
- Group coordination of tasks
- Shared agenda used for coordinating care around the patient

Reflections participants

2.1 FC: The senior may not want to share everything and therefore not all carers should be able to see everything on the platform.

2.2 FC: With MG grandchildren might be more easily involved in the care. Currently the grandchildren may want to help out, but they never receive any tasks (figure 20).

2.3 FC: For the senior it's important to keep doing specific activities on his own.

2.4 FC: When you receive a task you should get a message on your smartphone.

2.5 FC: The tasks and appointments give an overview for formal and informal carers.

2.6 FC: Volunteers should also be connected or added to the website, this way they can help out as well.

2.7 IC: The agenda should be linked to the Google agenda.

2.8 IC: The tasks overview should not only be available for the carers but also for the senior, he should be reminded by the system.

Information used to (partly) answer research questions: 2a,b,c

-u- *'I have a friend that I want to visit once a while, but I do not want my neighbour to know'*
(SENIOR CHARACTER PLAYED BY FC)

-v- *'I do not want everybody to know what I am doing'*
(SENIOR CHARACTER PLAYED BY FC)

-w- FC as senior: 'I want to be independent' FC as IC: 'Yes, but as you can see you are going independent' *(FC)*
-x- 'my dad always forgets to go to the care centre to get his, maybe if he receives a reminder 5 minutes beforehand.' *(FC)*
-y- *so you really think it is necessary for someone to join me to my dentist appointment?*
(SENIOR CHARACTER)

Usability findings

One case manager added an appointment in the task list. She found out later she should have added it to the agenda (see Appendix III).

4&5. Setting safe zone & preferences

Corresponding requirement:

- Set areas for the movement of the patient

Reflections participants

4.1 IC: There should be a difference between the safe zones in which the senior is walking around the house or when he is biking (Figure 26).

4.2 FC & IC: Most seniors have a pattern in their daily life, they go to a specific place every day, the safe zone(s) should be adapted to this pattern.

4.3 IC: The carers think adding a description to a safe zone is not necessary.

4.4 IC: It is unclear for the carers that you can also set a notification for the senior in case he moves out of the safe zone.

4.5 FC: The system should not be set in a way that the FC's have to check 24/7

Information used to (partly) answer research questions: 2b

-z-'that you directly know that the senior is on the bike' *(IC)*
-α- FC as senior 'but I still want to go to aunt Jannie' *(FC)*
-β-'Don't be scared I will get lost and won't come home, I know my way!'
(SENIOR CHARACTER)
-γ- 'with such as system, I have the feeling that I need to check 24hours a day how he/she is doing'(FC)

Usability findings

Some participants had difficulty understanding where and how to the safe zone and how to save it (see Appendix III).

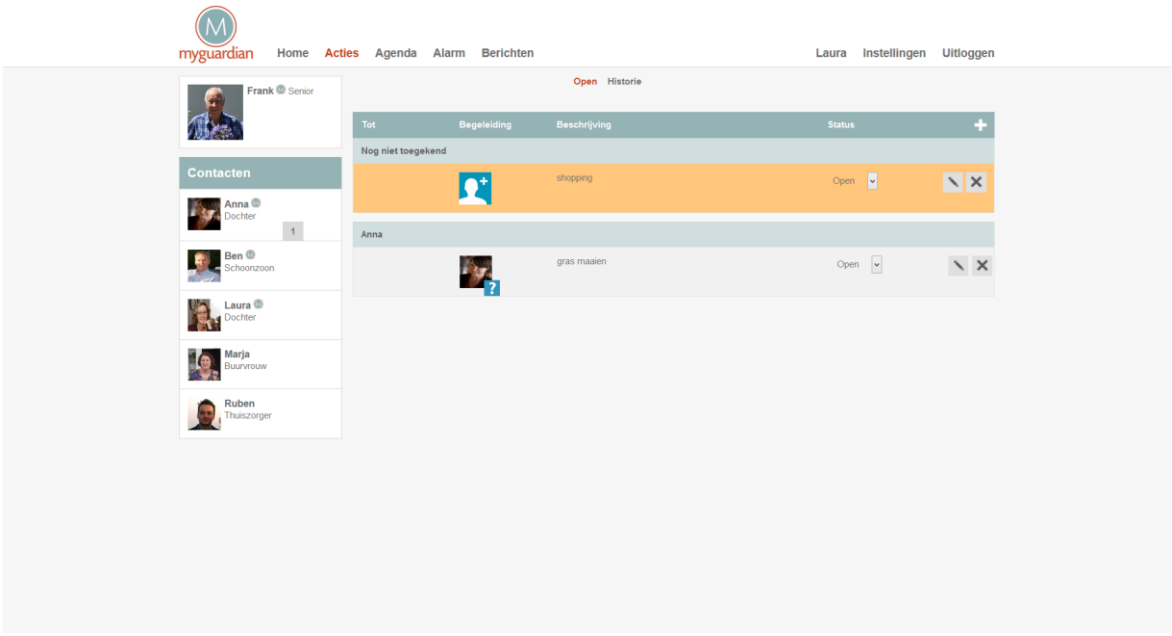


Figure 25: MG can help grandchildren to be more involved in the care of their grandparent.

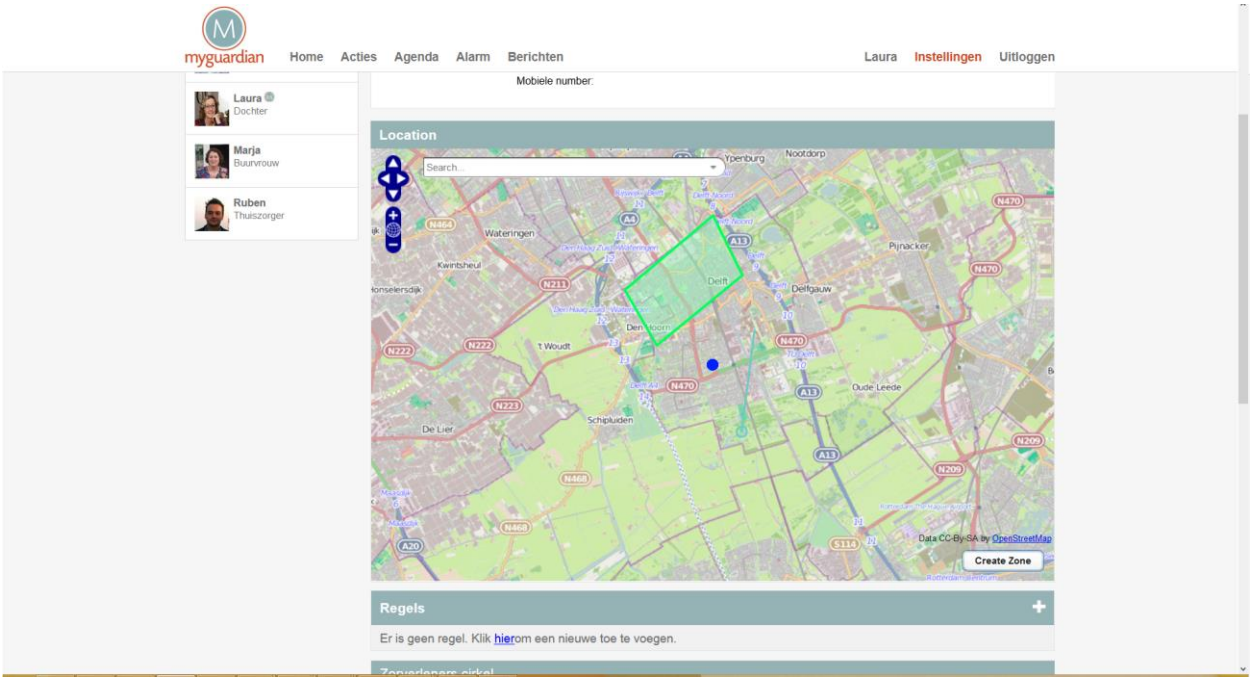


Figure 26: Being able to set more than one safe zone can be convenient. For example a bigger safe zone for when the senior cycles on Wednesday and a small one for the rest of the week.

2.8. Research limitations and recommendations

2.8.1. Number of participants

Because this first test still involved additional research work to map the functionalities of MyGuardian, and not all functionalities were reliable yet, caution was applied in the number of

research participants recruited. The research results are based on a total of nine participants. Of these, five were care professionals at the management level. They spoke and acted from their own perspective, but also took on the perspective of others: that of home carers, informal carers and seniors with mild MCI. The other four participants were informal carers. They spoke and acted from their own perspective, and also took on the perspective of the senior with MCI they cared for. Numbers were small but findings true to context.

2.8.2. Observational data on usability

The usability problems that were directly observed during the test, can be assumed to be salient. This is because those users took the perspective of others who would be even less able to use the technology. The total number of participants who tested any particular functionality was between three and four. These directly observed problems are described in section 2.7 and summarized in Appendix III. Usability and acceptance problems that these participants projected onto others (professional onto informal carers, informal carers onto seniors with MCI) are assumptions by these participants about someone else's perspective. These assumptions are based on close and intimate daily knowledge of that other person. However, it is conceivable that, for example, participants may have over- or underestimated the other person's ability with and acceptance of the technology. The project team did not always distinguish between statements made on one's own behalf and statements made on behalf of others.

2.8.3. Research Questions

Research questions 2d and 3 are not answered in this report. The TEMSED tool was not ready to use. Also, no measurable assesssment of the added value towards existing services, costs and income could yet be made, since the emphasis in this test was still on fine-tuning MyGuardian's basic functionalities.

In the absence of a further protocol for data comparison, a comparison with other test sites should be done qualitatively. This test focused on the experience of MyGuardian in context. We have described the protocol we used. We believe that this test provides the necessary information for the further development of MyGuardian. No TEMSED evaluation was made during this test. However, the results reported here could be used to do a test analysis using TEMSED. The consortium could do this, discuss whether the analysis is useful and provide recommendations for a feasible procedure.

This test has not yet researched the possible added value of MyGuardian towards existing services, costs and income of the care organisation. It might be useful if the consortium first draws up a concept of how this added value could be defined and captured. For example, in the form of a business model.

2.8.4. Recommendations

- Meetings 2 and 3 would be preferable to schedule at 3 hours rather than 2.5.
- Statements participants make on their own behalf, and statements made on behalf of others, should be more carefully distinguished in reporting than was possible in this initial test.
- Develop procedure for use of TEMSED, using the present data as sample data to work with.
- Develop protocol to assess value added, costs and income for the care organisation.
- Use consent form, give a small 'thank you' to non-professional research participants.
- Lastly, this test did not focus on interaction qualities of the MyGuardian prototype in detail. Detail results were only on usability, not experience (experience was only assessed of

MG overall). It might be useful to include interaction qualities in the next round of tests in order to derive more specific design inspiration for the consortium.

3. Preliminary user acceptance tests in France

3.1. Overview of the French tests

In France, preliminary user acceptance tests have been conducted in two times:

- Acceptance tests of the senior mobile application with online surveys
- Acceptance tests of the web application with standard usability tests

The choice of testing separately these two facets of MyGuardian is legitimated by the nature of the tests and the level of maturity of the prototype. If, at this stage, the prototype is not robust enough to allow tests covering all the facets of MyGuardian functionalities, such tests are not mandatory to get efficient feedback from a usability point of view and to improve the prototype. Preliminary user acceptance tests can therefore address different parts of the prototype. As a consequence, evaluation process is formative.

3.2. Mobile app acceptance tests with online surveys

3.2.1. Material: the online surveys

3.2.1.1. *A summary of the current prototypes*

The smartphone applications are addressed to the senior and to the caregivers. The persons can also access MyGuardian on the web. The current senior application prototype has several functionalities. First of all, it gives the elderly the possibly to contact one of his caregivers. When the application is open, four contacts are visible on the screen, which can be scrolled to access others contacts. The contact presentation includes three visible features: the caregiver's picture, his name and the nature of his relationship with the senior (my daughter, my therapist…). Thanks to the touch screen, by touching the contact's avatar the elderly can trigger the phone call. At the bottom of the screen figures the battery level in percent and an informative sentence designed to make clear to the seniors that the phone is currently connected. For now, that sentence is: "MyGuardian is here for you".

The caregivers' application and the web interface were not addressed during our pre-test on the acceptance issue perspective, even though the previous considerations about acceptance concern them as well.

3.2.1.2. *The rational of the surveys*

The two surveys were created with two aims: the first aim was to collect the ALMERE model markers of acceptability (attitude toward the assisting acts proposed by MyGuardian, anxiety with and without MyGuardian[1], perceived usability and ease of use…), the second one was to observe the evolution of the acceptability of the device depending on the empowerment of the elder during the MyGuardian presentation. The empowerment is expected to influence the attitude towards the technology and therefore influence the appropriation dimension. The desired items to complete the first objective are collected in the two surveys, but the empowerment effect on the MyGuardian acceptability is measured thanks to the comparison of the two surveys. Indeed, the first survey isn't built to empower the participant whereas the second one is. How do we understand "empowerment" here? The two surveys do share some empowerment features, such as explicitly giving to the participants the possibility to help improving MyGuardian, to give their judgment, to support or not and to accept or not MyGuardian. The difference between the surveys is whether or not they have the possibility to choose and to configure the assisting acts proposed by MyGuardian (participatory design). This possibility in only given in the second survey. The

[1] That is before and after the MyGuardian device presentation to the participants.

methodology of the two surveys construction can be found in Table 6. The content of the two survey is given in Appendix XV & Appendix XVI.

3.2.2. Setup of the surveys

3.2.2.1. *Contents and formulation: the surveys pre-test.*

The surveys where created by a psychologist consistently with the previous considerations. The surveys aren't standard: they were created specifically for the MyGuardian project and without a scientifically valid pre-testing. The surveys have been pre-tested, thanks to friendly tests, with only four healthy seniors that were split in two paired groups. The groups were paired thank to the fact that the participants were two couples. Indeed, recruit a couple and put the members of the couple in two different test groups is a very strong method to obtain paired groups, that is groups that are comparable as much as possible (age, gender, socio-professional group… etc.)). In summary, a women and a man (not from the same couple) filled in one of the two surveys under the watch of the designer of the surveys. Therefore, each survey was pre-tested twice. The mean age of the first couple was 77(±0,2) years old, and the mean age of the second couple was 83,5 (±1,5) years old.

3.2.2.2. *The situational anxiety measure: IASTA-Y65+ (Bouchard, 1996).*

The situational anxiety is the anxiety felt in a specific context or situation. It differs from what is called the "trait" anxiety, which falls under person's personality. The IASTA-Y65+ is the French adaptation of Spielberg's State-Trait Anxiety Inventory (form Y). For shortening purpose, we didn't use all items of the situational inventory in the first survey: we used 10 items within the 20 proposed by the IASTA-Y65+. Five items were proposed for the pre-SA and the 5 others for the post-SA. Those 10 items were "paired" for pre-SA/post-SA comparison purpose (see Table 5).

Pre-SA items	Post-SA items
Currently, the elder is feeling confused	Currently, the elder is feeling undecided
Currently, the elder is feeling overwhelmed	Currently, the elder is feeling shaken
Currently, the elder is feeling relaxed	Currently, the elder is feeling tense
Currently, the elder is feeling preoccupied	Currently, the elder is worrying about possible troubles
Currently, the elder is feeling calm	Currently, the elder is feeling nervous

Table 5: paired items for pre-SA/post-SA comparison purpose

3.2.2.3. *Setup of the surveys: blocs and contents*

	SURVEY 1	SURVEY 2
BLOCS and CONTENTS	POPULATION INFORMATION • Gender (G) • Age (A) • Socio-professional group (SPG) (8 items) • Devices currently used (DCU) (5 items) • Frequency of use (FU) (3 items)	
	SCENARIO PRESENTATION	
	Situational Anxiety measure (pre-SA): questionnaire IASTA-Y65+ (Bouchard, 1996)	None
	MYGUARDIAN EVALUATION WITHOUT EMPOWERMENT: Exploration of the thoughts that may contribute to the degradation of the scenario (from being lost to being in panic, namely from the first to the second scenario). **1.** Battery level and corresponding behavior **2.** Assessment of the support seeking behavior***** **3.** Assessment of the thoughts that may negatively impact the elder's attitude toward MyGuardian	MYGUARDIAN EVALUATION WITH EMPOWERMENT: Co-construction and customization of the assisting acts corresponding to the scenario and regarding mobility. **1.** Gathering the participant's habits regarding his mobility **2.** Selection (or not) of the security criteria (regarding his own mobility) that satisfy the participant **3.** Assessment of the acceptance regarding the comfort zone and the corresponding assisting acts **4.** Assessment of the support seeking behavior*****
	Enlightened Situational Anxiety measure, that is giving the knowledge the participants have about MyGuardian (post-SA): IASTA-Y65+	None
	Direct measure of the MyGuardian device acceptance	
	Questions and comments about the survey	

Table 6: the blocs of the two surveys and their contents. In the MyGuardian evaluation blocs, * stands for the contents that are assessed in the two surveys.

3.2.3. The population

3.2.3.1. *Diffusion of the surveys*

The surveys were diffused on the web thanks to friendly and professional contacts. The surveys were created on the www.typeform.com platform.

3.2.3.2. *Population*

- The sample size and main characteristics

	Survey 1	Survey 2	Total
Number of participants	32	44	76
Mean age	69,2 (ET=6,9)	69,9 (ET= 6,8)	69,6 (ET=6,8)
men/women ratio	1,0	0,8	0,9

Table 7: Sample size and characteristics

Socio-professional groups	**Size**	
	Survey 1	Survey 2
Higher managerial and professional occupations	15	19
Lower managerial and professional occupations	2	3
Intermediate occupations (clerical, sales, service)	1	0
Small employers and own account workers	3	4
Lower supervisory and technical occupations	1	1
Semi-routine occupations	0	1
Never worked	1	4
Unknown	9	0

Table 8: socio-professional characteristics of the sample

- Devices ownership in the total sample

Figure 27: ownership at home in the sample (in percent)

Within the total sample, this ownership at home goes with 96% of a rather frequent usage.

3.2.4. Results from survey 1

3.2.4.1. *Battery level and corresponding behavior*

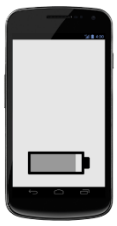
Figure 28: Battery level information

The percent battery level presentation is well accepted but seniors' perception of the remaining time is very heterogeneous. The answers are scattered, notably some overestimations (see Figure 28) and there is some extremes values (see Table 9), reflecting that the battery level information is not sufficiently well understood by the participants. Accordingly with a "battery charged at 47%", elders mainly have estimated that the smartphone will stay on for 86 to 241 minutes (95% confidence interval), which is still correct giving the fact that a remaining usage time for this type of device is a very difficult variable to determine (depends on what you do with the device). Three literal answers ("I don't know") and nonsense answer values ("90 seconds") were discarded from stats and processed as singularities. One participant gave the best answer, that is "it depends: if the device is connected it can decrease very fast". Therefore, based on percent information, the perceived remaining usage time clearly widely differs across participants in such a way that we can conclude that giving a battery level with this presentation isn't reliable. Plus, we can remember that our sample is mainly composed of persons belonging to the high socio-professional group and that 96% of them are having a rather often usage of one or more device at home. In order to be correctly informed on the usage time remaining, elders need a clear message. Indeed, we observed that although some participants really underestimated the remaining time of use, they didn't choose to adopt a responsive behavior[2]. By giving a clear time information -"usage time remaining: 3h22", we homogenized the senior's behavioral responses[3] and those responses appeared to be more adapted. Moreover, we found that 80% of the elders that responded to our first survey preferred that last type of battery presentation.

[2] Example: For a 47% charged battery: (1) Usage time estimation: 1 hour. No need to adopt a responsive behavior, the elders that is lost in town do have the time to go home (rate 5 on 7 levels, see the survey 1 in the Appendix XV); (2) Usage time estimation: 10 minutes. It is likely that the elder doesn't have the time to go back home, he must adopt a responsive behavior that is going back home immediately or giving a phone call for someone to pick him up.

[3] To the question: « Accordingly, do you think the elderly is in a hurry? »

It seems that the battery level (see figure on the right) is ambiguous; indeed, we found that seniors either interpret it as a well charged battery or as an almost empty battery. We presented the battery on a horizontal way because we need the information to be sufficiently big for visually impaired elders and given the HOME screen appearance of the senior application, a vertical battery presentation is quite misfit. We can conclude that this battery presentation is not a solution either.



Consistently with those results, we can make the following interpretation: the battery level is a hazardous information to give to the seniors. Indeed, and although the population is rather used to manipulate such devices, the battery level comprehension is not satisfying regarding our goals. Indeed, a misunderstanding of the battery level may be stressful (see how the anxiety can influence the acceptance in the ALMERE model (see General Introduction)). The senior's smartphone battery level information is a good information to give to the caregivers (maybe not for aged caregivers) and must remain managed as a rule that is an information given to the caregivers only is case of low battery level on the senior's smartphone. Therefore, we suggest that the battery level information is not necessary giving the fact that it is misunderstood information. For the senior application (and maybe also for the caregivers application), working with notification rules will be more consistent with the reality of the use in the field.

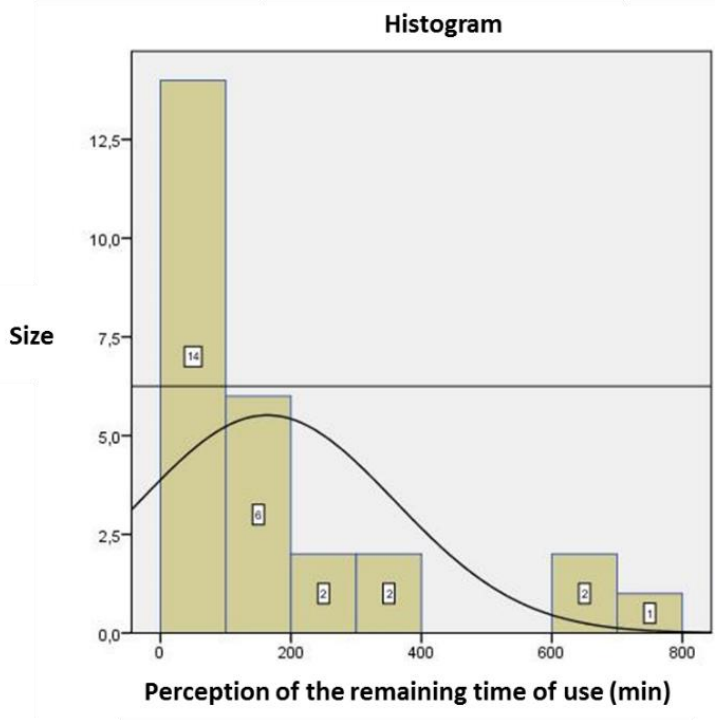


Figure 29: participant perception of the remaining time of use for a 47% charged battery (mobile app.)

RemainingTimeEst					
	Remaining time of use estimation (in minutes)	Size	Percent	Valid percent	Cumulated percent
Valid	4	1	2,8	3,7	3,7
	10	1	2,8	3,7	7,4
	15	2	5,6	7,4	14,8
	30	3	8,3	11,1	25,9
	60	5	13,9	18,5	44,4
	90 (Median[4])	2	5,6	7,4	51,9
	120	6	16,7	22,2	74,1
	240	2	5,6	7,4	81,5
	330	1	2,8	3,7	85,2
	360	1	2,8	3,7	88,9
	600	2	5,6	7,4	96,3
	720	1	2,8	3,7	100,0
	Total	27	75,0	100,0	
Missing values		9	25,0		
Total		36	100,0		

Table 9: Exploratory analysis of the participant perception of the remaining time of use for a 47% charged battery (mobile app.)

3.2.4.2. *Assessment of the thoughts that may negatively impact the elder's attitude toward MyGuardian*

- Spontaneously, who to contact in case of need?

We can observe that the close informal caregivers are predominantly chosen by the seniors. This information may be interesting for the seniors' attitude toward the device. Indeed, it will be interesting to collect such information upstream to the actual use. Indeed, we can make sure that the preferred contact is clearly visible on the by default application interface, even though the escalation rule or the caregivers' availability are variable. About the escalation process (Figure 30), it is interesting to notice that the participant comprehension of the rule is coherent with what can be observed in the field usage. Indeed, the coherence between the expected operating and the actual operating is a good think regarding the device acceptance (specifically concerning the trust and the perceived ease of use in the ALMERE model (see General Introduction)).

[4] In statistics and probability theory, the **median** is the numerical value separating the higher half of a data sample, a population, or a probability distribution, from the lower half.

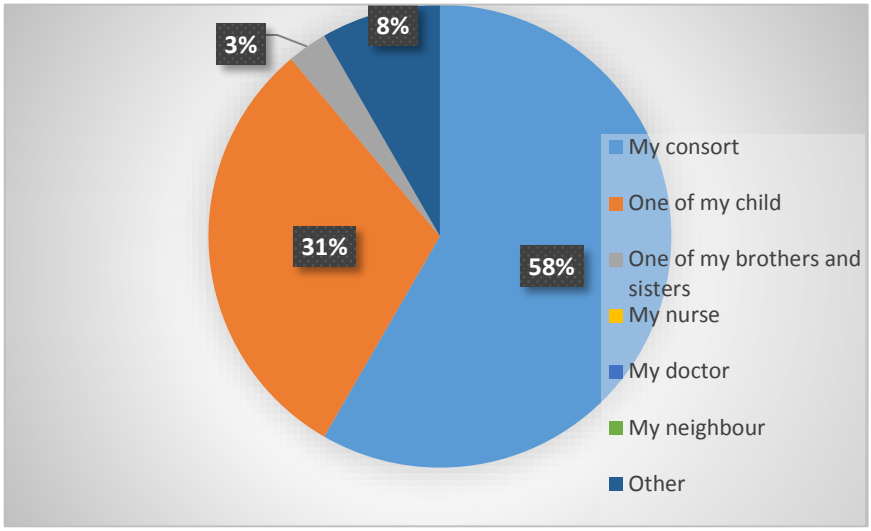


Figure 30: seniors' spontaneous contact preference in case of need

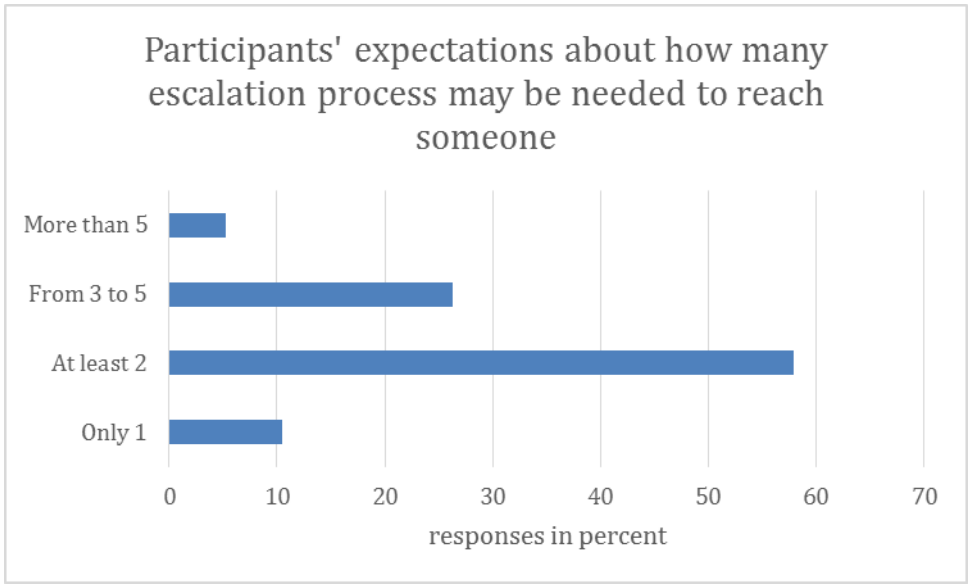


Figure 31: participants' expectations about how the escalation rule is operating

- Timing and safety assessments

To the question “considering that you and this person (the caregiver) are in the same town, can you roughly estimate how long it will take for him to come to you?”, the participants mainly responded from 33 to 45 minutes (95% confidence interval). Moreover, we assessed the safety feeling is this situation (Figure 31). We notice that the two main answers are in coherence with MyGuardian assistive acts. Indeed, the main answers make reference to: (1) optimize and simplify communication; (2) optimize and simplify the senior localization process.

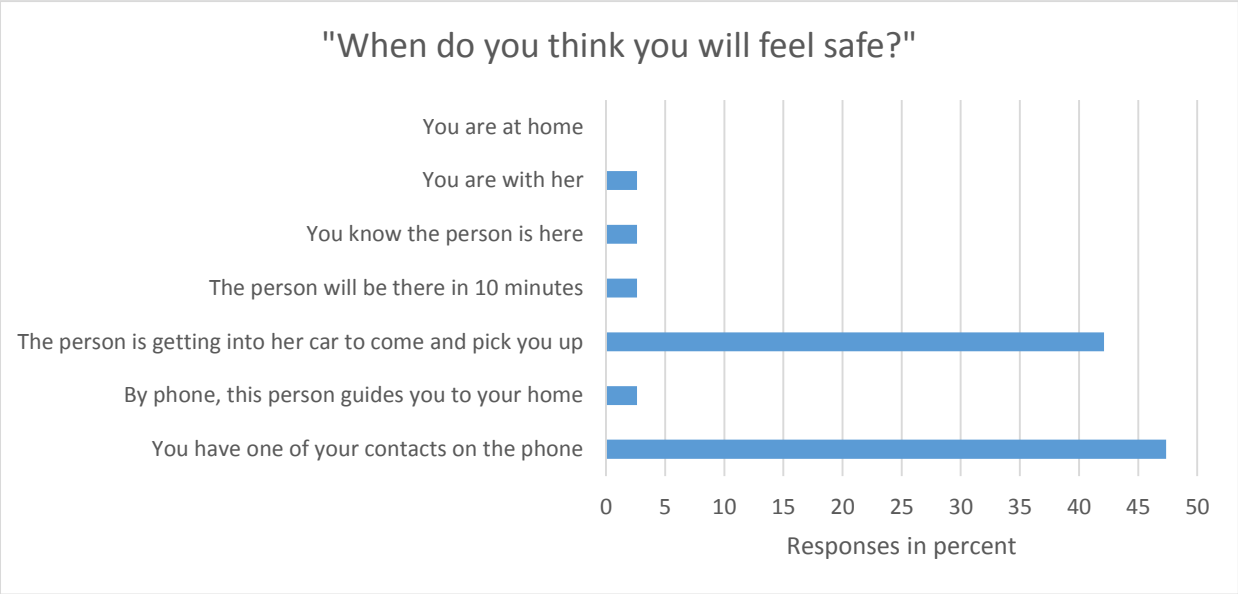


Figure 33: participants’ answers (in multiple selection question) to the question “when do you think you will feel safe?”

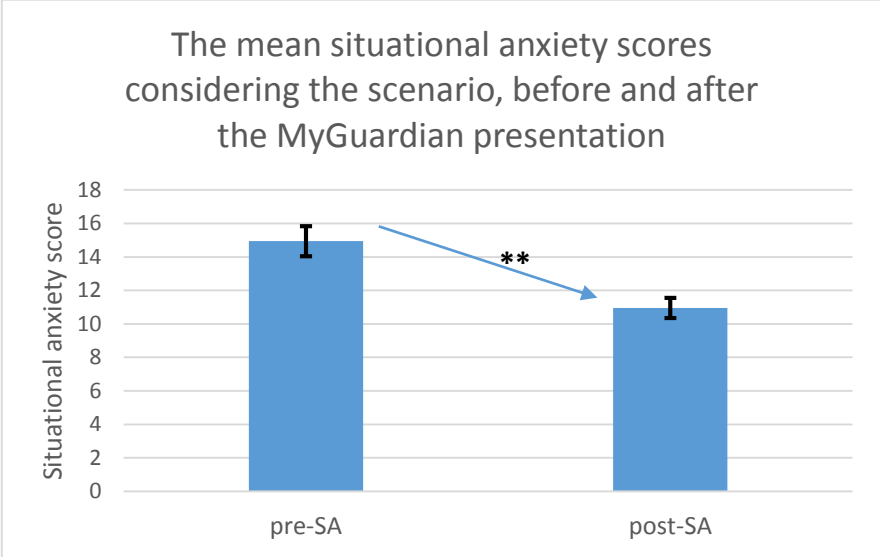


Figure 32: The mean situational anxiety score without and with MyGuardian device in a ‘lost in town’ scenario. * means a statistically very significant difference.**

- Situational anxiety with and without MyGuardian

The situational anxiety score was measured once before the MyGuardian presentation and once after it (Figure 32). We ran a dependent t-test (called the paired-sample t-test in the statistic program we used: SPSS). The output of the paired sample t-test gave the following statistics:

$t(37) = 5{,}506$, $p < 0.0005$. Due to the means of the two situational anxiety scores and the direction of the *t*-value, we can conclude that there was a statistically significant decrease in situational anxiety scores from 14,95 ± 5,53 to 10,95 ± 4,09 ($p < 0.0005$); a reduction of 4,0 ± 4,5. We can therefore conclude that knowledge about how MyGuardian operates and the fact of having MyGuardian with oneself in this particular scenario permitted to decrease the situational anxiety score.

3.2.5. Results from survey 2

3.2.5.1. *The participants' habits regarding their mobility*

The participants' habits may be a good marker of the possible complexity of the comfort zones and therefore address the "perceived flexibility" construct in the ALMERE model. The two figures below (Figure 33 & 34) show that the comfort zones may not be that simple to create. In the manuals, it would be interesting to have a document (questionnaire, scale…) bringing together the relevant questions to ask to the senior before the creation of the comfort zone. Some ethical problems regarding the seniors' intimacy and freedom may also be partly solved with this type of comfort zone setup tool.

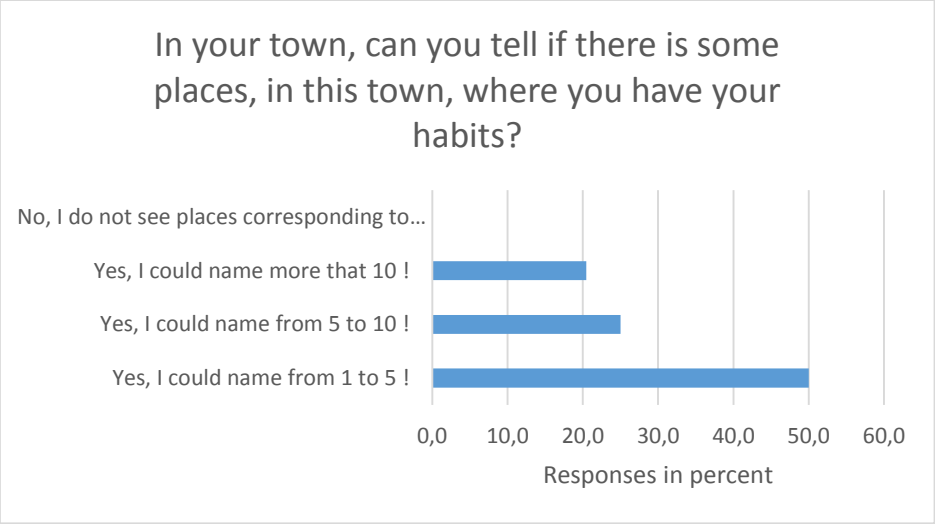


Figure 34: habits in town

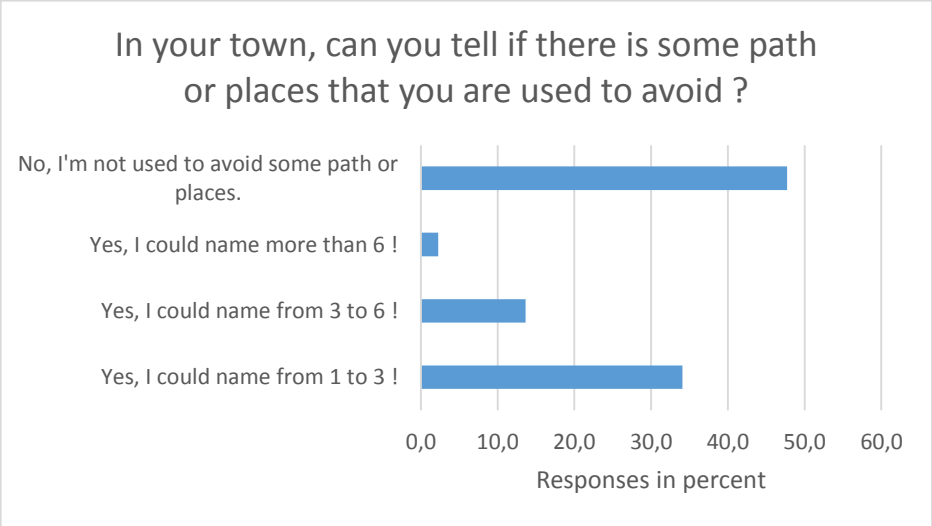


Figure 35: places where people avoid to go

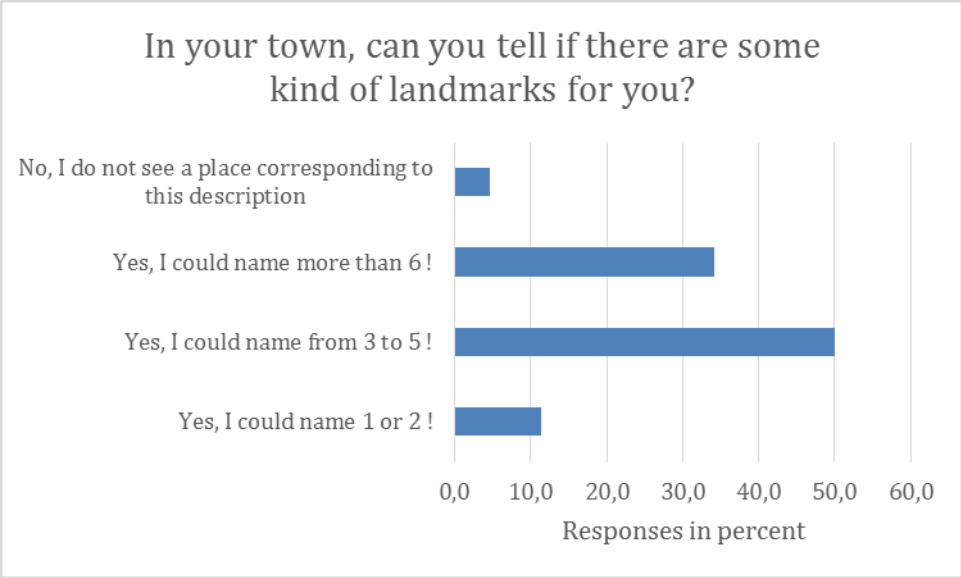


Figure 36: landmarks for people

3.2.5.2. *The assistive acts chosen by the participants for themselves*

The main result here is that all the participants choose one or more possibilities, although those possibilities are rules restricting their own mobility (Figure 35 & 36). This shows that the assistive dimension is well understood an internalized. Moreover, time alarms rules are well accepted by elders.

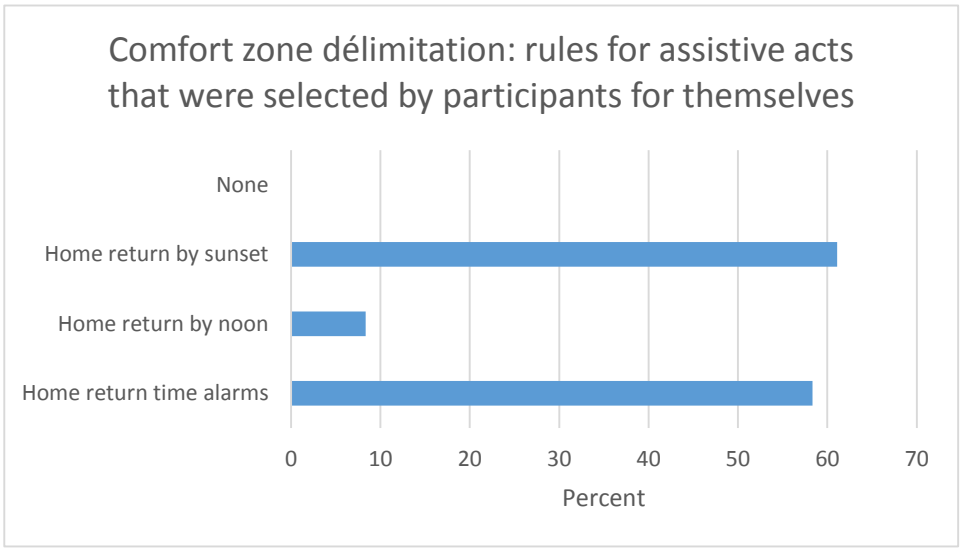


Figure 37: assistive acts regarding comfort zones

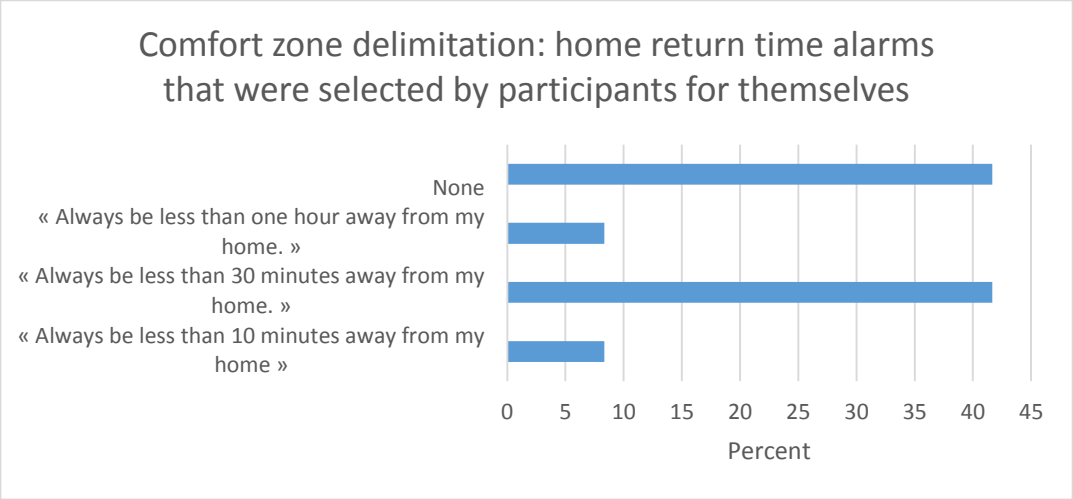


Figure 38: managing time to go back home with alarms

3.2.5.3. *Assessment of the acceptance regarding the comfort zone and the corresponding assisting acts*

Concepts	Percent of participant who choose to support the concept of the assistive acts.
Taking the smartphone when going outdoors	97%
Location	89%
Location without the senior permission	18%
Caregiver warned by the rule engine	81%
Be contacted by a warned caregiver	89%

Table 10: acceptance of the assistive acts as proposed by MyGuardian

3.2.6. Results across the two surveys: the effect of the empowerment on acceptability and acceptance

3.2.6.1. *The support seeking behavior*

The support seeking behavior was assessed thanks to 3 questions: “In case of need…

1. Will you rather avoid calling one of your contacts?
2. Do you think you will wait until nightfall before calling one of your contacts?
3. How long do you think you will wait before calling one of your contacts?”

The two first dependent variables were bimodal qualitative variables. Therefore, we ran a Chi-square to find out if the empowerment had an effect on the *yes*/*no* answers ratio across the two groups (survey 1 VS survey 2). To do so, we needed to create groups equally sized (N =38). The second group being bigger than the first one, we randomly generated a value for each participants of the second group and discarded the participants corresponding to the 6th lower values. The Chi-square tests showed no significant differences in the *yes*/*no* ratio across the two groups neither for 1. (*chi-square* = 0,053, *ddl* = 1, *p* = 0,818; see table 11) nor for 2. (*chi-square* = 0,461, *ddl* = 1, *p* = 0,497; see table 12). The empowerment, the way it had been proposed to the

participants, did not have an effect on those two support seeking behavior. We also notice that across the two surveys, 87% of the participants answered *No* to the question 1., and 57% answered *No* to the question 2. Therefore, the outcome is that the participants admit that they would rather avoid calling someone (implying, calling for help). Nevertheless, half of them would still wait until they have no other choice (wait until nightfall).

		1. Avoid calling		Total
		No	Yes	
Survey	Survey 1	32 (84%)	6	38
	Survey 2	34 (89%)	4	38
Total		66 (87%)	10	76

Table 11: participants distribution for question 1.

		2. Wait until nightfall before calling		Total
		No	Yes	
Survey	Survey 1	20 (53%)	18	38
	Survey 2	21 (55%)	17	38
Total		41 (57%)	35	76

Table 12: participants distribution for question 2.

On the contrary, the empowerment had a significant effect on the answers to the 3rd question. The conducted one-way ANOVA showed that the participants' answers to the 3rd question are significantly ($F(1, 65) = 10{,}03$; $p = 0{,}002$) shorter in the second group (20,76 min ± 18,4) than in the first group (57,4 min ± 64,8). Therefore, the empowerment did have a significant positive effect on this support seeking behavior. The participants of the second group are more responsive.

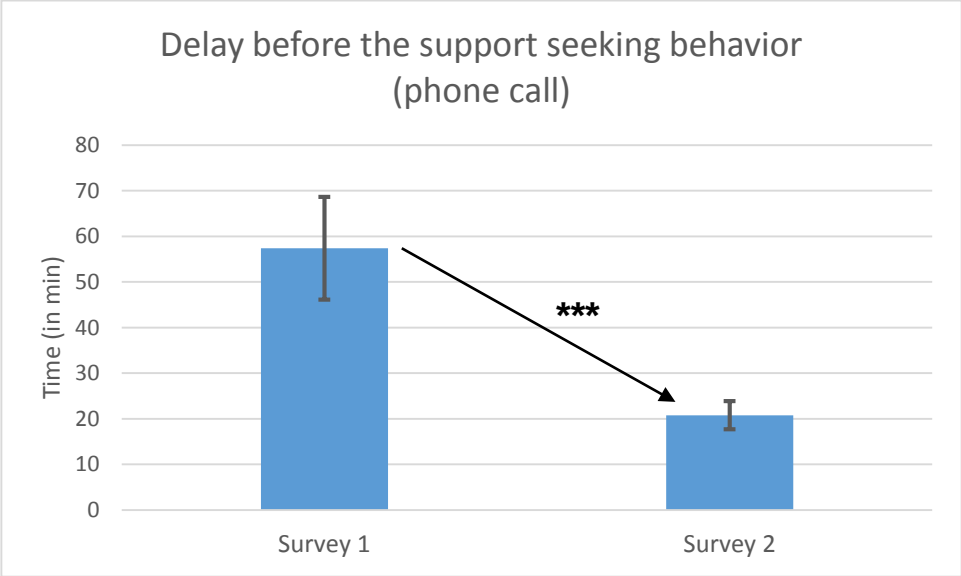


Figure 39: Participants answers (in minutes) to the question 3. in the two surveys (* means a statistically very significant difference).**

3.2.6.2. *Direct measure of the MyGuardian device acceptance*

The acceptance was assessed with one question: would you be willing to take ownership of this type of technology?

Four types of answers was possible: *Yes*, *No*, *Only if I feel like I really need it* (Only-If), *Maybe if my close relationships insists* (Maybe-If). None of the participants choose the *No* answer. Figure

37 shows the participants' answers. The prevalence of the Only-If answer is important to take under consideration. Indeed, it marks the fact that elders trust themselves first on the thematic of their own need for assistance. We can only be glad about this, but we also need to understand this result in the perspective of the acceptance problematic. Again, and consistently with the discussions on the models and theories about acceptance, it means that to reach an accepting state of mind regarding assistance, the senior must be integrated to the discussions and decisions process.

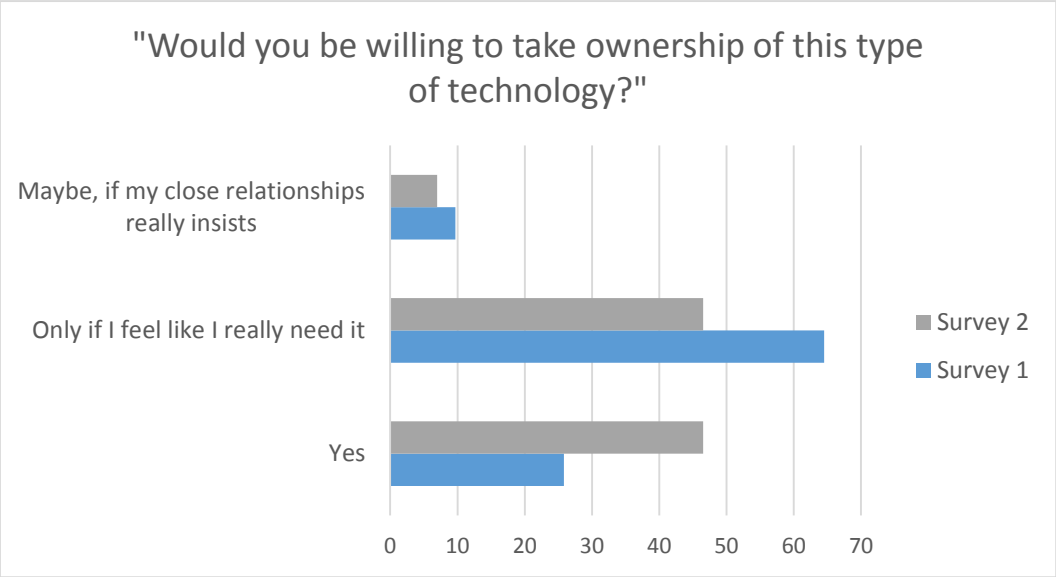


Figure 40: acceptance of MyGuardian technology

The direct measure of the MyGuardian device acceptance is assessed by gathering the Only-If and the Maybe-If answers in a single answer category: *Maybe*. This way, we can compare the *Yes*/*Maybe* answers ratio across the two surveys, in such a way that we have a good vision of the device acceptance depending on empowerment.

These answers are qualitative bimodal dependent variables. Therefore, we ran a Chi-square to find out if the empowerment had an effect on the *Yes*/*Maybe* answers ratio across the two groups (survey 1 VS survey 2). Again, we needed to create groups equally sized (N =38). To do so, the same treatment that in the 3.1.4.3.1 paragraph was conducted. The Chi-square test showed a significant difference in the *Yes*/*Maybe* ratio across the two groups (*chi-square* = 4,517, *ddl* = 1, *p* = 0,034). The empowerment, the way it has been proposed to the participants, did have a positive effect on this acceptance measure (see Table 13 for details).

		Acceptance		**Total**
		Maybe	Yes	
Survey	Survey 1	28	10	38
	Survey 2	19	19	38
Total		47	29	76

Table 13: participants repartition for the ownership question.

3.3. *Web app usability tests*

3.3.1. Objectives

MyGuardian web app offers the standard functionalities of a digital diary, some mechanisms to coordinate the assistance provided by the care network, a message service and a edition tool for the safe zones and the related alarms.

The care network includes:

- Professional/formal caregivers
- Informal caregivers. They provide alone or as a complement to the professional caregiver work the human assistance that is needed considering the loss of independence of the senior. The aim of the assistance can also be to prevent the loss of independence. In all cases, the actions of the informal caregivers are completed with no remuneration. Most of the informal caregivers are spouses, and in a less extend children, near relations, neighbours or friends.

Why to coordinate the assistance in the care network? For most of the informal caregivers providing assistance is experienced as a burden. A French study showed that 30% of them has no help from outside [Pixel study, 2001]. Developing tools to help caregivers to communicate on the senior needs and potentially optimize their spare time and limit their working load is therefore an interesting food for thought.

The objective of this study is therefore to test the usability of MyGuardian's digital diary, first with elderly people with no cognitive impairments. Testing usability issues of assistive technologies for cognition with people with no impairments was done with success in projects like AP@ALZ, an electronic organizer for people with Alzheimer disease [Imbeault 2014]. The feedback coming from no impaired people is valuable, as their perception of what is the technology, their motor or visual skills are the same as people with MCI. It means that basic usability issues can be identified in that way. Furthermore, working with people with no cognitive impairments facilitates the recruitment and the execution of the tests. Nevertheless, we know that the cognitive impairments, like planning issues, have a direct impact on the usability of the tools for this population, meaning that such tests have to be completed with the targeted population for the usability issue to be completely investigated.

3.3.2. Material and method

Each usability test is split up in 3 times:

1. Time 1: evaluation of the participant appetence for new technologies (questionnaire, see Appendix XII)
2. Time 2: the participant is asked to complete predefined tasks with the web app to test its usability (see below)
3. Time 3: evaluation of the participant's feeling about the web app (questionnaire, see Appendix XII)

To test the web app usability, each participant is asked to complete a predefined list of tasks covering the functionalities provided by the application.

A task can be passive or active. Passive means that the person has to describe what he can observe when looking at the application. He also has to explain what is it used for, from his point of view. Passive tasks give interesting feedback on the way the application is globally understood by the user.

Active tasks means that the experimenter asks the participant to complete a specific task (e.g. create a new appointment). The objective is to identify the difficulties the person has when completing the task. As our participants may have no prior knowledge of this kind of tool and as no specific learning is done before, the active tasks are not completed in an independent way, meaning that the experimenter can help the participant. The role played by the experimenter will then also be evaluated according to the following scale, proposed by Dutil *et al.* [1996] (see Table 14).

Independent success: the person completes the task step in a correct timing, without any intervention from the experimenter. The person can hesitate, make some errors, correct herself, do again the step.	Score: 4
Success, person asking for confirmation: during the task step completion, the person asks the experimenter to validate his actions (experimenter asks the person to read one more time the instructions). The person completes the task step in a correct timing.	Score: 3
Success, incitements from the experimenter: the person needs incitements from the experimenter when facing disruptions (the person says what he plans to do but does not move into action). Task step is completed in a correct timing.	Score: 2
Success, guiding from the experimenter: the person makes errors or has no or inappropriate reactions when facing disruptions. Needs the experimenter assistance to complete the task step. Task step is timing is correct.	Score: 1
Failure: even with the experimenter intervention, the person cannot complete the task step. The experimenter has to complete the task step.	Score: 0

Table 14: Dutil *et al.* scale for the evaluation of the independence of the users when completing tasks, the focus being on the assistance provided by the experimenter during the completion.

If the experimenter has to guide the participant, he will do it by following the roadmap of the task that was previously defined. This roadmap gives the steps that have to be completed as part of the task. Table 15 introduced the tasks that were evaluated and the related steps. The experimenter tells orally the participant the task to complete, which is also written in large characters on a paper.

All tests are filmed for a deeper analysis of the usability. Tests are done with a standard computer running Windows 7 with an Internet connection. The web browser is Google Chrome.

	0 = Independent	**1** = Success with incitement	**2** = Success with guide	**3** = Success with guide and slowness of execution	**4** = Failure
Task 1 – Switch the computer on - Find the switch button					
- Switch the computer on					
Task 2 – Passive task: general menu					
Task 3 – Passive task: diary					
Task 4 - Create a new appointment "hairdresser", January 10th at 4 pm.					
* Find the date					
* Select the hour					
* Name the appointment					
* Save the appointment					
Task 5 - Update the appointment date * Edit the appointment					
* Update the date					
* Save the modification					
Task 6 - Delete the appointment					
Task 7 - Create a new task : water the plants * Create the task					
* Name the task					
* Save the task					
Task 8 - have a look at the messages and answer to one					
- Write the message - Add it					
Task 9 – Disconnect & switch off					

Table 15: Tasks to be completed by the participants for usability test purposes

3.3.3. Legal and ethical considerations

The participant has to give his informed consent before beginning the test (see Appendix X & Appendix XI, in French). A notice of information is provided. The participant agreement is also asked to film the tests (see Appendix IX, in French).

3.3.4. Firsts results

Two first participants were interviewed. Here is an overview of their profile and some first results regarding the web app usability. Tests will go on with other participants in January 2015.

Personal situation:

Two elderly were questioned: an 85-years-old woman and a 72-years-old man. The first one was a business manager and the second one a foreign language teacher.

These two people followed computer courses, meaning that the are trained in the use of web technologies. They all have a laptop with Internet access at home.

Usability tests:

Duration of the tests was between 30 and 37 minutes. Quotations of the tasks can be found in appendix 6 for participant 1 and 7 for participant 2. Relevant verbatim from participant 1 (P1) and participant 2 (P2) are given bellow:

- Can you explain me the purpose of the elements you can see on the screen?

P1: "It's a diary like the paper one I have in my bag, but it is more complete. I can see the meetings, I don't know what means alarms."

P2: "To make an appointment with the doctors, but also to write the birthdays to be wished, others appointment or races to be made, appointment not to be missed. We can also change the appointments."

- Please go the diary page and explain me what you can do with it.

P1: "To remind me the appointments I have in the week".

P2: "It's a week-to-one-page diary to register the things which we have to make. There is also a location marks to put additional notes."

Analysis:

The results were globally good. No major problems to realize diverse tasks were identified. But we noticed that they take a lot of time to complete the tasks, execution was slow. For example, to add a new appointment, the conclusion was that it took more time to do it with the web app than with the paper diary (3 to 4 minutes more). The conclusion was the same to update the appointment. A training period, that may be quite long, really has to be planned to use the web app.

The “disconnect” button is never used. People prefer to close the web browser tab.

Participant expected the message functionality functioning to be different: they thought they could reply to one message, i.e. to one and only one person. One of the participants expressed some discomfort regarding the fact that everybody could read what she wrote. For example, she said an appointment to the gynecologist was “none of [other people in the network] business”. Intimacy issues have to be investigated.

The word “home” is not clear for participants. “Home page” could be more explicit. Few translations issues were also noticed that have to be fixed.

Feeling about the application

Here is some verbatim regarding the participant feeling.

- Do you think that this digital diary can be useful for you?

yes no ☑

If the answer is no, why?

"For meeting it's much faster on the paper diary, it may be because I am not trained and it is longer, it takes more time, you have to switch on the computer. Whereas my paper diary I always puts it in my bag, and at my home, I have a big calendar and I note all needed things."

- Would you like us to settle the application on your computer or tablet?

yes no ☑ I don't know

"On tablet possibly, but I am too old to appreciate these modern tools."

- **Do you find that the digital diary is rather clear and understandable?**

yes ☑ no

"It's less difficult than I was afraid it will be"

The same questions were asked to the second participant:

- Do you think that this digital diary can be useful for you?

yes no ☑ I dont' know

If your answer is no, why?

"Because it takes more time to make the things on computer that on paper. On paper, we write and it's finished so from this point of view it's not a good argument, but it's useful because we can send messages to several people, it's nicely written, we can modify, we can move elements (tasks, messages) while when it is hand-written you have to do again everything."

- Would you like us to settle the application on your computer or tablet?

yes no ☑ I don't know

"No because for the moment I think I don't need it, for example my hairdresser is my wife."

- Do you find that the digital diary is rather clear and understandable?

yes ☑ no

3.3.5. Future work

Usability tests will go on with elders without and with cognitive impairments, as AGIM got in touch with five directors of retirement homes. They all expressed their interest for the study, and the scheduling of the tests is in progress. The web app will also be tested on tablets.

Then, the web app will be tested with caregivers with a focus on coordination issues to conclude on the usability and usefulness of the web app.

4. General conclusion

The current work on the user acceptance reflects the complexity and the youth of this research and development field. Indeed, neither the tools nor the methodology are currently sufficiently developed (standardized). Accordingly, this work is mainly an exploratory approach and must be understood with caution. Nevertheless, the work has been rigorously conducted and the present results will guide the field tests which will be conducted by the end users partners.

4.1. Conclusion: summary of the preliminary outcomes and corresponding recommendations for the technical partners

Outcome 1: A major issue is that the current generation of elders do not master the use of smartphones, trust and self-esteem being therefore directly and negatively impacted, as is also the acceptance. It is an obstacle for healthy elders, and all the more for elders with MCI.

The device/phone application would currently not give them the security they need in order to feel safe when moving outside.

Recommendation 1: We recommend to pursue the interfaces simplification process. Concerning the senior application interface simplification, the results suggest: (1) that the battery level information is not necessary, nor well understood by the seniors. Notifications and charge alarms seem to be more consistent with the reality in the field (see recommendation 7); (2) the multiplicity of the contacts impacts negatively the senior's perception of the interface. Our results show that there is a spontaneous preference for one contact, certainly consistently with the senior habits before the use of MyGuardian. Also, the potential unavailability of the contact might anyway dissuade the senior to try another contact. Plus, considering the fact that MyGuardian is addressed to elders with MCI, it could be interesting to propose one avatar (the picture of the main caregiver/ preferred contact or a group picture) below which can be written a generic sentence such as "call my contacts". The availability of all the carers and the escalation configuration being variable is not conflicting with this recommendation: the rule engine could call or notify in priority the currently most available carer. Therefore, the escalations rules for phone calls proposed in the initial requirements of the MyGuardian Project are strongly supported by our outcomes. However, there is some technical difficulties regarding an escalation rule for phone calls and this is therefore a proposition for future developments. Escalation rules does exist in call centers, the difficulty is to implement escalation rules with private cell or fixed phones. Integrating the call centers in the process is therefore an interesting path toward escalations rules for phone calls.

Outcome 2: The system is developed in such a way that the elder in secured whether or not he interacts with the device. But, if the caregiver has the possibility to speak with the senior while taking a ride to join him, we must work to make it happen as much as possible. Therefore, the moment the senior adopts a support seeking behavior (phone call, red button…etc.), everything must be implemented to give an appropriate and responsive answer to it. The availability of the carers is therefore a very important variable to control in real time. The risk is to make the senior wait too long or to put him on hold in such a way that he could interrupt the support seeking behavior and stop interacting with the smartphone and with the carers in a durable way. The final risk being stopping using MyGuardian.

Recommendation 2: As future works that will be specified in the Deliverable 24, we recommend the development of the possibility to define each carer availability in real time (agenda) and to link it with the escalation rules. The carer availability should be possible and easy to configure in the rule engine. Consistently with the prevention aim of MyGuardian regarding safety and mobility issues, we also recommend to continue the optimization of the group coordination of tasks and shared agenda. The senior intimacy issue remains an obstacle toward this goal and again, conditions may be needed to access these information (only in the case an alarm is triggered (no physical activity[5] at the estimated time of departure for example), only for some of the carers…).

Outcome 3: For the seniors, the assistance acceptance challenge and the support seeking behaviors with MyGuardian are quite satisfying in the AGIM results but a little less in the Careyn results. Nevertheless, our final outcomes are the same: the more there is a real need for assistance (and even more so in case of a lack of disease insight), the less support seeking behavior might be adopted by seniors, this outcome being strongly supporting the automation of the alarms that is already implemented in MyGuardian.

Recommendation 3: We recommend to choose carefully the words on the senior application interface in order to improve reassurance mechanisms and not off-putting form or substance within the senior-device interaction (see our proposals in Appendix 17.)

[5] Interaction with the device, changing GPS location…

Outcome 4: In case of need, the current caregiver application prototype doesn't give a sufficient amount of information about the current status/ situation of the senior to the (in)formal caregiver. Contradictorily, notice that carers also expressed the fact that MyGuardian, as it is currently, make them feel like they need to always check what the senior is doing (Is he OK?). This is most certainly a prototype effect about trusting the system. In the future, with a fully developed device, this outcome should not come back to the foreground again (see open question 1.)

Recommendation 4: We support the development, already validated by the technical partners, of the possibility for the carer to visualize the senior current status in case of need: identity, photo, address, current location, location history, battery level… We also support the idea of developing rules to put under conditions the visibility of these information (only in the case an alarm is triggered, only for some of the carers and under rules conditions…).

Outcome 5: The configuration of the comfort/safe zone needs to be flexible.

Recommendation 5: We support the development, already validated by the technical partners, of the multiple zone creation and configuration and the development of the possibility to use different zones depending on the day of the week or on the activities/leisure. As a future development, we encourage an automatic analysis of the life pattern of the senior.

Outcome 6: The impacts of MyGuardian on different constructs and domains that are relevant for the acceptance issue (self-esteem, freedom, collaboration, reciprocity, physical safety, mobility) do vary across people. It depends on the personality, the degree of MCI, the relationships within the human network[6] as well as the manner to introduce the assistive device and the ensuing assistive acts to the members of the human network.

Recommendation 6: We recommend to control these variables during the field tests by giving a prevalent importance to the qualitative content of the protocol and of the outcomes. We also recommend to pursue the optimization of the device flexibility while paying attention not to increase its complexity.

Outcome 7: A major issue remains part of the outcomes: (1) the need for the seniors to manage the charge of the device; (2) the possibility to put on and off the device; (3) the fact of taking the device with them. Those three points being solved is the condition *sine qua non* for the carers to trust the device, having in such a way a positive impact on appropriation and acceptance, and accordingly on the mobility.

Recommendation 7: As a future development, we therefore recommend to develop and implement the rule engine with very robust charge notifications and alarms. This recommendations, which can be specified as final recommendations in the Deliverable 24, can be based on the links between notifications and alarms with locations and places (such as the senior's address) and with the agenda (incoming appointments of the senior).

4.2. Open questions

1. How to reduce technostress? In the future, the issue is to validate that the application gives a sufficient amount of information about the current status/ situation of the senior to the (in)formal caregiver, so that the caregiver feel less stressed with the technology as they don't need to check constantly the senior status (see outcome 4).
2. What are the rational and realism of giving a formal role to each member of the human network? This impacts the attitude toward the device, the effect of the social influence, as well as the risk to feel spied on or controlled instead of supported for the senior (anxiety, attitude toward the device).

[6] The human network is composed by the senior, the informal and the formal carers.

3. How can MG be integrated in basic organization of care (care centers)? This impacts the communication efficiency and therefore it impacts the attitude toward MyGuardian, the perceived usefulness of it as well as anxiety and trust for all the members of the human network.

Appendix I. Origin of scenarios (Careyn)

Scenario	Based on	Corresponding requirements
1	Scenario 1 consists of a combination of use case 1 and use case 4. Part of the storyline of use case 4 is used: • The informal carer sets an allowed area for the senior. • MyGuardian services notify the informal carer when the patient moves out the allowed area. • My guardian notifies Miguel * * can be found in elaborate description of usecases in 'MyGuardian D7 Use cases'.	• Mobile device • Easy to use • Rules engine • Reassurance mechanism • A warning is sent to the patient if he moves out • Notification to the IC about the status or help request • Real time localization • Set alarms to close the process
2	Scenario 2 consist of a combination of use case 2 and use case 3. Introduction used of use case 2 (senior goes to the market/bakery/shopping and gets disoriented): • "Maria has gone to the market to buy food. She became disoriented and confused and could not find the way back home." The story line of use case 3 is used: • The patient presses the "help" key and MyGuardian application alerts the informal carer. • The informal carer receives the notification of the problem but it is unanswered. • After three unanswered notifications, MyGuardian sends the alarm to the call-center. • The operator in the call-center phones the patient and assesses the patient's	• Mobile device • Easy to use • Reassurance mechanism • Rules engine • Alternative Access service • Mechanism to link to a 24/7 care desk and to link to nurses • Assign task based on their proximity to the patient. • Real time localization • Inform about the whereabouts of the carer • Notification to the formal carer when help requested • Preference for filtering information

	location. Also, the operator tries to contact the informal carer. • The operator sends a formal carer to help the patient. The operator looks for the formal carer who is nearest to the patient location. • The formal carer accompanies the patient home. When the patient is OK, he closes MyGuardian alarm and notifies the informal carer.	• Set alarms to close the process
3	In scenario 3 the emphasis is on first time use. Only use case 4 highlights first time use when setting the safe zone. • The informal carer sets an allowed area for the patient	• Set areas for the movement of the patient • Group coordination of tasks • Shared agenda used for coordinating care around the patient

Appendix II. Reflection of participants on research questions (Careyn)

1. Does MG increase the mobility of the senior?*

Yes, because:

- the senior is able to move freely inside the safe zone and does not need to be accompanied;
- if the senior feels insecure it might give him the extra self-assurance he/she needs in order to move on his own.

Maybe, because:

- in the first period of use it does not increase the mobility but maybe when the dementia gets worse the senior might get used to it.

2. How do the functionalities of MG match with the desired value for the care organization?

a. Senior

- **Does MG give the senior a safe feeling?**

Yes, because the senior:

- knows he is being supported.

Maybe,

- it can make the senior restless;
- the senior will feel more secure to go further from home and take more risks, which can result in extra stress for the informal carers.

No, because the senior:

- will feel spied upon;
- does not know how to use the device/phone.

- **What is the influence of MG on the self-esteem and freedom of the senior?**

Positive since:

- the senior will be able to live independently for a longer period of time and go out independently;
- if the senior trusts the carer, he will feel supported.;
- the senior will feel more free since he can go outside without limitations/restrictions.

Negative since:

- the senior might be suspicious and therefore feel watched/controlled/pedantic;
- the senior does not have the feeling help that he is in need of help by his carers.

b. Informal carer

- **Does MG give the informal carer peace of mind?**

Yes,

- because the (in)formal carers are alarmed when the senior moves out of the safe zone;
- because the (in)formal carers know that the senior can call for help using MG;
- because the (in)formal carers can get in contact with the senior or the senior can contact his/her carers;
- because the (in)formal carers can locate the senior with MG
- if the app on the smartphone was replaced by a bracelet or something that the senior would not easily forget;
- if the system were simplified and the senior is capable of asking for help.

No, because the (in)formal carers

- are unsure if the senior will always take the phone with him when going out, and whether it is always charged;
- are unsure whether the senior would know how to use the phone and how to respond to a call or alarm;
- would like to be alarmed and keep track of the senior on their mobile phone, which is currently not possible in prototype 1.

c. Professional/formal carer

- **To what extent does MyGuardian contribute to the well-being and independence of the senior?**

- It will contribute to a safer, more mobile, and independent situation. However, the question remains if the senior also has this insight. The senior might feel excluded.
- The (in)formal carers are able to divide more tasks easily to each other, which might result in more freedom for the senior.
- It will contribute to the well-being since the senior is more likely to go outside and 'exercise'.
- Care tasks and appointments have a bigger chance of being executed

- **Can MG be integrated in basic organization of care?***

*Although there is not sufficient information gathered from the meeting to give a complete insight, some first remarks can be made.

Yes, because:

- it is supplementary to current information systems
- it will give a nice overview of care related tasks for formal and informal care
- it can increase the circle of informal carers
- it can help involve grandchildren in the care ('sandwich generation')

No, because:

- website and application first need to be translated to Dutch
- MG does not meet all criteria within professional care information systems/ The application does not comply with the requirements for formal information systems.
- it is not realistic for a formal carer to pick up or receive a task through the MG website. If he or she will receive an allowance for every picked up task/appointment it might work/Dispatching tasks to formal carer might not be that realistic at this moment, unless they are paid for their services.
- there is no division yet between inner and outer care circle (you do not want to share all information with every one)
- it is not adjustable to state of MCI. Senior with mild MCI and with healthy partner will need different approach then senior with severe MCI and without partner.

Appendix III. Usability findings through observation (Careyn)

This appendix provides a total overview of the usability findings in the context epert meeting and the informal carers meeting. They were also briefly adressed in chapter 5 ‘results different scenario’s’.

Accept alarm

A casemanager and one informal carer are not sure where to click to take care of the alarm.

It takes a while before the informal carer realizes that she should click on alarm in order to see the map and not click on the quick-view of the alarm.

‘I see that he is probably out of his safe zone (she does not see a safe zone) and this is probably a place where he should not be ’ (FC)

‘how do I pick up the alarm?’ (FC)

Add tasks

The casemanager wanted to add an appointment which reoccurs, but includes this in the tasks. Later on in the process she noticed that she should have added it to the agenda and not the tasks list.

Write and send message

A casemanager tried to add a message on the ‘Message history’ page. After instructions, she types the message on the home page but forgets to click send.

‘Messages, difficult, I don’t know what I need to do here, how can I add something’ (FC)

Setting safe zone

Both a casemanager and a informal carer have difficulty finding where to set the safe zone and the rules for the zone. The informal carer found the word ‘rule’ not clear.

Once the casemanager and the informal carer clicked on ‘create zone’, they still had difficulties understanding how to create a zone.

Once the zone was created, both the casemanager and the informal carer did not understand that you can finish making the zone by double clicking.

‘I have no clue what I am doing’ (FC)

‘you can only make a triangle or a rectangle’ (IC)

Appendix IV. Full list functionalities – what did & did not run during sessions (Careyn)

- not used during session 1&2
- crucial for sessions 1&2

Functionalities prototype 1	Working during	Not working during	Simulated during session
Senior mobile			
Login	Session 1 & 2		
Retrieve key contacts	Session 1	Session 2	Simulated by using a print screen of the mobile phone with the photos of the contacts
Shortcut to call carers		Simulated by using a print screen of the mobile phone with the photos of the contacts	Simulated by "fake" calling the senior (the participants were in the same room)
Get senior location	Session 1 & 2		
Compute location context according to zones		Not sure	
Collect battery level	Session 1 & 2		
Display battery level	Session 1 & 2		
Receive alert in case of low battery level	Session 2	Session 1	
Asking senior status	Session 1	Session 2	Simulated by showing the user a print screen and explaining that normally the phone would ring at this moment
Display message from carer		Session 1 & 2	
Web			
Select language	Session 2	Session 1	During session 1 some specific words were translated during the session
Login	Session 1 & 2		
Retrieve forgotten password	?		
Register new account	Session 1? & 2		
Home screen			
Agenda enables coordination of care activities -create appointment	Session 1 & 2		

-delete appointment -invite carers to an appointment -accept invitation -reject invitation			
Task list enables coordination of care tasks: -create task -delete task -invite carer to task -accept/reject invitation	Session 1 & 2		
Invite new users		Session 1 & 2	
Add messages, view messages	Session 1 & 2		
Like/unlike	Session 1 & 2		
Acces message archive	Session 1 & 2		
Alarm quick view window home page			
Task coordination			
Create/view tasks	Session 1 & 2		
Edit tasks	Session 1 & 2		
Assign task to contact	Session 1 & 2		
Complete task	Session 1 & 2		
Delete task	Session 1 & 2		
Agenda			
Create appointment	Session 1 & 2		
View appointment	Session 1 & 2		
Edit appointment	Session 1 & 2		
Delete appointment	Session 1 & 2		
Invite contact to appointment	Session 1 & 2		
View & edit notes	Session 1 & 2		
Alarms			
Battery low alarm	Session 2	Session 1	
Help button alarm		Session 1 & 2	Simulated by calling someone
Comfort area alarm	Session 2	Session 1	
Alarm notification			
Escalation procedure		Session 1 & 2	Simulated by acting as if the seniors' phone was connected to the care desk.
View/update escalation settings		Session 1 & 2	
Notifications by Senior MG app		Session 1 & 2	Simulated by showing the user a printscreen and explaining that normally the phone

			would ring at this moment
Notifications by email		Session 1 & 2	Simulated by showing an own created email.
How to complete and close an alarm			
Accept / Reject / Close alarms from Website	Session 1 & 2		
View Active alarms with status (open / accepted) and context (alarm type)	Session 1 & 2		
View Active alarms with escalation status		Session 1 & 2	
Accept / Reject alarm from mail		Session 1 & 2	
History			
View history of messages			
Notification			
Task requests			
Reports		Session 1 & 2	
Roles settings			
View / define circles	Session 2	Session 1	Simulated during session 1 by explaining it would be possible to divide the carers in care circles.
View / update privacy settings	Session 2	Session 2	
User information and Personal settings			
View/edit user contact details	It did work just before session 2	Session 1 & 2	
Personal settings for alarms	It did work just before session 2	Session 1 & 2	
Contact details	It did work just before session 2	Session 1 & 2	

Appendix V. Detailed set-up of meeting 2&3 (Careyn)

08.45h Pick up Karen and Iris (Janna)

09.00h Arrival Koningin Julianaplein 3 (2nd floor)

09.05h Test safe zone & set-up camera

- Janna sets safe zone
- Iris walks outside
- Karen sets camera's

09.25h

- Janna connects computer to screen
- Karen hangs questions on the wall and lays down print outs of scenario's
- Iris sets computer with application

10.00h Introduction to expert group

10.00-10.10h Coffee and tea

10.10h Introduction MG by Janna

10.15-10.20h Explaination role play exercise by Iris

10.25-10.40h SCENARIO 1

- Look at print out of scenario 1 together
- Give participants role (attach name stickers)

  Participant 1= Fred (senior)
  Participant 2=Laura (daughter)
  Karen & Peter walk along with Fred
  Janna, Luc and particpant 3 stay with Laura

- Play out scenario 1

1. Participant 1 (Fred) leaves 'house' with phone (walk out of building)
   Karen with videocamera & Peter walk along
2. Iris puts on laptop screen recorder
3. Participant 2 (Laura) is working behind computer Iris
4. Participant 1 (Fred) indicates (when alarm goes off) that he needs help.
   (Karen explains to participant 1 that she has to indicate she needs help and if the system fails will show an image of the app from the photo gallery on the smartphone).
5. Participant 2 (Laura) receives email on computer Iris
6. If system fails, Janna will send email to lauramyguardian@gmail.com)
7. Participant 2 (Laura) takes care of alarm (Iris will give hint if necessary).
8. Participant 2 (Laura) walks out of building
   Luc, Iris & Janna walk along
9. Senior is picked and brought home by walking back to the room with the whole group.
10. Participant 2 (Laura) closes alarm (Iris will give hint if necessary).

10.40-10.45h Short evaluation scenario 1

- Is the scenario correct or should it be different?
- How did you experience the enactment?
- What came to mind?
- What went well and what did not?
- Why is that you think?

10.45-11.00h SCENARIO 2

- Look at print out of scenario 2 together
- Give participants role (attach name stickers)

  Participant 3= Fred (senior)
  Luc=emergency centre
  Peter= informal carer

- Play out scenario 2

1. Fred (participant 3) walks a circle through the room
2. Fred panics
3. Fred calls IC (IC does not pick up)
4. Fred calls emergency centre
5. Luc (emergency centre) picks up and calms down Fred
6. Luc check location Fred
7. Luc calls Peter (Formal carer)
8. Peter picks up Fred

11.00-11.05h Short evaluation scenario 2

-Questions idem dito to scenario 1-

11.05-11.15h Coffee break

- Janna empties application
- Iris answers questions where necessary
- Karen checks functioning camera's

11.15-11.30h SCENARIO 3

- Look at print out of scenario 3 together
- Give participants role (attach name stickers)

  Participant 2= Fred (senior)
  Participant 1=Laura (daughter)

Janna has allready logged into MG and connected the laptop to the screen so everybody can see what is happening.
Iris shows short movie
Karen sets camera in new position

- Play out scenario 3

1. Participant 1 & 2 discuss what tasks and appointments need to be added to MG
2. Group watches with on screen
3. Participant 2 (Laura) sets safe zone together with participant 1 (Fred)
4. Participant 2 (Laura) sets preferences in case the alarm goes off

11.30-11.35h Short evaluation scenario 3

-Questions idem dito to scenario 1-

11.35-12.00h Discussion (questions on A3 sheets) with post-its

- Iris & Karen briefly explain every question
- Group answers/reflects individually on post-its

The A3 sheets with questions can be found in the next appendix; 6.

Appendix VI. A3 questions sheets (Careyn)

Does MyGuardian give the **senior** a safe feeling?

Yes, since	No, because

Research // Scenario 1+2

What is the influence of MyGuardian on the **selfesteem** and **freedom** of the **senior**?

Research // Scenario 1+2

Does MyGuardian give the informal caregiver **peace of mind**?

Yes, since	No, because

Research // Scenario 1

To what extend does MyGuardian fit in the life of a informal caregiver?
Would they be able to cope with such a system?

Interactie // Scenario 1

myguardian

Who/what will ensure that the **senior** will always take MyGuardian with him?
Think off form/functionality

Interactie // Scenario 2

To what extend will the **senior** be able to cope with MyGuardian?
Will he be able to make a call?

Interactie // Scenario 2

What are ***possible scenarios/situations*** in which the senior would call the **informalcaregiver(s)** or emergency centre?

Senior calls emergency centre, since..

Senior calls informal caregiver(s), since..

Interactie // Scenario 2

If the senior calls the **emergency centre,** who would be the one **helping/ guiding/picking up** the senior? Would this work in practice?

Interactie // Scenario 2

myguardian

Who sets the seniors **safe-zone**? Are different zones for 1 senior necessary? (for different days/activities)

Interactie // Scenario 3

To what extend does MyGuardian help in the **organisation of care**?

Interactie website // Scenario 3

To what extend does MyGuardian contribute to the well-being and independance of the **senior**?

Research // Scenario 3

What are the **advantages** and **disadvantages** of using MyGuardian?

Advantages are:	Disadvantages are:

Interactie // Scenario 3

myguardian

To what extend does MyGuardian fit the current **care-system**?
What recommendations do you have for MyGuardian?

Research // Scenario 3

What are **possible scenarios/situations** in which the **(in)formal caregivers** would call the senior?

Formal caregiver calls senior since...	Informal caregiver calls senior since.

Interactie // Scenario 2

Does MyGuardian increase the seniors mobility?

Yes, since...	No, because...

Research // Scenario 2

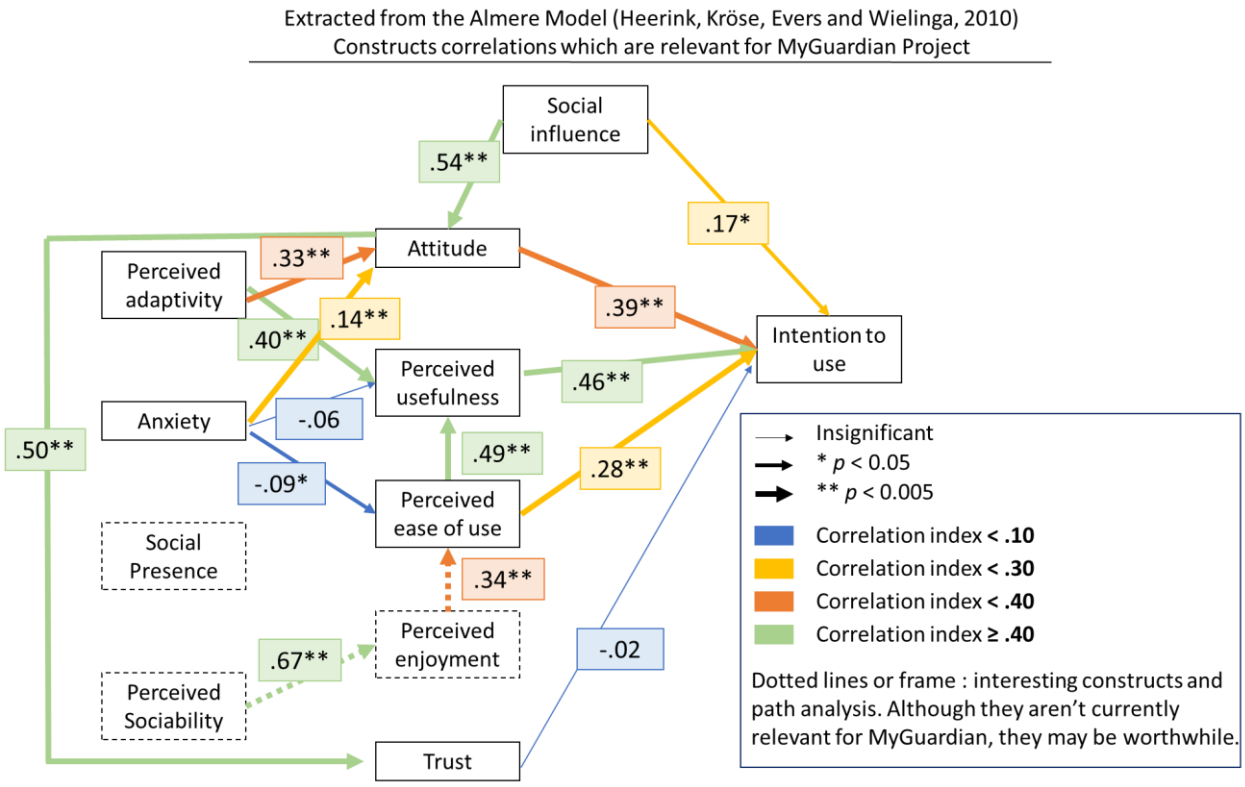
myguardian

Appendix VII. MG scheme (Careyn)

		Senior app	Informal caregivers	Formal caregivers
Usecase 1: Reassurance		• Juan lives alone • Marta checks if Juan is fine • Marta checks if phone is turned on • Juan starts feeling stress • A pre-recorded message is sent • When the battery level is low patient and IC is notified • IC tests if senior is OK • IC test if system is working		
	Added value	• Peace of mind • Comfort • Freedom • Trigger apprpopriate response	• Peace of mind	
	Service	• Battery level	• Communication service • In-app notification and alerts • Interface for message recording • System status • Battery level	
	Functionality	• Play pre-recorded message • Reassurance mechanism	• Notification to the IC about the status or help request	
Usecase 2: Intervention by system		• Mari goes to bakery to order bread (like every Monday) • Her husband stays at home • When reaches bakery forgot what to do • Gets nervous • Looks at device for help • Device helps to remind her • when walking home system notices she starts running • application sends a message to know if she wants help • Maria does not respond • MG sends out alert • Pedro (her husband) receives an alarm • Pedro accesses Maria's location • Pedro calls Maria • Maria is calm		
	Added	• Reduce the stress level • Reassure		
	Service	• Senior remote state assesment & • Contextual information generation • User positioning • Image sharing & • Communication service • Reassurance mechanism (req)	• Rules engine & • Rules creation/editing • Senior remote state assesment • In app notification and alert & • Communication service & • Communication & event log	
	Functionality	• Help not to forget the device • Use the device to let caregivers know where they are up to • Recognize localization • Device send reminders to them • Use images instead of words • Image sharing • Potential to be lost • Awareness of the confusion state	• Recognize location • Potential to be lost • Awareness of the confusion state • Notification to the informal caregiver about the status or help requested • Real time localization • Set alarms to close the process	Analyze trends and changes
Usecase 3: Informal caregiver unavailable		• Bea (loves classical music and is very active), Pilar, Bea's sister is diagnosed 2 years ago and they live together • Bea trusts MG serice and goes to concert • After lunch Pilar goes for a walk (as she used to do with Bea) • Pilar feels like eating an ice-cream • She goes to the shop (where sehe spent every afternoon when she was a child) • Pilar feels confused after leaving the shop. • Pilar is disoriented and presses the button to ask for help • Bea is alerted • Bea does not answer (her phone is off because she is in a concert) • Alarm is escalated to the call-center • CallCenter acces Pilar's location • Operator sends formal caregiver • Formal caregiver accompanies Pilar home • Bea can see that the alarm was taken care off		
	Added	• Calm down • Reassure help is coming • Comfort	• Freedom • Trust	
	Service	• Senior remote state assesment & • Contextual information generation • User positioning • Reassurance mechanism (req) •Voice communication (not a requirement nor service defined)	• Rules engine & • Rules creation/editing • Mechanism to link to a 24/7 care desk and to link to nurses • Senior remote state assesment • In app notification and alert & • Communication service & • Communication & event log •Voice communication (not a requirement nor service defined) with senior	• Authorization • Rules engine

	Functionality	• Help not to forget the device • Reassurance mechanism (alarm button??) • Recognize localization • Awareness of the confusion state • Awareness of the potential to be lost • Real time localization	• Recognize location • Potential to be lost • Awareness of the confusion state • Notification to the informal caregiver about the status or help requested • Real time localization • Set alarms to close the process	• Mechanism to link to a 24/7 care desk to link to nurses • Notification to formal caregiver when help requested • Alternative acces service • Acces rights per user • Real time localization • Set alarms to close the process
Usecase 4: Out of safe zone		• Marina has set an area where Miguel is free to move in his way to the center • She is calm because she knows she is warned if he moves out • Miguel walks to the day care • Miguel is disoriented and moves out of the allowed area • MG warns miguel • MG notifies Marina • Marina calls miguel and guides him to the care center • MGservice sends Marina message Miguel has arrived		
	Added	• calm • Self-confidence	• calm • be sure everything is ok	
	Service	• Zone creation/ editing • Senior remote state assesment & • Contextual information generation • User positioning • Reassurance mechanism (req) •Voice communication (not a requirement nor service defined)	• Zone creation/editing • Rules engine & • Rules creation/editing • Senior remote state assesment • In app notification and alert & • Communication service & • Communication & event log •Voice communication (not a requirement nor service defined) with senior	
	Functionality	• Help not to forget the device • A warning is send to the patient if he moves out • Use the device to let caregivers know where they are up to • Recognize localization • Real time localization • Awareness of the confusion state • Awareness of the potential to be lost	• Set areas for the movement of the patient • They (safe areas) aren't fixed, can be adjusted by the user • Notifications to the informal caregiver about the staus or help requested	
Usecase 5: Care task distribution		• Anna and her daughters can set their timetable • Anna wants to buy a present for her daughter • When on her way to the shopping center she needs help • Cris (her daughter) is working and Maria (her daughter) is on a trip • She gets disoriented • Anna presses the help key • Cris who is working is receives the call • Cris can't calm her mother and notifies a formal caregiver • MG looks for the caregiver who is nearest to the patient location • Formal caregiver helps Maria back home • Next day Anna tries to go shopping again	• She uses MG service to follow instructions to the shopping centre • After buying the present she goes to the farmacy • In the pharmacy she forgets what she was going to buy • She presses help • MG notifies Cris • Cris sends Ana picture of medicines • Anna remembers after seeing the image what she was buying	
	Added	MG	Free Comfortable	Free Comfortable
	Service		• Shared availability for caregivers • Shared task list for care task • User profile	• Shared availability for caregivers • Shared task list for care task • User profile
	Functionality	• Help not to forget the device • Reassurance mechanism (alarm button??) • Recognize localization • Awareness of th+e confusion state • Awareness of the potential to be lost • Real time localization • Device send reminders to them • Use images instead of words • Image sharing	• Define availability as caregiver • Shared agenda used for coordinating care around the patient • Group coordination of task	• Define availability as caregiver • Shared agenda used for coordinating care around the patient • Group coordination of task

Appendix VIII. Constructs correlations relevant for MyGuardian – From ALMERE Model [Heering, 2010]



Appendix IX. Web app usability tests: consent form for filming the tests (in French, AGIM)

Autorisation pour l'enregistrement vidéo et l'exploitation des données enregistrées

Je soussigné(e) _____
□ autorise par la présente Laetitia Courbet à enregistrer en vidéo l'entretien du ____/____/ 2014

□ autorise l'utilisation de ces données, sous leur forme enregistrée aussi bien que sous leur forme transcrite et anonymisée (*barrer les paragraphes qui ne conviennent pas*) :
a) à des fins de recherche scientifique (mémoires ou thèses, articles scientifiques, exposés à des congrès, séminaires) ;

□ prends acte que pour toutes ces utilisations scientifiques les données ainsi enregistrées seront anonymisées, ceci signifie :

a) que les transcriptions de ces données utiliseront des pseudonymes et remplaceront toute information pouvant porter à l'identification des participants ;

b) que les bandes audio qui seront présentées à des conférences ou des cours (généralement sous forme de très courts extraits ne dépassant pas la minute) seront « bipées » lors de la mention d'un nom, d'une adresse ou d'un numéro de téléphone identifiables (qui seront donc remplacés par un « bruit » qui les effacera) ;

c) en revanche, pour des raisons techniques, le projet ne peut pas s'engager à anonymiser les images *vidéo* mais s'engage à ne pas diffuser d'extraits compromettant les personnes filmées.

□ souhaite que la précaution suivante soit respectée

Conformément à la loi informatique et libertés du 6 janvier 1978 modifiée, vous pouvez exercer vos droits d'accès, de rectification ou de suppression de vos données ; pour cela, veuillez contacter Laetitia Courbet (laetitia.courbet@agim.eu ou par téléphone 06.35.21.17.44).

Fait à _____ le _____ en deux exemplaires originaux.

Signature :

Appendix X. Web app usability tests: notice of information (in French, AGIM)

Note d'information destinée aux personnes âgées participant à l'étude

Etude MyGuardian : Usabilité d'une application d'agenda sur une interface web chez les seniors ne présentant pas de troubles cognitifs.

Responsable scientifique du Projet: Mr Vincent Rialle
Chef de projet : Mr Jérémy Bauchet
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Domaine de la Merci
38400 Saint-Martin d'Hères

Madame, Monsieur,

Les nouvelles technologies offrent des nouveaux services pour les personnes. Les tablettes tactiles ou ordinateurs peuvent en particulier faciliter la planification des rendez-vous et des tâches quotidiennes par l'utilisation de calendriers qui se substituent progressivement aux agendas papiers.

L'objet de cette étude est d'évaluer dans quelle mesure un produit disponible dans le commerce serait adapté aux besoins de la population des séniors et utile dans l'amélioration de leur quotidien.

L'investigatrice de l'étude, Mme Laetitia COURBET vous présentera l'agenda au moyen d'un ordinateur et s'entretiendra avec vous pendant une vingtaine à trentaine de minutes pour :
- connaître vos habitudes et aptitudes concernant les nouvelles technologies en général
- connaître votre perception d'un ordinateur
- juger avec vous de la facilité d'utilisation de l'agenda au travers de l'ordinateur
-évaluer l'utilité ressentie

Votre participation à l'étude implique de votre part de participer à cet entretien avec Mme COURBET. Cette étude ne vous expose à aucun risque particulier. Vous êtes libre de participer ou non à celle-ci et vous pouvez également changer d'avis après avoir accepté.

Conformément à la loi, aucun frais lié à cette étude ne sera à votre charge. Si vous le souhaitez, les résultats globaux de l'étude pourront vous être communiqués sur simple demande de votre part en téléphonant au 04 76 63 71 11.
Les informations recueillies pendant l'entretien seront totalement anonymes.

Nous vous remercions par avance de votre aide dans la réalisation de ce projet et Mme L COURBET (tel : 04 76 63 71 11) se tient à disposition pour toute information complémentaire.

Appendix XI. Web app usability test: consent form (in French, AGIM)

Titre du projet : Évaluation de l'utilisation d'un agenda numérique
Chercheurs titulaires responsables scientifiques du projet :
Vincent Rialle, Maître de conférences-praticien hospitalier CHU de Grenoble
Laboratoire AGIM FRE 3405 CNRS-UJF/équipe GEM Faculté de médecine, Bât Jean Roget, Domaine de la Merci, 38 706 La Tronche
Email : vincent.rialle@agim.eu
Jérémy Bauchet, Chef de projet
Laboratoire AGIM. 74160 Archamps
Email : jeremy.bauchet@agim.eu
Assistante de recherche : Courbet Laetitia et Agathe Morin (AGIM FRE 3405 CNRS-UFJ).
Email : laetitia.courbet@agim.eu agathe.morin@agim.eu
Lieu de recherche : Laboratoire AGIM (Faculté de Médecine) ou domicile des participants ou EHPAD

But du projet de recherche : Les nouvelles technologies offrent des nouveaux services pour les personnes. Les tablettes tactiles ou ordinateurs peuvent en particulier faciliter la planification des rendez-vous et des tâches quotidiennes par l'utilisation de calendriers qui se substituent progressivement aux agendas papiers.
L'objet de cette étude est d'évaluer dans quelle mesure un produit disponible dans le commerce serait adapté aux besoins de la population des séniors et utile dans l'amélioration de leur quotidien.

Ce que l'on attend de vous (méthodologie)
Si vous acceptez de participer à cette étude, vous participerez à une expérience nécessitant une seule rencontre d'une durée estimée entre 25 et 35 minutes. Dans un premier temps, vous aurez à compléter des renseignements vous identifiants (âge, nom, prénom, catégorie socioprofessionnelle). Vous aurez ensuite à réaliser quelques tâches de la vie quotidienne, en utilisant un agenda numérique sur un ordinateur.
En outre, une analyse fine des informations nécessite l'enregistrement vidéo de la réalisation des tâches impliquant l'utilisation de l'agenda numérique. Cette recherche est en train d'être approuvée par la Comission nationale de l'informatique et des libertés (CNIL). Toutefois comme cette étude ne présente pas de données à caractères sensibles, elle peut tout de même être réalisée en attendant l'approbation de la CNIL.

Vos droits à la confidentialité
Les données obtenues dans le cadre de cette recherche seront traitées avec la plus entière confidentialité. Si les enregistrements vidéos devaient être utilisés en public, votre voix serait modifiée et votre visage flouté. Enfin, seuls les Responsables scientifiques et les chercheurs adjoints auront accès aux données.

Vos droits de vous retirer de la recherche en tout temps
Vous avez le droit de refuser de participer à cette recherche et vous pouvez retirer votre consentement à tout moment et demander que les données vous concernant soient détruites, sans aucune conséquence.

Bénéfices
Cette recherche doit nous permettre de mieux comprendre les difficultés rencontrées par les personnes dans l'utilisation de technologies de communication. Une meilleure compréhension

pourra contribuer à augmenter l'efficacité des aides proposées et ainsi améliorer la prise en charge à domicile des personnes âgées dépendantes, avec une préoccupation de limitation des conséquences de ce maintien sur l'entourage du patient et sur les personnels de soin.

Risques possibles

À notre connaissance, cette recherche n'implique aucun risque ou inconfort autre que ceux de la vie quotidienne. Il est possible que la formulation de certaines questions vous surprenne, nous vous rappelons cependant que toutes les informations recueillies seront anonymes et que votre participation est essentielle pour faire avancer nos connaissances en ce domaine.

Diffusion

Cette recherche s'inscrit dans un travail de recherche financé par la Région Rhône Alpes et peut être en outre amenée à être diffusée dans des colloques et publiée dans des actes de colloque ainsi que des articles de revue académique.

Vos droits de poser des questions en tout temps

Vous pouvez poser des questions au sujet de la recherche en tout temps en communiquant avec les Responsables scientifiques du projet, M. Vincent Rialle et le chef de projet M. Jérémy Bauchet, et les assistantes de recherches Laetitia Courbet et Agathe Morin. Vous pouvez me joindre à l'adresse mail suivante : laetitia.courbet@agim.eu (ou par téléphone au 06 35 21 17 44). Vous pouvez ainsi, si vous le souhaitez, demander à être tenus informés des résultats de cette recherche.

Consentement à la participation

En signant le formulaire de consentement, vous certifiez que vous avez lu et compris les renseignements ci-dessus, que nous avons répondu à vos questions de façon satisfaisante et que nous vous avons avisé que vous étiez libre d'annuler votre consentement ou de vous retirer de cette recherche en tout temps, sans préjudice.

A remplir par le participant :
J'ai lu et compris les renseignements ci-dessus et j'accepte de plein gré de participer à cette recherche.
Nom, Prénom – Date – Signature
Acceptez-vous d'être recontacté afin de vous proposer de participer à d'autres projets de recherche?
Bien sûr, lors de cet appel, vous serez libre d'accepter ou de refuser de participer aux projets de recherche proposés. □ **Oui** □ **Non**
Coordonnées (courriel ou telephone) :
_____
Un exemplaire de ce document vous est remis, un autre exemplaire est conservé dans le dossier.

Appendix XII. Web app usability tests questionnaire (AGIM)

Madam, Sir,

Within the framework of an European research project, I'm going to ask you about the services and the digital tools which you use maybe in the retirement home. For that purpose, I invite you to participate in the anonymous survey below, and thank you beforehand for your collaboration.

Name:
First name:
Age :
Socio-professional group:
Farmers developers ❑
Architects, storekeepers and business managers ❑
Frames and superior intellectual occupations ❑
Intermediate occupations ❑
Employees ❑
Worker ❑
Mother or father at home ❑
Other ❑

1 - PERSONAL EQUIPMENT

1. Have you access to a computer in your home?

Yes ❑ No ❑

Which type is your computer?

Desktop computer ❑ Laptop computer ❑ No computer ❑

2. Have you access to Internet in your place of residence?

Yes ❑ No ❑

In WiFi?

Yes ❑ No ❑

3. Do you possess a smartphone?

Yes ❑ No ❑

Which type is your smartphone ?

Iphone ❑ Android ❑ Other ❑ No smartphone ❑

I don't know ❑

4. Has he Internet access ?

Yes ❑ No ❑

5. Do you use Internet on your smartphone?

Several times a day ❑ Once a day ❑ Several times a week ❑

Occasionally ❑ Never ❑

6. Have you got a tablet ?

Yes ❑ No ❑

Which type is your tablet ?

Ipad ❑ Android ❑ Windows ❑ Other ❑ No tablet❑

I don't know ❑

7.Has she Internet access?

Yes ❑ No ❑

8. Do you used Internet on your tablet?

Several times a day ❑ Once a day ❑ Several times a week ❑

Occasionally ❑ Never ❑

2 - DESCRIPTION OF THE TASKS TO BE COMPLETED

To verify the usability of the digital diary throught the web site or throught the tablet, I'm going to ask you at the moment to create and to realize some material tasks.

The scores will be estimated on a scale of global quotation of the tasks which includes 4 different levels :

0 = independent 0.5= Success with confirmation 1 = success with incitement
2 = Success with guide 3= Success with guide and slowness execution 4= Failure

First task : Find the button of starting up of the computer and switch it on.

Second task : (passive consultation) once arrived on the diary's homepage, observe attentively the general menu (icons, images, text). Can you explain me the end of various elements which you see in the screen?

Third task : Can you go to the diary and observe attentively, and explain me, according to you to whom it is of use (passive consultation)

Fourth task: Once in the diary, create an appointement at the hairdresser on January 10th, 2015 at 4 pm.
Go to the good date and select the good hour
Put a title in your appointement

Fifth task: once the created appointment, modify it
Go to your appointment and change the date or the hour

Sixth task : Delete now this appointement

Seventh task: create at the moment a new task: water plants
Protect then your task

Eighth task: go to read your messages and answer in the course of the discussions

Last task: disconnect from the diary and put out the computer / the tablet

3 - USER'S FEELING EVALUATION

1. What these tasks appear to you?

Easy ❑ rather easy ❑ Difficult ❑ Very difficult ❑

Impossible to be done❑

2. Did you feel comfortable during the exercise?

Yes ❑ No ❑

3. You would have needed help?

Yes ❑ No ❑

4. Did the manipulation of the tablet appear to you?

Flexible ❑ rather handleable ❑ Very difficult to treat ❑

5. Do you think that the MyGuardian's diary can be useful for you?

Yes ❑ No ❑

If not, why ?

6. Would you think of buying a touchpad?

Yes ❑ No ❑

If yes, you would like that we settle you the application of the digital diary?

7. Do you find that the digital diary is rather clear and understandable?

Yes ❑ No ❑

8. Do you find that the digital diary is rather clear and understandable?

Easy ❑ Averagely easy ❑ Very difficult ❑

The survey is ended at the moment. Thank you for your invaluable participation.

Appendix XIII. Web app usability tests: Participant 1 analysis grid (AGIM)

Participant 1	**0** = Independent	**0.5** = Success with confirmation	**1** = Succes with incitement	**2** = Success with guide	**3** = Success with guide and slowness of execution	**4** = Failure
First task: - Find the button of starting up of the computer					X	
- Switch it on	X					
third task: - Open the diary				X		
Fourth task: - Create a meeting at the hairdresser	X					
* find the good date		X				
* Select the good hour		X				
* put a title in your meeting	X					
* protect he meeting	X					
Fifth task: - Modify your meeting: *Change the date			X			
* protect the modification	X					
Sixth task: - Delete this meeting	X					
Seventh task: Create a new task * Meeting November 20th visiophonique with the family					X	
* give the title of " visiophonique meeting family" in your task						X
* protect the task	X					
* Delete the task * Look your task on the homepage		X			X	
Eighth task: - read a message and answer it				X		
- write the message - Add it		X		X		
Ninth task: - Disconnect you of the diary's application						X
- Switch off the computer	X					

Appendix XIV. Web app usability tests: *Participant 2 analysis grid (AGIM)*

Participant 2	**0** = Independent	**0.5** = Success with confirmation	**1** = Succes with incitement	**2** = Success with guide	**3** = Success with guide and slowness of execution	**4** = Failure
First task: - Find the button of starting up of the computer	X					
- Switch it on	X					
third task: - Open the diary		X				
Fourth task: - Create a meeting at the hairdresser	X					
* find the good date	X					
* Select the good hour	X					
* put a title in your meeting	X					
* protect he meeting		X				
Fifth task: - Modify your meeting: *Change the date				X		
* protect the modification	X					
Sixth task: - Delete this meeting	X					
Seventh task: Create a new task * Meeting November 20th visiophonique with the family					X	
* give the title of " visiophonique meeting family" in your task	X					
* protect the task	X					
* Delete the task * Look your task on the homepage						
Eighth task: - read a message and answer it				X		
- write the message - Add it			X X			
Ninth task: - Disconnect you of the diary's application						X
- Switch off the computer			X			

Appendix XV. Online survey #1 (AGIM, original survey in French)

Hello,

thank you for the interest you have shown in our research.

The AGIM laboratory (Grenoble University, France) is working on a smartphone device intended to assist seniors presenting mild cognitive difficulties in their daily life
In order to design this device, it is very interesting to ask to elders, who have more than 65 years old and who doesn't have mild cognitive difficulties, to share their opinion on some of the device's feature. It is the purpose of this survey
Thank you in advance for your answers.

This survey in anonymous - The recolted data will only be used in this research project "MyGuardian" (european project)
For more informations, please contact us:
(myguardian.project.agim@gmail.com)
(04 56 44 81 08).

Thank you, Agathe Morin, AGIM laboratory (grenoble University)

Start ! press ENTER

1 ➡ In order to process properly your answers, can you clarify...

a. Are you :

A A man B A woman

b. Your age

c. Your socio-professional group ?

- A Intermediate occupations (clerical, sales, service)
- B Small employers and own account workers
- C Lower supervisory and technical occupations
- D Higher managerial and professional occupations
- E Semi-routine occupations
- F Never worked
- G Lower managerial and professional occupations
- H Other

d. Which of those devices do you use ?

Choose as many as you like

A A computer

B A mobile phone

C a smartphone with touch screen

D A tablet

E I use none of those devices

e. This or those devices, would you say that you use it...

A Rather often

B Rather rarely

C Never

“ Thank you.

We are going to propose to you a scenario that seniors with mild cognitive difficulties sometimes encounter in their daily life.

The device you are going to discover is currently being designed with the purpose to avoid those kind of scenario.

Your participation will help us to **improve** this device

Continue press ENTER

2 ➔ The scenario:

In town, a senior has lost his way.

Accordingly, how do you think the elder is feeling like?

Please answer the question as **spontaneously** as you can.

Continue press ENTER

a. Currently, the elder is feeling confused.

CAREFULL, you can choose between 4 answers !

A Not at all

B A little

C In moderation

D So much

b. Currently, the elder is filling overwhelmed.

A Not at all

B A little

C In moderation

D So much

c. Currently, the elder is feeling relaxed.

A Not at all

B A little

C In moderation

D So much

d. Currently, the elder is filling preoccupied

A Not at all

B A little

C In moderation

D So much

e. Currently, the elde is filling calm.

A Not at all

B A little

C In moderation

D So much

3 ➜ We now propose you to test with us the software for smartphone called MyGuardian.

My Guardian keeps you in touch with the persons who have **engaged** themselves to help you maintaining a good autonomy level. Those persons or contacts are geographically **close** to you.

In this scenario, the elder lost in town could use MyGuardian to contact his network and find a solution **with** them..

myguardian

Continue press ENTER

“ Some questions about the battery level of the device ...

Continue press ENTER

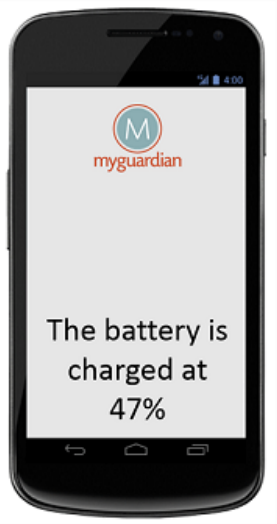
“ You are free to answer the way that you want.

There is **no answers** considered as good or bad.

Continue press ENTER

a. Considering the battery level below and knowing that you may have to call somebody eventually, can you make an estimation of the remaining time of use of the device?

Please type your answer directly on the keyboard



b. Considering your previous answer, to what conclusion the elder lost in town needs to arrive?

You can position your answer on the scale below, from 1 to 7.

1	2	3	4	5	6	7

I have a very little time on my hands

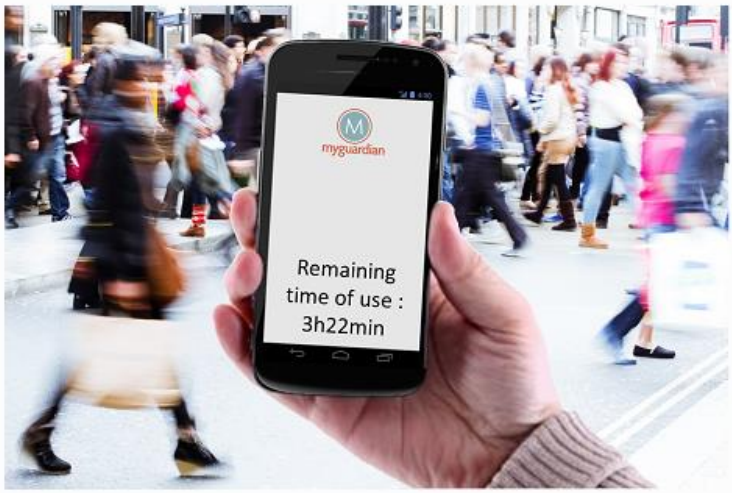
I have enough time to find my way back home

c. In your opinion, this type of battery level presentation is more adapted?

Y Yes

N No

d. This time and considering your previous answer, to what conclusion the elder lost in town needs to arrive?



1	2	3	4	5	6	7

I have a very little time on my hands

I have enough time to find my way back home

e. If you were in the elder's shoes, would you have a tendency to wait until darkness before calling one of your contacts?

Y Yes

N No

f. If you were in the elder's shoes, would you like to avoid calling one of your contacts ?

Y Yes

N No

g. Considering your previous answers, can you make an estimation of how long you think you will wait before calling one of your contacts?

h. If you were in the elder's shoes, which of these persons will you contact first ?

- A My consort
- B One of my child
- C One of my brothers and sisters
- D My nurse
- E My doctor
- F My neighbour
- G Other

i. MyGuardian will start with calling the person that you selected!

If this person doesn't answer to the phonecall, the others contacts will be warned automatically.

To your opinion, how many persons the MyGuardian software will have to call before one of them becomes aware of your situation?

- A Only 1
- B at least 2
- C from 3 to 5
- D More than 5

j. Please consider that you are in the elder's shoes.

Thanks to the phonecall, you just spoke to one of your contacts.

With him, you have taken the decision that he will come to you.

Considering that you and this person are in the same town, can you roughly estimate how long he will take for him to come to you?

4 ➡ Thank you, the survey is almost over.

In this last part, we are again interested in how might feel an elder in that type of scenario.

Continue press ENTER

“ Please continue to imagine that you are in the elder's shoes.

This time, and thanks to the previous questions, you know how works the MyGuardian software and therefore, how the elder might use it (below, an example of MyGuardian)

a. Currently, the elder is feeling undecided

CAREFULL, you can choose between 4 answers !

A Not at all

B A little

C In moderation

D So much

b. Currently, the elder is feeling shaken.

A Not at all

B A little

C In moderation

D So much

c. Currently, the elder is feeling tense

- A Not at all
- B A little
- C In moderation
- D So much

d. Currently, the elder is worrying about possible troubles.

- A Not at all
- B A little
- C In moderation
- D So much

e. Currently, the elder is feeling nervous.

A Not at all

B A little

C In moderation

D So much

5 ➡ And finally, our three last questions !

a. If you were in the elder's shoes, when would you feel safe?

CAREFUL, there are 7 possible answers below. Please choose one.

- A You have one of your contacts on the phone
- B By phone, this person guides you to your home
- C The person is getting into her car in order to come and pick you up
- D The person will be here in 10 minutes
- E You know the person is here
- F You are with her
- G You are at home

b. During this survey, can you tell to what degree you have "been" into the elder's shoes?

You can position yourself on the scale below, from 1 to 7.

1	2	3	4	5	6	7

No, I didn't really have been imagining myself into the elder's shoes.

Yes, I really have been imagining my self into the elder's shoes

c. Even if you never get to need to use a device like MyGuardian (automatic alerts, phonecalls...), your close relationships may be reassured if you take MyGuardian with you.

Would you support this idea?

- [Y] Yes
- [N] No

d. Accordingly, would you be willing to take ownership of this type of technology?

- [A] Yes
- [B] No
- [C] Only if I feel like I really need it
- [D] Maybe, if my close relationships really insists

e. How did you find this survey?

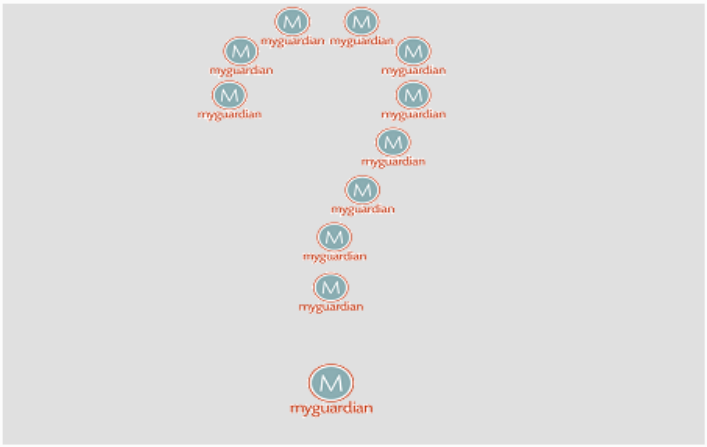
Choose as many as you like

- [A] Simple
- [B] Not always understandable
- [C] Too complicated
- [D] I have not always understood its purpose.
- [E] Rather short
- [F] Too long

f. Do you have some comments or questions?

Pass this question if you don't.

If you do have a question, you are free to give your coordinates, so that we can provide you with an answer.



“ The survey is over, but **CAREFUL**!

Do not forget to click the "**Submit**" button that will appear after this screen.

If you do not, all your answers will be lost.

Continue press ENTER

Appendix XVI. Online survey #2 (AGIM, original survey in French)

Hello,

thank you for the interest you have shown in our research.

The AGIM laboratory (Grenoble University, France) is working on a smartphone device intended to assist seniors presenting mild cognitive difficulties in their daily life
In order to design this device, it is very interesting to ask to elders, who have more than 65 years old and who doesn't have mild cognitive difficulties, to share their opinion on some of the device's feature. It is the purpose of this survey
Thank you in advance for your answers.

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(myguardian.project.agim@gmail.com)
(04 56 44 81 08).

Thank you, Agathe Morin, AGIM laboratory (grenoble University)

Start press ENTER

1 ➡ In order to process properly your answers, can you clarify...

a. Are you :

A A man B A woman

b. Your age ?

c. Your socio-professional group ?

- A Lower supervisory and technical occupations
- B Never worked
- C Semi-routine occupations
- D Small employers and own account workers
- E Lower managerial and professional occupations
- F Higher managerial and professional occupations
- G Intermediate occupations (clerical, sales, service)
- H Other

d. Which of those devices do you use ?

Choose as many as you like

A A computer

B A mobile phone

C A smartphone with touch screen

D A tablet

E I use none of those devices

e. This or those devices, would you say that you use it...

A Rather often

B Rather rarely

C Never

“ Some older people do not dare to leave their homes unaccompanied.

Thanks to your answers, solutions will be developed.

Continue press ENTER

“ One of the difficulties faced by older people is the fear of going out alone, the danger being precisely to be alone in case of problems.

The survey refers to that particular difficulty.

Continue press ENTER

2 ➔ Therefore, we will propose to test with us the software for smartphone called MyGuardian.

MyGuardian keeps you in connection with a network of people who are committed to help you maintain the best possible level of autonomy. These people are geographically close to you.

Continue press ENTER

“ Let's collaborate!

With the acquisition of MyGuardian you and the people around you are going to have to develop the help that is brought by MyGuardian for your independence to be optimal.

Let's try.

Continue press ENTER

“ Please make the supposition that this town is yours.

This city is a fictional city, it does not actually exist.

Continue press ENTER

a. Supposing that this town is yours.

Can you tell if there is some kind of landmarks for you.

Some places from where you are sure that you can start from to go back home whatever the circumstances are (you can find your way back home without thinking)

A Yes, I could name 1 or 2 !

B Yes, I could name from 3 to 5 !

C Yes, I could name more than 6 !

D No, I do not see a place corresponding to this description

b. Supposing that this town is yours.

Can you tell if there is some places, in this town, where you have your habits (being there for a moment or just passing through)

A Yes, I could name from 1 to 5 !

B Yes, I could name from 5 to 10 !

C Yes, I could name more that 10 !

D No, I do not see places corresponding to this description

c. Supposing that this town is yours.Can you tell if there is some path or places that you are used to avoid ?

- [A] Yes, I could name from 1 to 3 !
- [B] Yes, I could name from 3 to 6 !
- [C] Yes, I could name more than 6 !
- [D] No, I'm not used to avoid some path or places.

d. Please select the security criteria that you would like to apply to your own trips :

"Regardless of my type of locomotion or on foot, I want to..."

Choose as many as you like

- [A] being less than 10 minutes away from my home.
- [B] being less than 30 minutes away from my home
- [C] being less than one hour away from my home
- [D] being home for noon
- [E] being home for nightfall
- [F] Other

“ Thanks to your answers, we can demarcate your "comfort zone".

It is a zone geographically limited in which you feel safe and were you have some habits that you care about.

Continue press ENTER

3 ➔ Please let us present our ideas for overcome the difficulties that prevent some of our elders to go out alone.

At each step toward that goal, you will be consulted and asked to say if you support those ideas.

Continue press ENTER

a. You need to take your smartphone with you when you go out if you want MyGuardian to work properly.

Would you support this idea ?

Y Yes

N No

b. The members of your network will be automatically warned :

-if you have stepped in a place you wish to avoid

-if your security criteria come into force

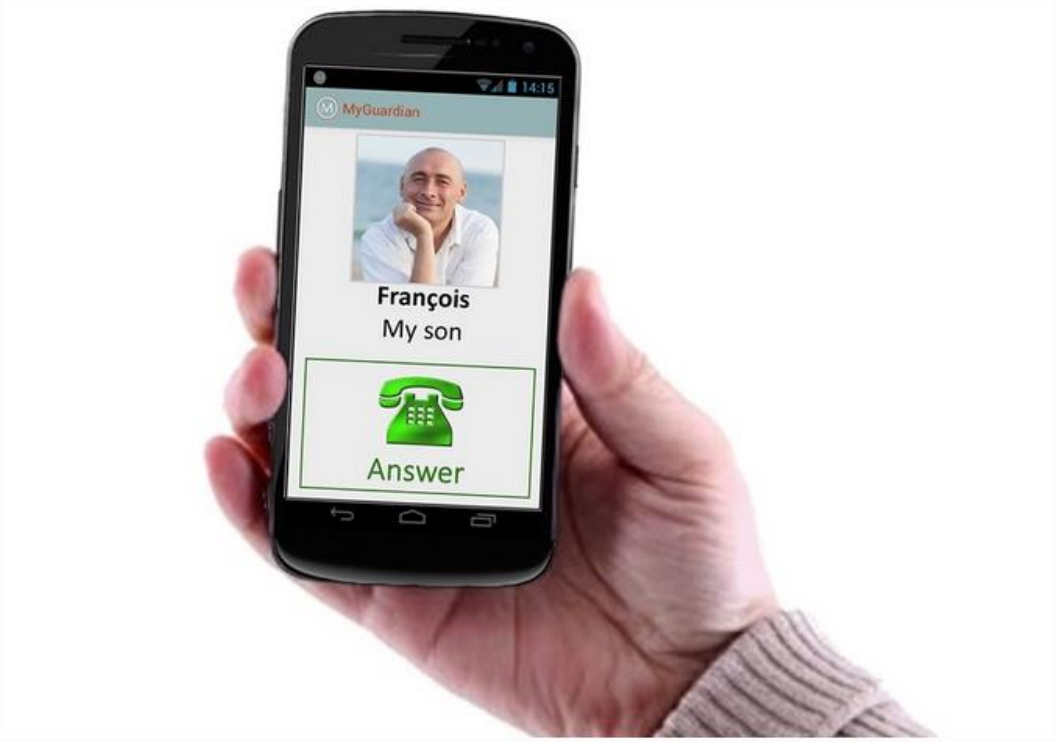
Would you support this idea ?

Y Yes

N No

c. Once warned, the more available member of you network is going to contact you.

Would you support this idea ?



d. If you feel that it is needed, the person that you are speaking to on the phone will have the possibility to know your GPS location thanks to your smartphone.

Would you support this idea ?

Y Yes

N No

e. The members of your network will not have knowledge of your location without your permission.

Would you support this idea ?

Y Yes

N No

f. Then, you could :

- be guided on the phone to one of your landmarks in town

- be guided back into your comfort zone

- be joined by one member of your network (maybe the one you have on the phone)

- or whatever other solution being decided during your phonecall.

Would you support this idea ?

Y Yes

N No

4 ➡ Another possibility : you find yourself in a situation that you judge not to be a good one and you want to get out from it.

But you are in your comfort zone in such a way that none of your network members is warned.

a. Knowing that your network members are aware that this kind of situation could happened, are you going to give them a phone call to warn them?

Y Yes

N No

b. Would you rather like to avoid to warn them?

Y Yes

N No

c. Generally, and considering that you think that a phone call is needed, can you tell how long you think you will wait before giving it?

d. Do you think you will wait until nightfall before giving a phone call?

- [Y] Yes
- [N] No

5 ➡ Even if you never get to need to use a device like MyGuardian (automatic alerts, phonecalls...), your close relationships may be reassured if you take MyGuardian with you.

Would you support this idea?

- [Y] Yes
- [N] No

6 ➡ Accordingly, would you be willing to take ownership of this type of technology?

- [A] Yes
- [B] No
- [C] Only if I feel like I really need it
- [D] Maybe, if my close relationships really insists

7 ➜ How did you find this survey?

Choose as many as you like

- A Simple
- B Not always understandable
- C Too complicated
- D I have not always understood its purpose.
- E Rather short
- F Too long

8 ➜ Do you have some comments or questions?

Pass this question if you don't.

If you do have a question, you are free to give your coordinates, so that we can provide you with an answer.

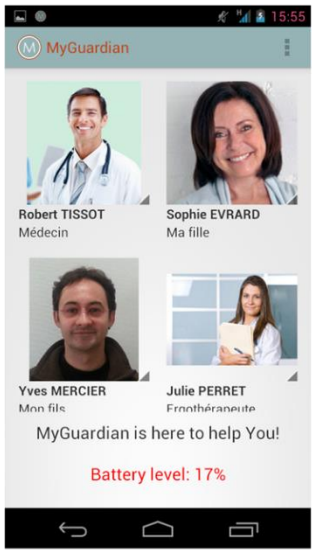
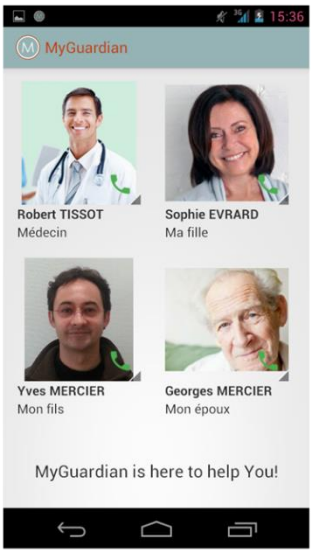
“ The survey is over, but **CAREFUL**!

Do not forget to click the "**Submit**" button that will appear after this screen.

If you do not, all your answers will be lost.

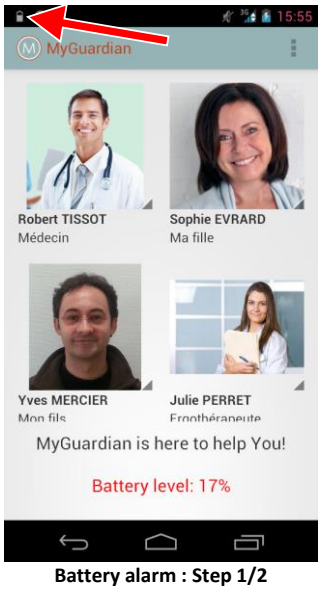
Continue press ENTER

Appendix XVII. Senior app updates based on this D22 outcomes

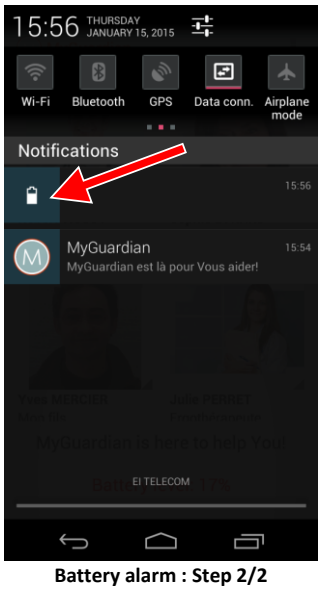
	PROTOTYPE 2	PROTOTYPE 3
HOME PAGE	 Home Page : Ancient version	 Home Page : Proposal

PROTOTYPE 2 **PROTOTYPE 3**

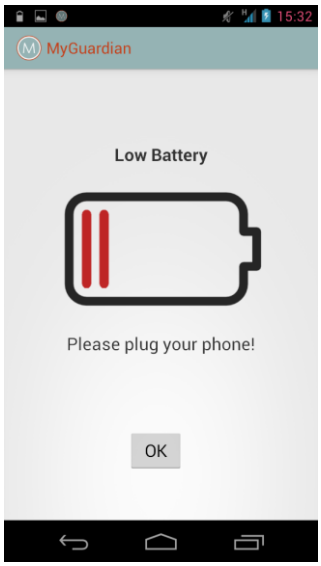
BATTERY ALARM



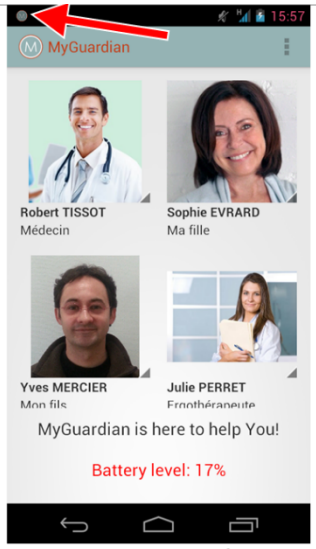
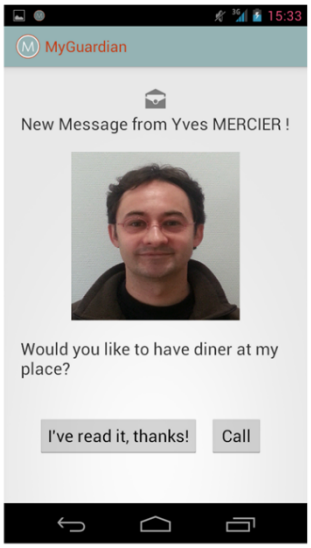
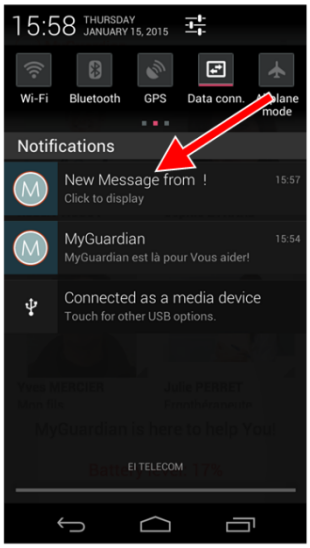
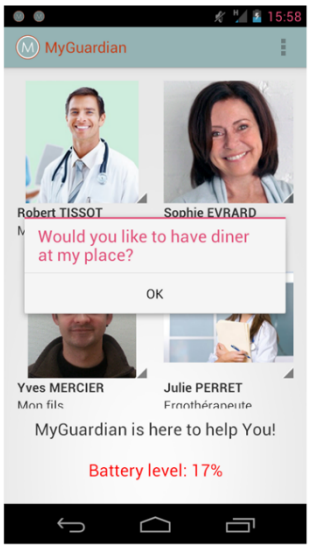
Battery alarm : Step 1/2



Battery alarm : Step 2/2



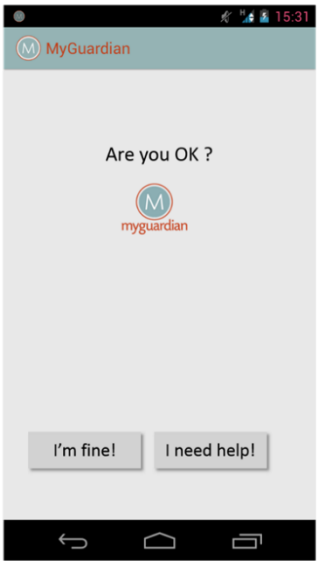
Battery alarm : Proposal Step 1/1

	PROTOTYPE 2	PROTOTYPE 3
MESSAGE	 Message : Step 1/3	 Message : Step 1/1
	 Message : Step 2/3	
	 Message : Step 3/3	

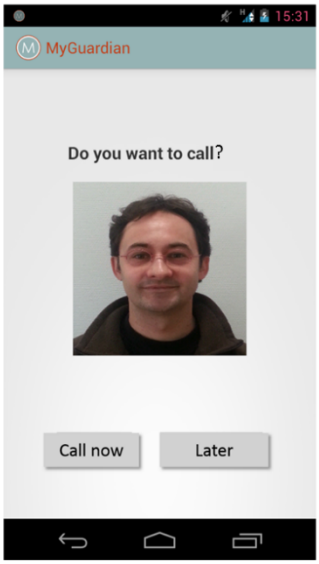
PROTOTYPE 2

PROTOTYPE 3

LOCATION ALERT



Location alert : Step 1/1



Location alert : Step 1/1