AAL Joint Programme

HOME4DEM

HOME-based ICT solutions FOR the independent living
of people with DEMentia and their caregivers

D2.2 – Results of the preliminary evaluation

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	3	i-Home Lab	i-Home
	4	University of Lund	ULUND
	5	Eichenberger-Szenografie	EIS
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RE	Restricted to a group specified by the consortium (including the Commission Services)	
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Table of Contents

Acronyms

IT = Italy

NO = Norway

CH = Switzerland

SE = Sweden

PwD = Patients with Dementia

H4D = Home4Dem

WP= Work Package

HCI = Human Computer Interaction

CG = Caregiver

Executive summary

The deliverable *2.2 Results of the preliminary interface evaluation* describes the methodology and results of task *T2.4 Test and Evaluation of the integrated interface*.

To facilitate the interface evaluation and app usage patterns, formal and informal CGs in CH, IT, NO and SE were recruited. Participants completed an evaluation of the CG app and website and their impressions were captured with questionnaires and notes from the study facilitator.

Section 1 addresses the main purposes of this work, detailing the results collected and the methods that were used.

In section 2, the detailed methodology and the different target users are presented including the procedures and recruitment strategies.

The results for the app and web evaluation are reported in section 3 and a summary in section 4.

1. Introduction

1.1 Scope of this document

The main goal of the work presented in this document is to capture immediate feedback concerning the app and website's acceptability and usability by means of user interface tests. The secondary goal was to determine how the app fits into the life of CGs.

To capture the desired information, we involved formal as well as informal CGs.

2. Methods and Procedures

There are two aspects that are evaluated in the presented tests. First, we validate the usability of the app and website (section 2.1.) and, second, we gauge how well the app and its way to present information fits into the CG's daily life (section 2.2). The results help us to improve the app and website as to ensure successful a successful field trial.

2.1 Evaluating Acceptance and Usability

The main objectives of the evaluation of user acceptance are:

1. Can the user complete the tasks given by the facilitator?
    - Can the participant locate the desired information?
    - Is the information presented in an appealing way?
    - Is the information recognizable and relevant?
2. Which problems does the person have with different tasks?

Only if the CG understands the presented information, can navigate to the desired information and finds it useful, the app has a chance to be accepted in the CG's daily routines.

The items were evaluated in the following order:

3. App
4. Website
5. Behavioral change engine

In the following the recruitment process as well as the methodology are described more detail.

Recruitment

In Norway two main approaches have been used to find participants. The first strategy was to approach potential participants in KARDE's existing network and the second via Facebook announcements in two groups. Afterwards KARDE contacted every potential participant via phone and/or email to explain the next steps and verify the participants' eligibility.

In Sweden participants were recruitment among the coworkers at TREL. Among those participants were carers, nurses and occupational therapists. The superior was contacted before the potential participant. The participant was contacted via phone to explain the next steps.

The Italian CGs were recruited inside the INRCA hospital (Alzheimer assessment Unit), in the Day Care Centre, in voluntary organizations for CGs and Alzheimer's Cafè (self-help groups for relatives). During the enrolment carers were contacted by phone or during ad hoc appointments where we summarized the project and the aim of the tests.

Participant inclusion requirements

To be considered for the rapid field trials, participants should:

6. Be a formal or informal CG for PwD
7. At least one year experience as a CG

Methodology

In this sections we concentrate on outlining the most important aspects of the tests including the tested instances (i.e. app, website and behavior change feature), their state and the motivation for testing. A detailed overview of the tests is provided in the annex as well as the test protocols and questionnaires.

To test the app, we used the actual implementation (as opposed to a mock-up) developed for this project. The app is written in Ionic, an open source framework for hybrid apps that uses web technologies such as HTML and CSS. Hence little extra effort is required to modify the app to be used for user tests: while the user interface and navigation was unchanged, the functionality in the background was disabled to avoid distracting the participants. The app was tested in the country's respective language.

To guarantee the app is accepted we should ensure that it is usable. This includes understanding the provided information, being able to facilitate core tasks (e.g. register, sign in and configure the app notifications …) and being able to find the desired information. The complete test setup and instructions to the interview facilitator as well as the participant can be found in the annex.

The website has been developed for people to find information about dementia. The aim of the website is to give useful information to CGs on how to deal with the daily problems related to the dementia symptoms. The website also contains information about organizations that can be contacted for further information and links to literature about dementia. The website's URL is http://home4dem.wpengine.com. The main question is whether users can find the desired information and find the website usable and useful. The complete test setup and instructions to the interview facilitator as well as the participant can be found in the annex.

The goal of the behavioral change detection tests was to determine what information is useful and which presentation best conveys said important information. The behavioral change feature determines whether the behavior of the PwD has changed to help the CG to better understand the PwD's situation. The tests were conducted using paper screenshots of the potential designs. The reason for using paper prototypes as opposed to the app was that paper prototypes are easier to create. Since we were testing different designs of which a few might end up in the final design we opted for the less time consuming option. Also, paper prototypes allow the participants to directly draw on them to outline important issues. There are paper prototypes in all relevant languages. The complete test setup and instructions to the interview facilitator as well as the participant can be found in the annex.

We used the following methods to capture data during the tests:

8. Facilitator observes the participants and takes notes

   During the test of each person the researcher will take notes on the observation form describing in detail what happened during the testing. He/she also writes down the answers given by the test person to each question on the same form. Immediately after the interview the researcher should go through the notes to see if they need any additions and/or corrections. The notes could contain e.g. whether the test person seemed to be anxious or uncomfortable in other ways during the web testing or if he/she seemed to enjoy the testing, if the person seemed afraid of or reluctant to do something and reflections about reasons for the person doing as he/she did some tasks.

9. Questionnaire to be completed by the participant

   To collect all the information, questions to capture the participants'' background as well as opinions were developed, assuring the opportunity of reaching the full understanding of the users' perspective.

10. Video recording

    The method is based on recordings made by the camera during user interaction with the product, to allow the capturing of hand movements, statements and expressions of the user. It is not a requirement for participation in the testing. If video recording is not done, there must be two researchers present during the testing, one for leading the testing and one for taking notes.

The tests were conducted in IT, NO and SE. Each participant took no more than one hour to complete all tests. The results are detailed in section 3.1.

The test protocols and questionnaires can be found in the annex of this document.

2.2 Determining how the App fits into Caregiver's daily life

The goal was to determine how the CG app fits into the CG's everyday life. While it is well understood, what information is desired by CGs to better understand a PwD' day to day life on a general level, we are still lacking the information how an app fits into the CG's daily life. Some examples:

11. What are the situations in which (s)he would use the app?

    Is the app used just before the CG sees the patient as a quick informant? Does the CG have 2 minutes per patient or 20 minutes to update themselves with the app's information? Answering these questions allows us to tailor the information structure more to a CG's needs.

12. How does (s)he view the app (i.e. as additional useful source of information, as replacement for already known facts, as an intrusion to their job …)?

    Answering this question helps to better sell the app by getting the right message across. If CGs fear they are being replaced or that technology is doing a better job they won't accept the app. Thus, it is crucial to inform them appropriately about what the system can and cannot do and how it could help the CG.

13. What is the motivation to use the app?

    Does the CG want extra information? Is that extra information viewed as a second opinion or as bare additional information: thus should the app provide an interpretation of the sensor data or provide non-interpreted facts such as activity length and frequency averages? The answer will allow better judgement present information captured by sensors.

14. What are the main requirements on the app apart from content

    Is fast access to the most relevant information most important or is it as much information as possible CGs want to get? The answer will allow us to better customize the app to the CG's needs.

This evaluation was a also more detailed extension of the last other tests' last part inquiring about the behavior change detection.

Answering and addressing these questions will increase the chance of acceptance significantly.

Recruitment

The tests were exclusively done in CH. We approached participants through existing networks of the Swiss partners Domo and iHomeLab. We contacted potential candidates via email and phone. If the CGs signaled availability, we agreed on a time and place to meet them in person. There was no compensation for participation.

Participant inclusion requirements

To be considered for the rapid field trials, participants should:

15. Be a formal or informal CG for PwD's
16. Have at least one year experience as a CG

Methodology

The tests were done in CH. The test took participants approximately 45 minutes to complete. The tests were conducted as informal interviews and were conducted either at the CG's work place or at iHomeLab's headquarters. The interviewer and CG would meet and sit down together. After briefly introducing each other, the interviewer would explain the project more detailed as well as the motivation for the interview. Afterwards the actual interview would start. The first part was to better understand the CG's daily routines including information such as:

17. How CG and patient meet (who visits whom)
18. How many patients the CG visits every day
19. How many patients the CG is taking care of simultaneously
20. How often the CG sees a patient
21. How long a visit lasts

In the second part of the interview, we tried to better understand how the CG assesses a patient's situation, how said information is preserved and shared. We then presented screenshots of the app showing different versions of the behavior tracking feature and engaged in a discussion about what information (derived from sensor readings) is most valuable to the CG and how it is best presented. Finally, after the CG had a better understanding of what the app can do (i.e. which insights it can provide) we asked them to philosophize how the app could fit in their daily life. More specifically, we wanted to know when they would use the app to get what kind of information and how it might influence their interaction with the patient.

We also encouraged the CG to share any ideas and suggestions (s)he has about other features we may have not considered but may be of value.

The results are detailed in section 3.2.

3. Results

Here we report the results from the rapid tests. First, the results from the tests investigating the user acceptance and usability for the website and app (section 2.1) are reported. Afterwards, the results from the investigation into how the app fits into the CGs' daily life are explained in detail (section 2.2).

The tests were conducted in three countries. Each country analyzed the results captured in video recordings, interviewer notes and questionnaires. The analysis resulted in a list of issues for the app and website. Each issue has a description (what problem arose when completing the tasks), a severity rating describing how urgent the issue should be addressed (**Errore. L'origine riferimento non è stata trovata.**) and a source (the task that failed). Additionally, a recommendation is given how the issue can be fixed. All issues were collected, similar issues merged, ranked by their severity and the proposed recommendation discussed and adjusted by the consortium. Finally, the consortium decided which issues to address which are now worked into the app in order of severity.

3.1 User Acceptance and Usability

In total 34 people from Sweden, Norway and Italy participated in the trial. 33 of them answered the website questionnaire after the testing.

Website

Information from the Questionnaire

The questionnaire contained five questions where answers should be given by a tick on a visual analogue scale. The most favorable impressions were to the right on the scale.

It was obvious that almost all the test persons found the website easy to use. Most of them thought that the website was visually appealing, five persons ticked the visual analogue scale the left of the middle, and four abut on the middle. In Sweden, they were less enthusiastic about the layout and use of pictures and colors than in the other countries. The information on the screen was by most test persons considered very clear. There were different opinions about the size of the text on the screen. 11 of 33 persons ticked to the left of the middle of the visual analogue scale. Especially the text in the vertical many was considered too small. Most test persons found the website rather intuitive. 22 completely agreed that they could use the website by themselves, 10 somewhat agreed, and only one neither agreed nor disagreed.

Information from the website testing

- About 30% of the test persons had problems with changing the language.
- Very many would have liked a larger font size in the menu to the left.
- Some wished a somewhat larger font size in the texts.
- In Italy and Sweden most of the test persons did not know how to enlarge the text by usual ways for a website screen.
- Very many did not find the orange color in the left menu good as the contrast to the background was not good enough.
- In Norway, most of the test persons did not think the three-column layout for «Facts about dementia - Symptoms and challenges» were a good design.
- In the same country 30 did not understand how and/or why the text should be expanded in «Useful tips for daily life - Assistive technology». 40% did not know how to collapse the text again.

- Two persons in Sweden did not think there was enough information about the life story book and would like to see an example of a life story book, and one person in Norway suggested to add information about songs in the text about the life story book.
- In Norway, most of the test users did not find all the menu items in the horizontal menu clear and intuitive, especially not Products, Resources and Publications. In Italy Resources was not considered intuitive.
- About 26 % had problems with closing the new tab when an external document had been opened.
- One person who started a Vimeo video on a Mac ad problems with stopping the video. Apart from this there seemed to be no problems with videos - enlarging the video window, starting and stopping a video or go back to the website after having enlarged the video window.
- In Norway half of the test persons did not see the arrow to the right on the bottom to come to the top of page again. However, his did not seem to be a big problem as they used the wheel on the mouse or the sidebar to move to the top. In Italy, none of the test persons thought the use of this arrow was intuitive.
- Not all images were illustrating good enough the text they are supposed to illustrate. This was especially obvious for the Swedish and the Italian website.
- There were a few translation issues.

Recommendations of improvements with decreasing priority

- Use larger flag and text to indicate where to change the language.
- Enlarge the font size in the text in the left menu.
- Change to color in the left menu to black or dark blue.
- Ensure all translations are done correctly.
- Make an option for enlarging the text size at the website.
- Use «non-academic» words for all the menu choices in the horizontal menu.
- Change the images for the Home Screen, Home Design and Community Services for Norway.
- Find better and more images for the Swedish and Italian website or use the same images in all countries if they are considered adequate for the text.
- Do not use three columns for «Symptoms and challenges». Write about the stages with full lines under each other, and if possible make the text shorter.
- Do not use the option to expand and collapse text at the website.
- Make the arrow to move to the top more visible or drop it.
- Add an example of a life story book or at least an image, and explain in the text that also songs could be included.
- Investigate if there are problems with stopping Vimeo videos at the website.
- Change the colors used on the website.

We will implement most of these recommendations. The most important are to increase the font size in the left menu and to increase the contrast of text elements against the background. The main colour schema will remain unchanged to maintain the "family resemblance" with other Home4Dem technologies/services. The national project teams will quality check the contents and the language to secure understandability. All images in the rapid testing were "place holders" and will be replaced with final, descriptive ones, before entering the trial. Some aspects that are normal web design conventions/functionalities (flags for changing the language, arrows that appear to allow moving to

the top of the page without scrolling and so-called toggle-fields for expanding/collapsing text fields) will remain unchanged.

Smartphone App

Setup

The test was made of two parts:

1. Six major tasks using a mobile phone with the prototype of the care giver application installed. All functionalities needed for the tasks were implemented. The visual design and the interaction design of the prototype was a approximation of the design templates.
2. A closing questionnaire regarding general impressions.

Figure 1 shows a screenshot to illustrate the differences between the clickable prototype (build) and the design template.

Figure 1 The original design template (right) and the one used to test (left) the app.

The participants completed the following six tasks during the test:

1. Activating the menu and setting a new language
2. Assessing the layout and intuitiveness of the menu
3. Navigating back to home screen and design of home screen

4. Working with the alarm function
5. Navigating to menu and register a new care giver
6. Navigating to menu and activate/deactivate sensors

Results - Smartphone App

In this section, the results from the observations and the questionnaires are reported and a strategy for improvements outlined. In general, the tasks were understood and the interface design and the interaction design were well received. The issues mentioned by the participant were partly owed to the limitations and the state of development of the prototype.

An analysis of the results identified the following issues:

- 21 out of 34 people had difficulties to find the menu location of the language setting
- 17 out of 34 people did not like or understand the split screen used for the menu
- 11 out of 34 people were not happy with the location of different menu options
- 12 out of 34 people did not understand how to handle alarms
- 19 out of 34 people had trouble to register a new CG

The questionnaire contained seven questions. Answers should be given by a tick on a visual analogue scale. The most favorable impressions were to the right on the scale. The questions are as follows:

1. Overall, using the application was:
2. Visually, the application was:
3. The information on the screen was:
4. The text on the screen was:
5. The application was intuitive to use:
6. I think I could use this application by myself:
7. Which improvements would you suggest for the Home4Dem application?

Figure 2 shows the results of the questionnaire are summarized and color coded by country.

The following key issues were identified:

- Menu interaction (location of different options, e.g. Language, new CG)
- Confusing color coding
- Home screen: only colored circle clickable

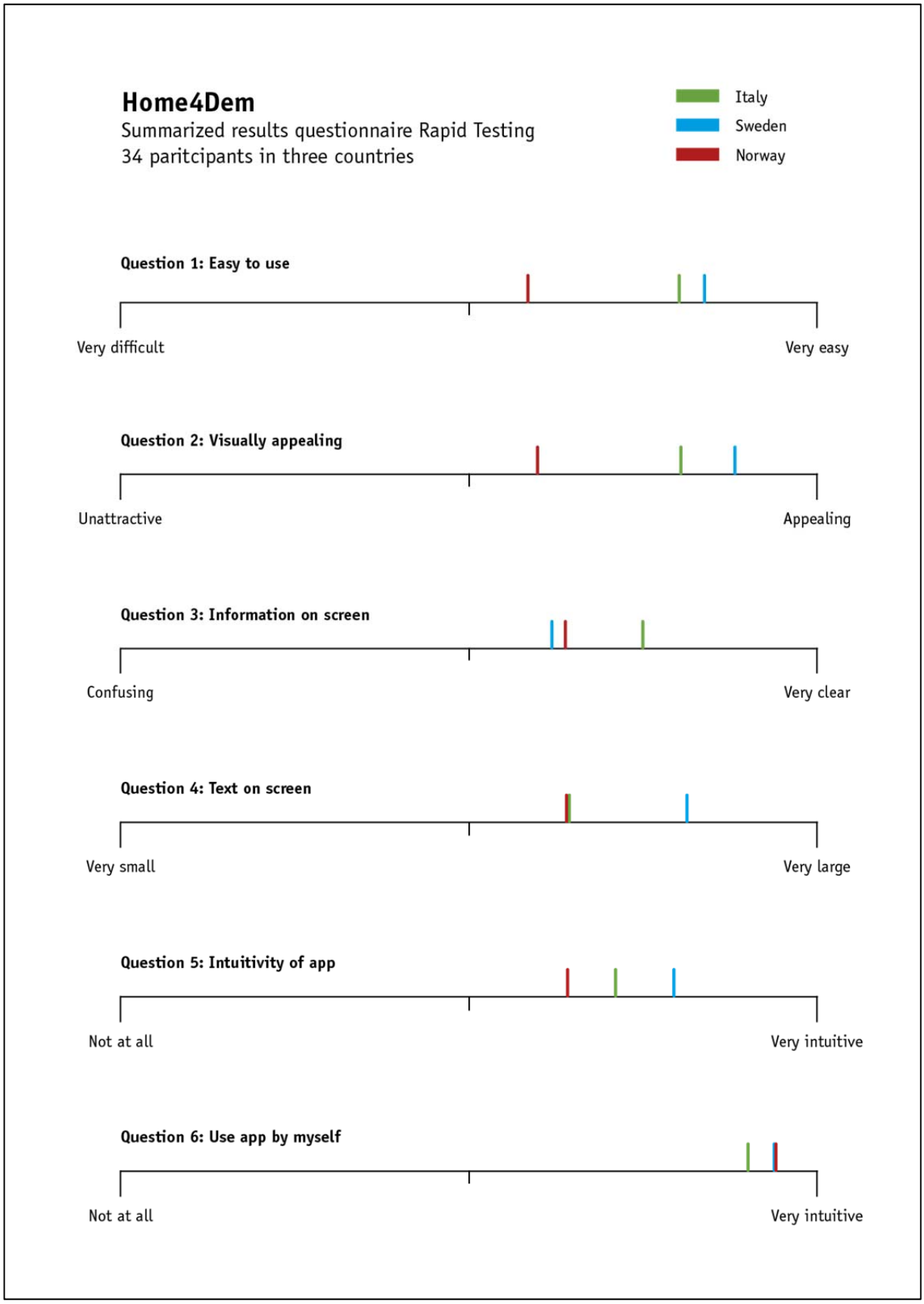

Home4Dem
Summarized results questionnaire Rapid Testing
34 paritcipants in three countries
Italy
Sweden
Norway
Question 1: Easy to use
Very difficult
Very easy
Question 2: Visually appealing
Unattractive
Appealing
Question 3: Information on screen
Confusing
Very clear
Question 4: Text on screen
Very small
Very large
Question 5: Intuitivity of app
Not at all
Very intuitive
Question 6: Use app by myself
Not at all
Very intuitive

Figure 2 Results of the closing questionnaire color coded by country.

Recommendations of Improvements

To address the difficulties participants had when completing the tasks captured by observations and the questionnaire, we plan to, first, improve the *key* issues in the subsequent version of the mobile application. One of the key issues was with setting the language and adding a new care giver. These two features will be moved into the initial setup of the application. Another main issue arose from the color coding which will be adjusted per the design template. In a second step, *minor* issues will be discussed in the consortium and addressed in the next version of the app as per discussion result.

3.2 App Usage Context

The goal of the rapid tests conducted in Switzerland was to determine how the app fits into the caregiver's daily life. We have interviewed six caregivers of whom five are professional/formal caregivers and one informal caregiver. All caregivers are between 30 and 60 years of age

The questionnaire and interviewer's comments were analyzed by iHomeLab. The analysis results were categorized and recommendations for the app developed. Here we answer the questions raised in the methodology section using the analyzed results from the rapid tests using the tests conducted in Switzerland as well as those conducted in the other countries.

What are the caregiver's daily routines?

A caregiver's daily routine strongly depends on whether it is a professional/formal caregiver or an informal caregiver. Formal caregivers have very little extra time for their patients. They see between 10 and 20 patients per day and care for up to 20 patients simultaneously. The caregivers spend around 10 to 45 minutes with each patient mostly sticking to a schedule that is set up every few weeks. Most patients the caregivers see every day allowing them to closely follow a patient's development. The interviewees clearly stated that in their profession time is of the essence.

Informal caregivers have different routine and motivation. In an informal caregiver's life, a person with dementia is likely a family member or a close friend. Their motivation to stay in contact with the person with dementia is to stay informed about what is going on. Thus, time is not so much of the essence and when necessary the informal caregiver takes the required time.

How does the caregiver assess a patient's situation?

The caregiver mainly relies on his/her observations to gauge a patient's situation. Across caregiver organizations there is no standardized way to preserve information (e.g. one document template) so caregivers develop their own strategy or use the means provided by their employer. For example, Spitex employees get a tablet PC with which they can record information. Specific apps to store information have not been used by the interviewees.

What information is most valuable to better understand a patient?

Since formal caregivers frequently meet patients (mostly every day) they have a good insight into a patient's life and situation. Extra information would therefore mainly serve two purposes: first, provide insights into the time between visits and, second, record patient information for later reference. To understand what happens between visits, an overview of the patient's activity suffices. The record of activities can include more detailed information such as activity averages and frequencies. These are best presented with graphs as they are easy to understand and allow the information to be quickly absorbed.

Informal caregivers may not see the PwD every day but have other means to stay in contact such as the phone or through friends. The interviewed informal caregivers wanted as much information as possible. Thereby the information does not have to be analyzed, plain statistics such as activity averages and frequencies are acceptable.

How does the app fit into caregiver's day?

Two main app usage scenarios emerged. In scenario one the caregiver would check the patient information on his/her way to the patient. Thereby they would concentrate on the patient's activities between now and their last visit. This allows them, for example, to see why the patient is so tired today (because he was up all night watching TV). In this scenario, the time spend with the app would range from 1 to at most 5 minutes.

In scenario 2 the caregiver is notified by the app about long term behavior changes. Since the caregiver would not check long term behavior changes without reason, this checking would have to be triggered by the app. Once notified the caregiver would check the information and try to match it with his/her own observations. Because it is difficult to remember exactly how the patient behave a long time ago, he/she would check the statistics (averages of activity duration and frequencies) and compare it with the statistics from six month before.

When using the app, the caregivers want to confirm their own observations. Regardless of whether they are studying long term behavior changes or what has happened since yesterday, caregivers tend to already have an impression of the patient and want to confirm this with the information provided by the app. One caregiver also stated that patients do not talk about their past activities so the app would provide an insight the caregiver would otherwise not have.

Other requested features

A highly sought after feature by formal and informal caregivers was the ability to print reports. These reports are a more detailed summary of a patient's behavior over time. Printed reports allow caregivers to better share the information and archive it for later reference.

Another requested feature is the detection of extraordinary events. Extraordinary events are events in a patient's life that trigger considerable behavioral changes. Behavioral changes can occur slowly over time or happen suddenly. In the latter case, it is interesting to know when the change occurred (e.g. when the person moved flats).

A measure of unrest was also requested by half of the caregivers. Unrest is often a sign for something more severe and would help the caregiver to act preemptively. A proposed measure of unrest is the total amount of movement during the day.

Rekommandation

1. Have the most important info visible and quickly accessible
   For example, when opening the behavior change feature immediately show the results of an analysis. If the user wants a different analysis, (s)he can choose so on the results screen.
2. Prefer information (and make it more visible) that has clear a statement/purpose and an associated course of action
   Information a caregiver knows how to act upon is preferred and highlighted opposed to purely informative data that has no direct impact on the caregiver's actions.
3. Do an analysis where possible and provide plain data where required
   Prepare the information by analyzing it and only communicate the highlights. For example, the analysis results are emphasized on the results screen. Thereby it is indicated whether a change

has been detected and briefly explained what has changed. For more detailed information the user can access more detailed information via a button.

4. Narrow down the cause of behavior changes as much as possible
   For example, in the behavior tracking feature, try to narrow down the point in time when the change occurred.
5. Make information easy to grasp
   For example, show graphs instead of tables to communicate averages.

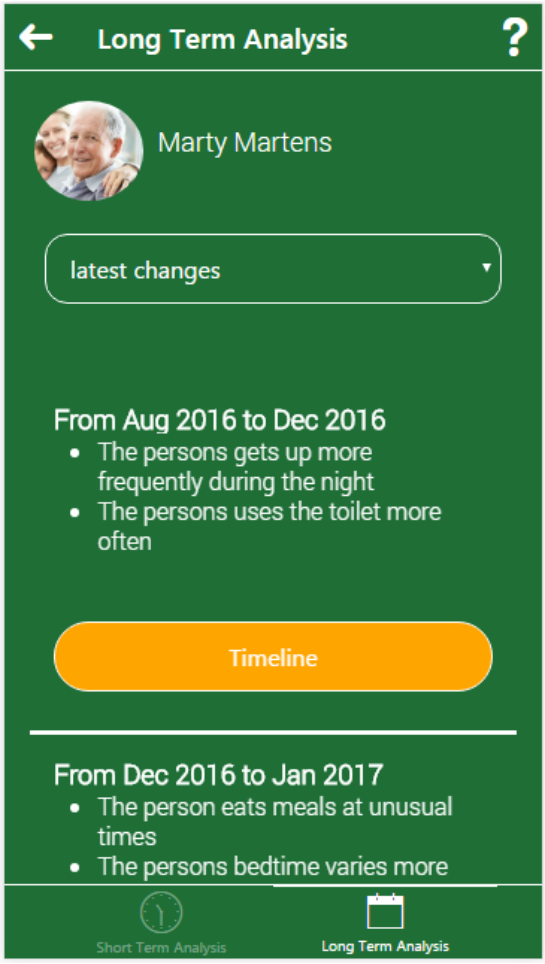


Figure 3 The screen shows the results of the behavior change detection analysis. Multiple changes over different time periods were detected. For each change time and reason is given with the option to get more information.

We used these recommendations to evaluate and improve the current user interface. The first recommendation was already properly addressed in the designs as the maximum menu depth is three. This means that the user can reach any information in less than four clicks. Also, the first screen for each feature shows the results of the respective feature as opposed to a "select/search" screen showing the most essential information first (Figure 3). The third and fourth recommendations mainly apply to the behavior change detection feature. The chosen design addresses them by offering various levels of detail starting with an overview on the first screen (Figure 3). Thereby, each detected behavior change has a clearly assigned reason if the analysis allows. To make information easy to grasp numbers (e.g. average sleep duration) are never presented without context. For example, if a behavior change because of increased sleep is detected, the information is relayed in a short sentence rather than a table.

4. Summary

This document outlined the rapid user tests conducted by the partners to test usability and acceptance of the website and application. The results have identified improvements that are addressed by the consortium. For details please refer to the respective section in this document.

5. Annexes

Overview of Evaluating the acceptance and usability

1.0 Overview

The testing should be done in the following order:

1. App testing
2. Web testing
3. Behavioral change testing

Duration of testing: Preferably not longer than 1 hour.

Number of test persons in each country: At least 10.

Test persons for each country must be numbered 1-10 (or more of there are more than 10 test persons).

2.0 Caregiver App (link)

Here you will find a document with a link to the newest version of the app.

3.0 Information and consent form

The information and consent document should be sent to the test persons before the testing. For each country a version with the local language and the needed justifications must be used. Typical parts of the document where local text is needed are shown with yellow background.

Test persons must have the chance to ask questions before they sign the consent form. The consent form should be signed before any test activity starts. It is useful for us to use video recording during the testing, but consent to video recording is not a requirement for participation in the testing.

4.0 App test Protocol

This document contains methodology you need to study before the test situation and the listed tasks for the test person. It contains guidelines for participant observation and how to set up everything for the testing. There is also an introduction you can read for the test person.

Questions about age of the test person and to what extent they are familiar with each of listed technologies should be written in the 4.2 App test questionnaire.

4.1 App test Observation sheet

This document must be used during the testing of the app. Tasks described in the app test protocol are transferred to this document. Both observations, any help given and answers to questions should be written down. Immediately after the testing, there should be time to as make self-reflexive notes and if needed make additions to the observations make the notes as complete as possible. Later video records can be watched as needed if there is uncertainty about what really happened. This can make

the notes reflect better what really happened during the testing. If video recording is not done, two researchers should be present during the testing.

4.2 App test Questionnaire

The App test Questionnaire must then completed by the test persons after the task execution. It is important that details to identify the country, date of testing, number the test person given and name of the observer are written by the observer.

5.0 Web test Protocol

This document contains methodology you need to study before the testing of the dementia web developed in the project. It is very similar to the app test protocol.

5.1 Web test Observation sheet

The Web test Observation sheet is used in the same way as the App test Observation sheet.

Web test Questionnaire

The questions to be asked after the testing are very similar to the questions in the App test Questionnaire.

6.0 Behavioural change test

This part of the test is made by the iHomeLab-team and should be done in the end of the testing. It should take approximately 10 minutes. If the previous parts have taken more than 50 minutes you may need to make this last part of the test shorter. iHomeLab want feedback related to their current charts.

The document “Behavioral change test” contains information about what the screenshots based on input from sensors are showing. The researcher should explain with their own words what they think is relevant to the test persons. The screens can also be seen in the app, but paper prototypes must be used as they are of better quality.

This document is an all-in-one tool with both explanations to the researcher and questions to be answered by the test person. The test person should see the questions and the alternatives, so the questions with alternative answers must be translated to the local language.

It is important that details to identify the country, date of testing, number the test person given and name of the observer are written by the observer.

On the last page you will find pictures you can print and use in the test situation. If you have a photo laminator you could print the screenshots in a real size for a laminating the pictures.

Information and consent form

Information for testing the caregiver app and web in Home4Dem

[Organisation name, e.g: Karde AS] is participating in the European research and development project Home4Dem (HOME-based ICT solutions FOR the independent living of people with DEMentia and Their caregivers). In the project technology for both patients, next of kin, formal caregivers and institutions for dementia care is being developed. The aim is that the technology should be able to increase the quality of life for all persons concerned.

The technology will be able to learn what normal activity and normal patterns of behaviour for the person with dementia are. Caregivers should get notifications through a mobile app if abnormal events occur. These notifications may, for example, be that the person is restless or sitting still for a very long period. The caregivers will also be warned if something more serious has happened, such as a fall.

The mobile phone app will provide information to next of kin and formal caregivers for small and large events in the home of the user. The project is also developing a **website** that will provide relevant information and useful tips for caregivers of people with dementia.

Now we are going to test the usability of this website and the first version of the app. Some of the screenshots to be tested is still just images on paper. In the test situation, we will guide you through the tasks to be done. You will get some simple tasks that will help us to find out what we can improve. We do not require any knowledge in technology in order to participate in the testing. We will not test your skills in using apps or websites. There are no wrong answers to our questions. The purpose of the testing is to get feedback before adjusting the app and the website, to make everything easy to understand and easy to use. If some tasks are difficult to perform or something is difficult for you to answer, it is very likely that this will be difficult for others too.

Voluntary participation

It is voluntary to participate in the project. If you are willing to participate, please sign the consent declaration. You may at any time and without giving a reason withdraw from the testing.

Handling of data

The information collected will only be used for this project. All test results will be stored and processed without name, identity number or other direct person identifiable information. Storage and use of collected data is done according to current data protection regulations.

Use of video during testing

It can be useful to use video to record hand movements when using the app and to be able to hear what is being said. The recordings will be used as a support for documenting what happened in the test situation as it can be difficult to write down everything that is happening during the testing. The recordings will be deleted when the project is over. You can participate in the testing even if you do not consent to video recording.

Other

You should have the opportunity to ask us questions before signing the consent declaration.

The test will last for approximately one hour and can be carried out at our premises or in your home. [You will get a voucher for £ (500 NOK) after completing the test].

You can read more about the project on our website (ex: http://www.karde.no/prosjekter/senior/home4dem.)

Contact information (to be changed to local contact information)

	Telephone	**E-mail**
Name	xxx	xx@xx.xx

Consent to participate in the testing in Home4Dem

	Yes	No
I understand what the testing is about, and I am willing to participate in the testing.	☐	☐
I consent to the use of video during testing.	☐	☐

…… …….

Date Signature

App test protocol

1. Introduction

In order to get the advanced specifications to support the development of the technologies envisaged, user involvement has become indispensable, from the perspective of user-centred design.
The specific objectives of the rapid testing phase for the Home4Dem project is to receive feedback on the system usability, focusing on the HCI (Human Computer Interaction) and satisfaction with the website.
Each country (Italy, Switzerland, Sweden and Norway) will involve 10 adult persons of different ages and both women and men in each country for testing of the Home4Dem website and app. In this protocol these persons will be called test persons. The same test person will test both the website and the app and paper mock-ups of the "behavioural change" protocol. This should preferably be done on one occasion for each person. The researcher should provide a smart phone for the app testing.
For the testing this protocol should be followed carefully.

2. Methodology

The following methods will be used during the testing:

2.1 Participant Observation

During the test of each person the researcher will take notes on the Observation form describing in detail what happened during the testing, see document *4.0 App test Observation sheet*. He/she also writes down the answers given by the test person to each question on the same form. Immediately after the interview the researcher should go through the notes to see if they need any additions and/or corrections.
In addition self-reflexive notes should be written for assessment of the validity of the answers and the user cooperation. The notes could contain e.g. whether the test person seemed to be anxious or uncomfortable in other ways during the web testing or if he/she seemed to enjoy the testing, if the person seemed afraid of or reluctant to do something and reflections about reasons for the person doing as he/she did some tasks.
During all the tasks, the researcher will be guided by the following key questions for the observation:

6. Does the person understand the functionalities to be used on the website?
7. Which problems does the person have with different tasks?

If the test person does not know how to do a task, please tell her/him how to do it. It is important that the researcher waits to see if the test person is able to do a task on his/her own before helping.
The help given should be documented.

2.2 Video Interaction Analysis

The method is based on recordings made by the camera during user interaction with the product, to allow the capturing of hand movements, statements and expressions of the user. This requires consent of the participant, and should be done whenever the participant consents. It is, however, not a requirement for participation in the testing. If video recording is not done, there must be **two researchers** present during the testing, one for leading the testing and one for taking notes.
The video recording can be done with a separate video camera or a good smart phone or tablet camera on a tripod. It must however be tested that the camera will give a good enough recording so that the screens and hand/finger movements can be clearly seen and what is said, can be heard.

Video clips should be used when the researcher is not quite sure what really happened during a task. Information from the video should give complementary information to be written on the observation notes.

2.3 Closing questions

In order to collect all the information, six questions are developed, assuring the opportunity of reaching the full understanding of the users' perspective. The visual analytic scale is used in five cases, while one question is based on a 5-point Likert scale. The basis of the closing questions is usability, acceptance and human-computer interaction. Please see Step III.

3. Procedures and Setting

3.1 Setup

3.1.1 Position of test person and researcher and PC

The test person and the researcher should sit at the site of each other by a table. The test person should hold the smartphone with the Home4Dem app.

3.1.2 Informed consent

If the informed consent is not obtained in connection with the web testing, it should be done according to the following procedure:
Prior to any activity, participants should be given written information about the testing and an informed consent obtained. The document(s) should preferably be sent to participants before they meet for testing. The document(s) should be read out loud to participants. The researcher must ask participants whether they have any doubts or questions regarding the information and/or the informed consent and offer to clarify these. The researcher should ensure that the test person gives written consent and writes the date for the consent. If written consent is not given, the testing should not proceed. One copy of the consent will be given to the researcher and one copy kept by the test person.

3.1.3 Camera

A video camera/smart phone/tablet should be placed so that is shows the PC screen and the hands of the user when the user is using the smartphone. For a good video a tripod should be used. It must be ensured that the video recording works properly so a test recording should be taken and checked prior to starting the real website testing. Make sure there is enough light to make a good video. Use a camera with a fully charged battery and also remember battery charger. Prior to the testing it should also be ensured that there is sufficient free space in the memory of the camera or the camera memory card for the video(s) to be recorded. Video files are often very large.

3.1.4 Smartphone with Home4Dem app

The Home4Dem app should be downloaded before the testing starts.
URL to be provided at Dropbox in the folder *Rapid testing* called *1.0 Caregiver App.*
Make sure the latest version of the app is downloaded.

3.1.5 Glasses

Ensure that the test person wear glasses if this is something he/she normally would do when using a PC.

3.1.6 Language in the app and closing the app between test persons.
Before the start of the testing, please ensure the language in the app is set to English. This is to perform Task 1.3 in a natural way. Also the very best is if the app is closed and opened again before each test person starts. This is to ensure the screen has the same appearance for Task 4.2 – 4.4 for all test persons.

3.1.7 Observation form and Closing questionnaire
Please write country date, number given for test person and Name of the observing researcher on top of each form. Each country number their test persons from 1 to 10.

3.2 Introduction

During this phase, all the needed information should be given carefully to users, in order to make sure they have understood the aim of the testing as well as the importance of their feedback.

The following information should be given:
If not said in connection with the website testing:
We are working on a new system to help caregivers of persons with dementia. The system is about controlling the environment and assisting in daily activities. This is to support the independence of the persons with dementia as long as possible.
About the app testing
Among other things an app is developed to send information to carers about deviations from the normal habits for the person with dementia. In the app these deviations are called “notifications”. Alarms can be triggered in more serious cases like a fall.
What we would like to learn is how you handle the app and your opinion about it. We wish to know if things are easy to read, to understand and to do. The app is at a very early stage of development so changes will be done. If you have suggestions for improvement, please tell.
We will not test how good you are in using the app, and there are no wrong answers to the questions we ask. If something is hard to do or to understand, please tell us. Then it is probably also difficult for many others and should be done or written in another way. The experience we get through your practical use of the app and your opinions are of great importance to us for making the app as good as possible!

3.3 Step I - Initial questions

Before we look at the devices, there are few questions I would like you to answer. These questions should be answered in the app-testing questionnaire.
1. How old are you? _____

2. Can you indicate to what extent you are familiar with each of these technologies? You can choose from the following statements:

1 = I don’t know this technology
2 = I know this technology but I’m unable to use it myself
3 = I can operate this basically and often need help
4 = I can operate this, I rarely need help
5 = I know the possibilities of it well, I use it

2 3 4 5

and I never need help 1						
a.	Computer	❑	❑	❑	❑	❑
b.	Smartphone	❑	❑	❑	❑	❑
c.	Tablet	❑	❑	❑	❑	❑
d.	Digital television	❑	❑	❑	❑	❑
e.	Internet	❑	❑	❑	❑	❑

App test questionnaire

Home4 Dem

4.2 App test questionnaire

Country…….. Date……..

User number ……..

Name of researcher……

Before we look at the devices, there are few questions I would like you to answer.

1. How old are you? _____

2. Can you indicate to what extent you are familiar with each of these technologies? You can choose from the following statements:

   1 = I don't know this technology

   2 = I know this technology but I'm unable to use it myself

   3 = I can operate this basically and often need help

   4 = I can operate this, I rarely need help

   5 = I know the possibilities of it well, I use it and I never need help

		1	2	3	4	5
a.	Computer	❑	❑	❑	❑	❑
b.	Smartphone	❑	❑	❑	❑	❑
c.	Tablet	❑	❑	❑	❑	❑
d.	Digital television	❑	❑	❑	❑	❑
e.	Internet	❑	❑	❑	❑	❑

Closing questions

Here are some very general questions on your experience with the app.

Please, make a mark on this scale where your answer should be.

1. Overall, using the application was:

Very difficult Very easy

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

2. Visually, the application was:

Unattractive Appealing

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

3. The information on the screen was:

Confusing Very clear

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

4. The text on the screen was:

Very small Very large

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

5. The app was intuitive to use:

Not at all Very intuitive

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

6. I think I could use this app by myself:

1	2	3	4	5
Completely disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Completely agree

7. Which improvements would you suggest for the Home4Dem app?

Many thanks for your support and cooperation!

Web test protocol

Web test protocol Introduction

In order to get the advanced specifications to support the development of the technologies envisaged, user involvement has become indispensable, from the perspective of user-centred design.

The specific objectives of the rapid testing phase for the Home4Dem project is to receive feedback on the system usability, focusing on the HCI (Human Computer Interaction) and satisfaction with the website.

Each country (Italy, Switzerland, Sweden and Norway) will involve 10 adult persons of different ages and both women and men in each country for testing of the Home4Dem website and app. In this protocol these person will be called test persons. The same test person will test both the website and the app. This should preferably be done on one occasion for each person. The researcher should provide a PC with an external mouse for the testing.

For the testing this protocol should be followed carefully.

Methodology

Notes from the testing and answers from questions asked during the testing should be written on the 5.1 Web test Observation sheet developed for this testing.

The following methods will be used during the testing:

2.1 Participant Observation

During the test of each person the researcher will take observation notes describing in detail what happened during the testing. He/she also writes down the answer given by the test person to each question. Immediately after the interview the researcher should go through the notes to see if they need any additions and/or corrections.

In addition self-reflexive notes should be written for assessment of the validity of the answers and the user cooperation. The notes could contain e.g. whether the test person seemed to be anxious or uncomfortable in other ways during the web testing or if he/she seemed to enjoy the testing, if the person seemed afraid of or reluctant to do something and reflections about reasons for the person doing as he/she did some tasks.

During all the tasks, the researcher will be guided by the following key questions for the observation:

- Does the person understand the functionalities to be used on the website?
- Which problems does the person have with different tasks?

If the test person does not know how to do a task, please tell her/him how to do it. It is however important that the researcher waits to see if the test person is able to do a task on his/her own before helping.

The help given should be documented in the observation form (5.1).

2.2 Video Interaction Analysis

The method is based on recordings made by the camera during user interaction with the product, to allow the capturing of hand movements, statements and expressions of the user. This requires consent of the participant, and should be done whenever the participant consents. It is, however, not a requirement for participation in the testing. If video recording is not done, there must be **two researchers** present during the testing, one for leading the testing and one for taking notes.

The video recording can be done with a separate video camera or a good smart phone or tablet camera on a tripod. It must however be tested that the camera will give a good enough recording so that the screens and hand/finger movements can be clearly seen and what is said, can be heard.

Video clips should be used when the researcher is not quite sure what really happened during a task. Information from the video should give complementary information to be written on the observation notes.

Closing questions

In order to collect all the information, six questions are developed, assuring the opportunity of reaching the full understanding of the users' perspective. The visual analytic scale is used in five cases, while one question is based on a 5-point Likert scale. The constructs at the basis of the closing questions are usability, acceptance and human-computer interaction.

Procedures and Setting

3.1 Setup

Position of test person and researcher and PC

The test person and the researcher should sit at the side of each other by a table. A laptop PC (provided by the researcher) should rest on the table. A PC charger should be available in the test situation.

Informed consent

Prior to any activity, participants should be given written information about the testing and an informed consent obtained (3.0 Information and consent form). The document(s) should preferably be sent to participants before they meet for testing. The document(s) should be read out loud to participants. The researcher must ask participants whether they have any doubts or questions regarding the information and/or the informed consent and offer to clarify these. The researcher should ensure that the test person gives written consent and writes the date for the consent. If written consent is not given, the testing should not proceed. One copy of the consent will be given to the researcher and one copy kept by the test person.

Camera

A video camera/smart phone/tablet should be placed so that is shows the PC screen and the hands of the user when the user is using the PC. For a good video a tripod should be used. It must be ensured that the video recording works properly so a test recording should be taken and checked prior to starting the real website testing. Use a camera with a fully charged battery and also remember battery charger. Prior to the testing it should also be ensured that there is sufficient free space in the memory of the camera or the camera memory card for the video(s) to be recorded. Videos files are often very large.

PC screen for testing

The Home4Dem carer website should be open on a PC, not a tablet or smartphone. The link is http://home4dem.wpengine.com. The username and password provided by the project team must be used.

It is important that the testing is not disturbed by a screen that is too small or the screen not being optimal. This means that the window with the website to be tested must cover the whole width of the PC screen. The screen should have an enlargement like this so that all menu items for both the vertical and the horizontal menus can be seen, and there is not redundant space at the side or the bottom of the menus.

Separate mouse

A separate mouse should be provided by the researcher. This will ensure that it is not problematic for the test person to use a mousepad on a PC, to which the test person might not be used to.

Glasses

Ensure that the test person wear glasses if this is something he/she normally would do when using a PC.

English language on the website to be tested

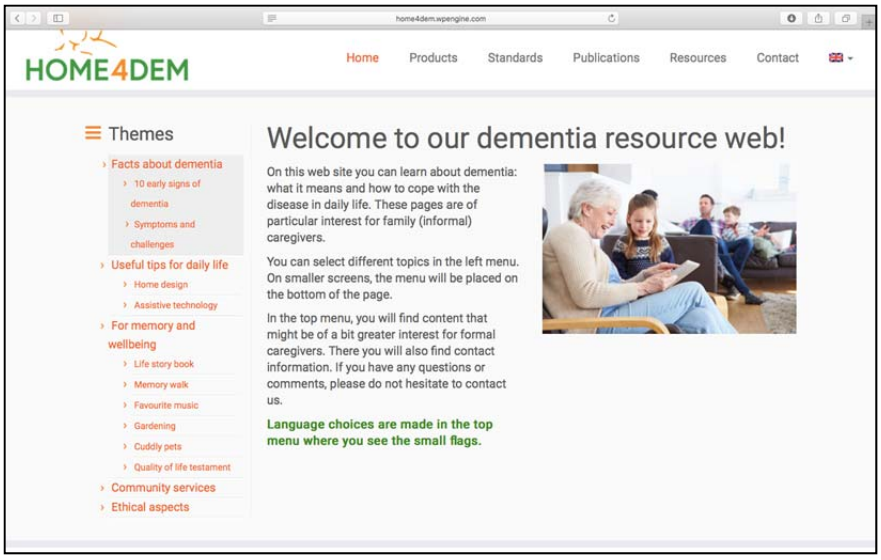
This should be set to English. This is to be able to conduct task 1 in a natural way.

Introduction

During this phase, all the needed information should be given carefully to users, in order to make sure they have understood the aim of the testing as well as the importance of their feedback.

The following information should be given:

We are working on a new system to help caregivers of persons with dementia. The system is about controlling the environment and assisting in daily activities. This is to support the independence of the persons with dementia as long as possible.



Among other things a website is developed where people can find information about dementia. The aim of the website is to give useful information to caregivers on how to deal with the daily problems related to the dementia symptoms. The website also contains information about organizations that can be contacted for further information and links to literature about dementia.

What we would like to learn is how you handle the website and your opinion about it. We wish to know if things are easy to read, easy to find, how you move around on

the website and so on. We can still do changes to the website. If you have suggestions for improvement, please tell.

We will not test how good you are in using the website, and there are no wrong answers to the questions we ask. If something is hard to do or to understand, please tell us. Then it is probably also difficult for many others and should be done or written in another way. The experience we get through this session and your feedback are of great importance to us for making the design as good as possible!

3.3 Step II – Task execution (Participant observation)

Task 1 Language

Task 1.1. We start with the language of the website. The text is now in English, but it is possible to choose Italian/Swiss/Swedish/Norwegian (choose the language for the country where the test is done) language. Can you see where you can change the language and do so?

Task 1.2 [When the correct language is selected]: How easy do you think it was to find out how to change the language?

Task 2 Language and design.

Task 2.1 [Open the menu item "Facts about dementia" and "10 early signs of Dementia"]: The next thing we want to know is if the text is easy to read. If you have trouble reading the text you can just tell us. Let's start with this text. Can you please read the whole text?

Task 2.2 [Facts about dementia - 10 early signs of Dementia] How easy do you think it is to understand what is said in the text?

Task 2.3 [Facts about dementia - 10 early signs of Dementia] What do you think about the size of the letters in the text you just have read?

Task 2.4 [Vertical menu to the left] What do you think about the size of the letters in the menu to the left?

Task 2.5 It is possible to change the text size for a website. Could you do this for our website?

If the test person does not know, the researcher will show one of the methods, e.g. to click Ctrl and + on a PC or cmd and + on a Mac.

Task 2.6 What do you think about the colors used on the website?

Task 2.7 What do you think about the contrasts between the text and the background?

Task 3 Web page with much information

Task 3.1 [Facts about dementia - Symptoms and challenges]: Now we will go to the menu item to the left to "Facts about dementia" and "Symptoms and challenges". Can you open "Symptoms and challenges"?

Task 3.2 [Facts about dementia - Symptoms and challenges] What do you think about this page?

Task 3.3 [Facts about dementia - Symptoms and challenges] Do you have any suggestions for what could have made this text easier to read?

Task 4: Find menu items, links and from a heading expand and collapse text

Now we go to the menu item "Useful tips for daily life" in the left menu. We have grouped some suggestions for technological supports and activities that can support persons with dementia.

Task 4.1: [Useful tips for daily life] Can you click at the menu item "Useful tips in daily life" and then "Assistive technology".

Task 4.2: [Useful tips for daily life – Assistive technology] What will you do to see more information about the examples of assistive technologies?

Task 4.3: [Useful tips for daily life – Assistive technology] How can you make the additional text that just appeared to disappear again?

Task 4.4 [For memory and wellbeing] Now we want to look at the menu item "For memory and wellbeing". Can you move to that menu item from here?

Task 4.5 [For Memory and Wellbeing]: Please select "Life story book", and read the text. Are you missing a link to more information, or is the content sufficient?

Task 5: Intuitiveness and navigating back to website from document in separate tab

Task 5.1 [Horizontal menu]: Now we would like you to look at the horizontal menu.
Please read out the menu items out loud.

Task 5.2 [Horizontal menu]: Do you think all the menu items are clear and intuitive or not? If not, which ones are not?

Task 5.3 [Resources]: If you would like to receive some information about a volunteering association, where you would click?

Task 5.4 [Publications]: If you would like to read reports about dementia, where would you click?

Task 5.5 [Library - documents]: Please, open one of the document listed. Do you think it was easy to open the document?

Task 5.6 [An open document in another tab]: Please go back to the Home4Dem website.

Task 6 Videos

Task 6.1 [Products]*:* Please open Products in the horizontal menu. What do you think the images at the bottom represent?

Task 6.2 [Products]: Please start one of the videos.

Task 6.3 [Products, ensure the video is running]: If the person is not expanding the window for the video himself/herself: How would you make the size of the video window larger?

Task 6.4 [Products – a video is running]: Can you please stop the video? How do you come back to the dementia website?

Task 7 Navigating

Task 7.1: [Products]: Now we do not see the horizontal menu on the top any more. What will you do to get back to that menu?

Task 7.2 [Products. Point at the upward arrow in the lower right corner of the page.] Is scrolling by the side bar as good as, better or worse than using such a button.

Task 7.3 [From Products to the Home page]: Please go back to the Home Page for the website.

We have almost finished!

Task 8 Images

Task 8.1 [Images at the website]: Please have a look at some of the images at the website. You can open menu items if you would like. What do you think about the use of images on this website, e.g. do they give good enough illustrations and are there enough images?

[When this task is completed]: We are finished with the tasks!

3.4 Step III – Closing questions

Now I am going to ask you some very general questions on your experience with the system.

Please, make a mark on this scale where your answer should be.

8. Overall, using the application was:

Very difficult — Very easy

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

9. Visually, the application was:

Unattractive — Appealing

If to the left of the middle:
On the top of your mind, could you please explain the why you ticked there?

10. The information on the screen was:

Confusing Very clear

11. If to the left of the middle:

    On the top of your mind, could you please explain the why you ticked there?

12. The text on the screen was:

Very small Very large

    If to the left of the middle:

    On the top of your mind, could you please explain the why you ticked there?

13. The website has intuitive to use:

Not at all Very intuitive

14. I think I could use this application by myself:

1	2	3	4	5
Completely disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Completely agree

15. Which improvements would you suggest for the website?

Many thanks for your support and cooperation!

Materials

PC with open Home4Dem website.

Observation Sheet (mandatory)

Questionnaire with 6 Closing questions from Step III (mandatory)

Web test questionnaire

Home4 Dem

5.2 Web test questionnaire

Country…….. Date……..

User number ……..

Name of researcher……

Closing questions

Here are some very general questions on your experience with the Home4Dem dementia website.

Please, make a mark on this scale where your answer should be.

1. Overall, using the website was:

Very difficult — Very easy

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

2. Visually, the website was:

Unattractive — Appealing

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

3. The information on the screens was:

Confusing Very clear

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

4. The text on the screens was:

Very small Very large

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

5. The website was intuitive to use:

Not at all Very intuitive

If to the left of the middle:

On the top of your mind, could you please explain the why you ticked there?

6. I think I could use this website by myself:

1	2	3	4	5
Completely disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Completely agree

7. Which improvements would you suggest for the Home4Dem dementia website?

Many thanks for your support and cooperation!

Behavioral change test protocol and questionnaire

General Comments

The aim is NOT to find out whether A is better than B but whether A and B are helpful (independent of each other). Thus we want to know what visualizations are helpful so we can use them if we want to.

This feature tells you whether there are any significant changes in the person's behavior over a longer duration. Longer duration as we try to identify changes cause by the progressing disease (as opposed to short term changes due to that new TV show that started last week). In this test we try to find out which information is most relevant to you to HELP you judge a person's dementia state. We do so by providing a more detailed and meaningful insight into the person's daily activities over time.

The designs are proposals. I am sure there are designs we have not thought of. If the test person can think of any information or visualization that is helpful, please get a description of said helpful information/design and we will try to incorporate it.

There are three question parts. The pre, during and post questionnaire plus the two images showing possible screen designs. Part A of the questionnaire should be done before showing the designs, part B while showing the designs and part C after all designs have been shown.

Screenshots can be printed and laminated before shown to test persons.

Questionnaire

PART A: General questions for caregivers/test persons

Gender	□ Male	□ Female		
Do you work full time as a caregiver	□ Yes	□ No	□ Not applicable	
How many patients with dementia do you typically care simultaneously	----------	□ Not applicable		
Your experience as caregiver in years	----------	□ Not applicable		
Use of computer to help monitoring people with dementia	□ Not at all	□ A little	□ Moderate	□ A lot
	□ Not applicable			
How often do you use a smartphone	□ Never	□ Weekly	□ Daily	□ Hourly

PART B: Questions while running the analysis

Section 1 – Select dates to compare

When comparing two days to determine whether the behavior has changed it is interesting to know:

1. You can compare today with any point in time in the past to determine whether a person's behavior has changed. Considering you are taking care of people with dementia, we want to know two things.
    a. First, do you want to compare the current behavioral pattern with a the pattern at predefined points of time like a day 3 months ago, a day 6 months ago and a day 12 months ago or to choose the point of time for comparison yourself?
    b. Second, if predefined points of time in the past are OK, when should these points of time be (such as a day 3 months ago or a day 6 months ago?

    a) Predefined periods suffice: [Yes|No]

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    b) Time periods of interest:

Section 2 - Can explanations be grouped by time and location? (See figure 1)

If the comparison of days showed significant differences, these results can be visualized grouped by time and/or location (Figure 1 left and right image). The **advantage** of time is that all activities are visible at ones (left image) whereas for location grouping only one location is visible at a time (right image).

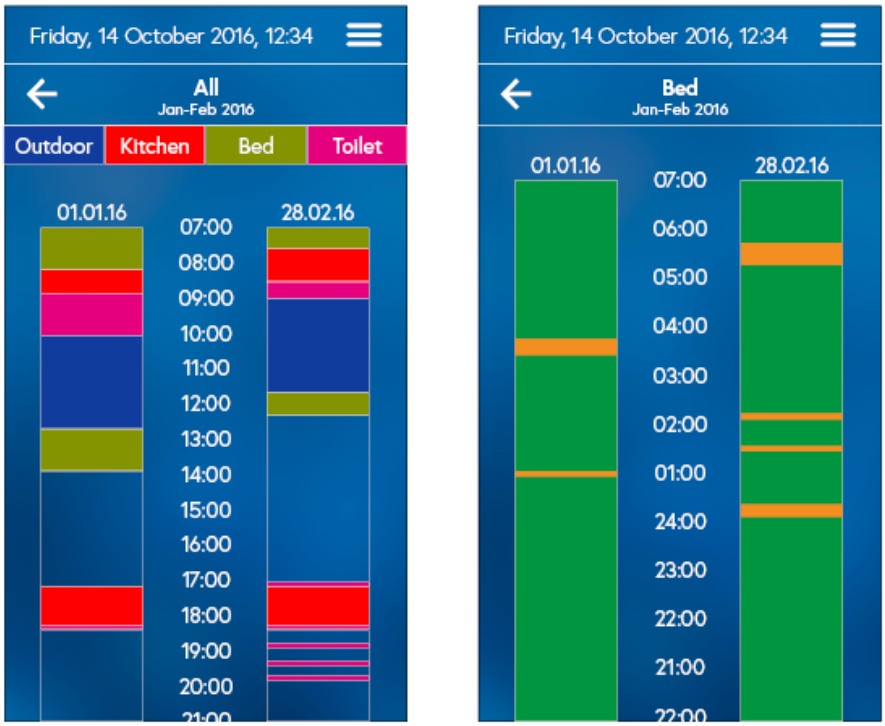

Figure 1: The left screen shows the result split by time. Hence all activities are visualized in one bar. On the left side of the left screen you see a typical day from the first time period and on the right side from the second period. For example, the person was typically outdoors between 10 and 12.30 in the first period. The right screen shows the result grouped by location, hence only a typical day for the bedroom is shown. Green means the person was there and orange that he/she wasn't.

How HELPFUL is it to group results BY TIME	□ Not	□ Very little	□ Some	□ Quite a bit	□ Very much
How HELPFUL is it to group results BY LOCATION	□ Not	□ Very little	□ Some	□ Quite a bit	□ Very much
How HELPFUL is ONE location per bar graph?	□ Not	□ Very little	□ Some	□ Quite a bit	□ Very much
How HELPFUL are ALL locations per bar graph	□ Not	□ Very little	□ Some	□ Quite a bit	□ Very much

Comments

Section 3 - The time log: Graphs, table or both? (see figure 2)

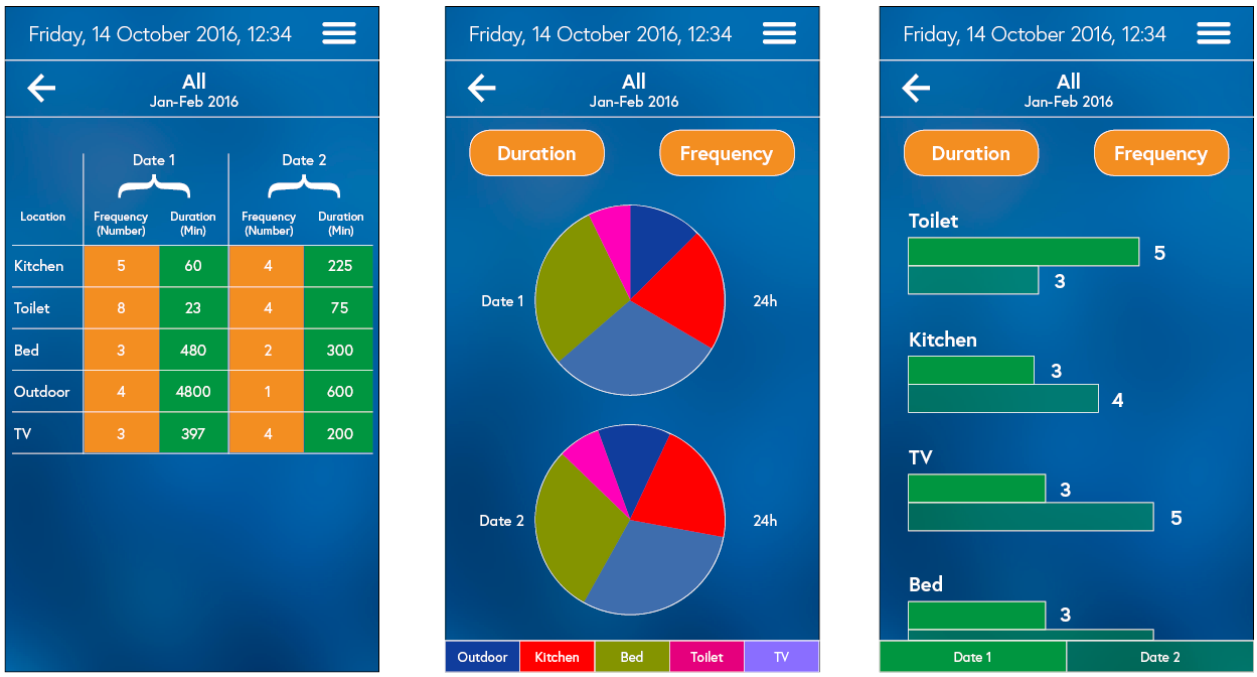

Figure 2: The left screen show a tabular representation of the mean duration/frequency and duration for both periods for all locations. As opposed to a table the center and right screens show a graphical version: the middle screen shows the mean durations for all locations as a pie chart. The right screen shows the frequencies in form of bar charts.

How HELPFUL is the tabular design	□ None	□ Very little	□ Some	□ Quite a bit	□ Very much
How HELPFUL is the pie chart design (duration)	□ None	□ Very little	□ Some	□ Quite a bit	□ Very much
How HELPFUL is the bar design (frequencies)	□ None	□ Very little	□ Some	□ Quite a bit	□ Very much

Comments:

PART C – Open Questions after the test

Is there any information you can think of that would help you to better understand the PwD's daily activities?

Free comments:

Thanks a lot for participating!

App usage context

Explanations for interviewer

The interview is an informal interview. The goal is to figure out under what circumstances the app is used and what information is desired how (presentation, access, …). The material provided in the following provides pointers to questions surrounding the caregiver's daily routines, the information caregivers use and are the information that is missing.

There are also designs of possible information we can provide regarding the behaviour change detection feature. As we are interpreting the sensor data and provide an estimate as to whether something has changed in the patient with disease's daily behaviour, it is important to know how we can proof and or justify our analysis results. In other words we want to know what it takes to establish trust. This is important as the other app features provide information that can be immediately validated by the caregiver (e.g. call the person after an event such as a fall/fire/… was detected).

Question pointers for app usage:

8. Do you use technology to help you with patients with dementia?
9. How often do you already or would you use assistive technology?
10. How much time do you have to prepare for a visit of the person with dementia respectively stay informed about the person with dementia daily activities?
11. What information does it take to trust the behaviour change analysis results?

Please document the answers.

In the following you will find screen designs plus explanations what information each screen contains. Please use the screens to get feedback on what information is desired and its design. Remember these are only proposals.

The attached questionnaire captures general information about the participant (part A) and general comments (part B).

Can explanations be grouped by time and location?

If the comparison of days showed significant differences, these results can be visualized grouped by time and/or location. The advantage of time is that all activities are visible at ones whereas for location grouping only one location is visible at a time. However, the latter might be easier to read.

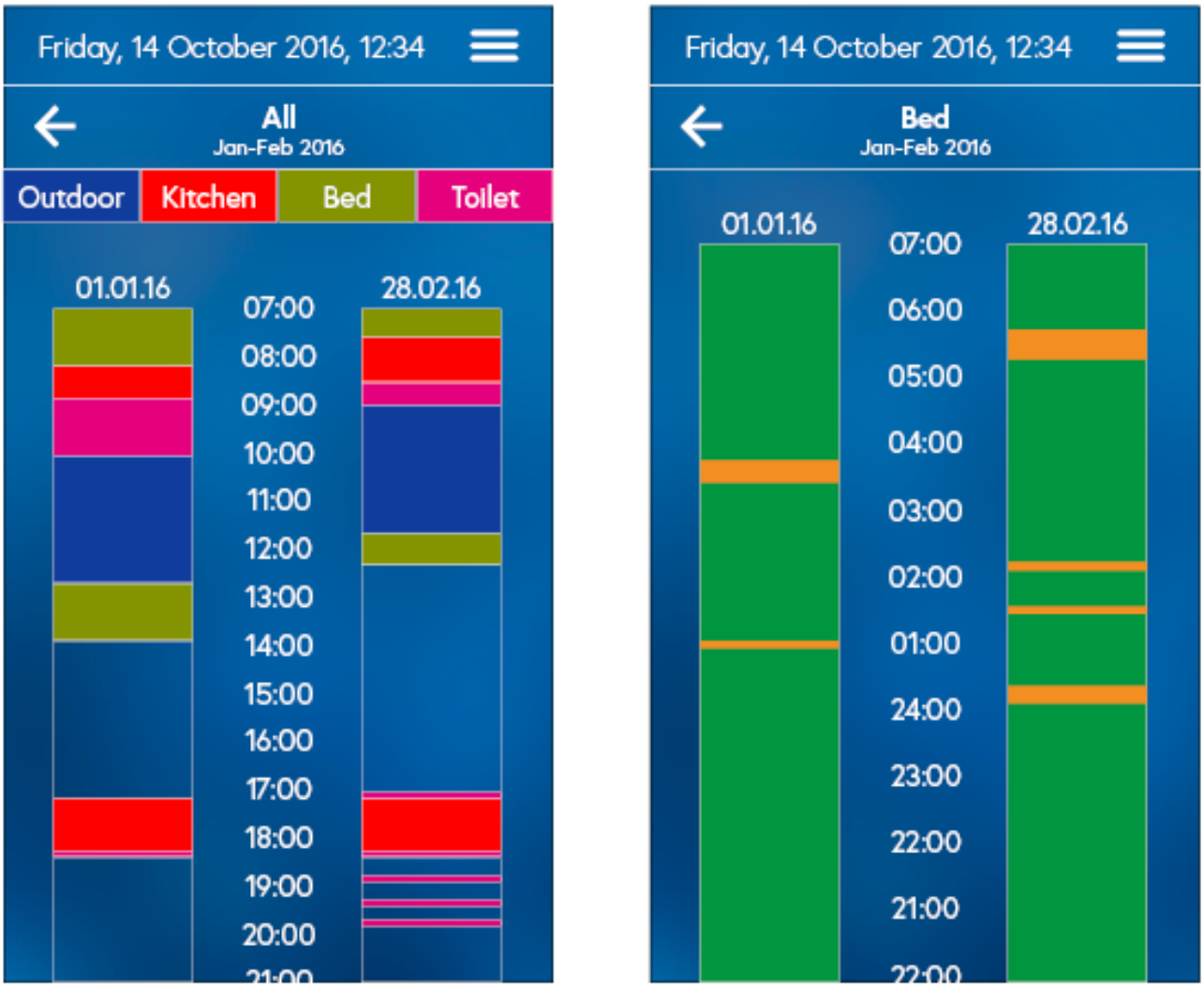

Figure 1 The left screen shows the result split by time. Hence all activities are visualized in one bar. On the left of the first screen you see a typical day from the first time period and on the right side from the second period. For example, the person was typically outdoors between 10 and 12.30 in the first period. The right screen shows the result grouped by location, hence only a typical day for the bed room is shown. Orange means the person was there and green that he/she wasn't.

How many days per period

When both periods are compared, the average day OR days for each period could be shown. A period may not only consist of one typical day as people may have different routines on weekdays compared to weekends. The purpose of showing multiple typical days is to provide a deeper insight into a person's routines.

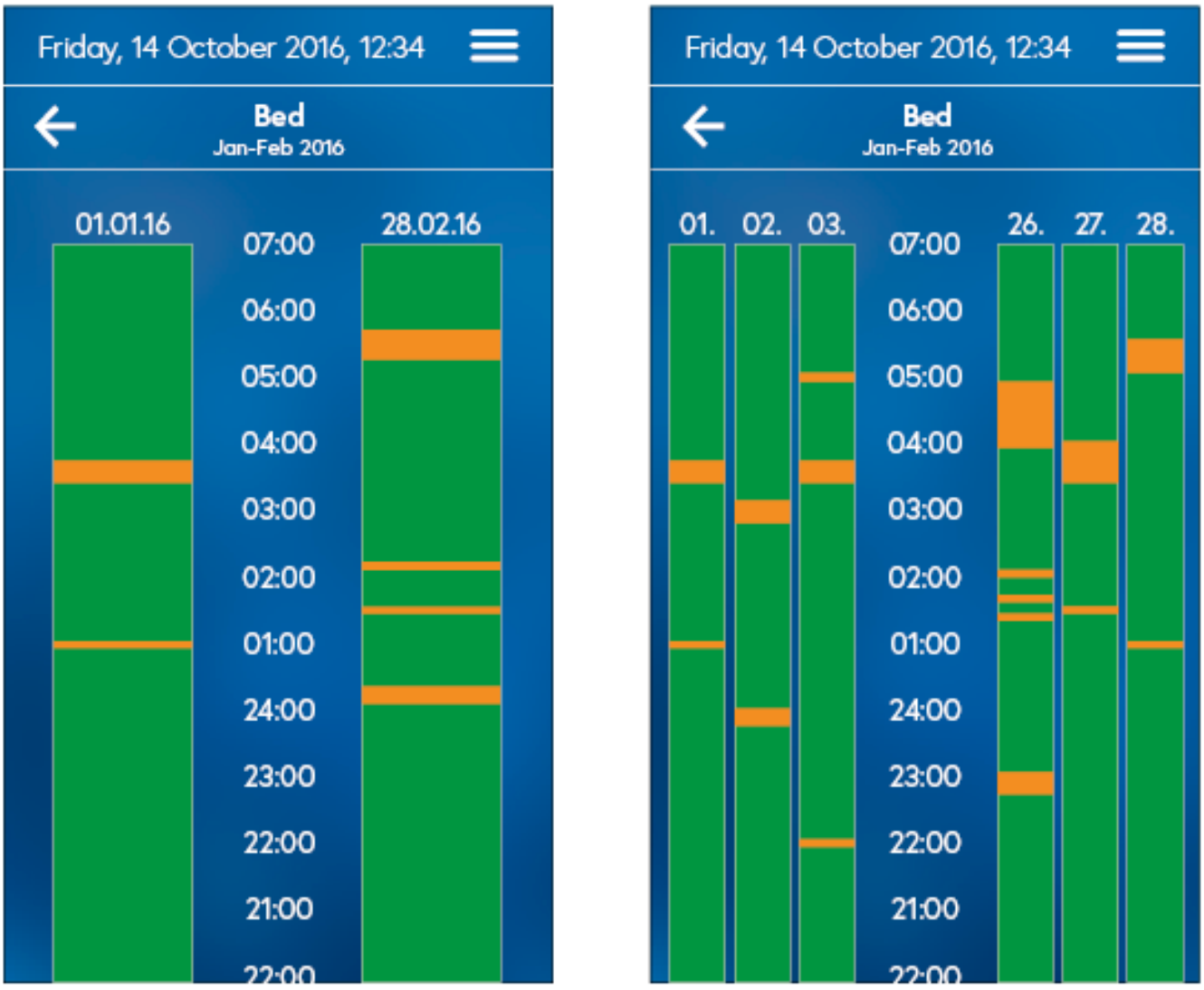

Figure 2 Activities order by time. On the first screen the average day from each period is shown whereas the second screen shows the three most typical days from the first and second periods. Remember that a period does not only cover one day and that days within a period might look different (for example weekends versus week days).

See the whole day at once or only a part

Instead of showing the results for part of the day, the activities can be shown for the entire days at once. Whether that is helpful and still readable is what we want to find out.

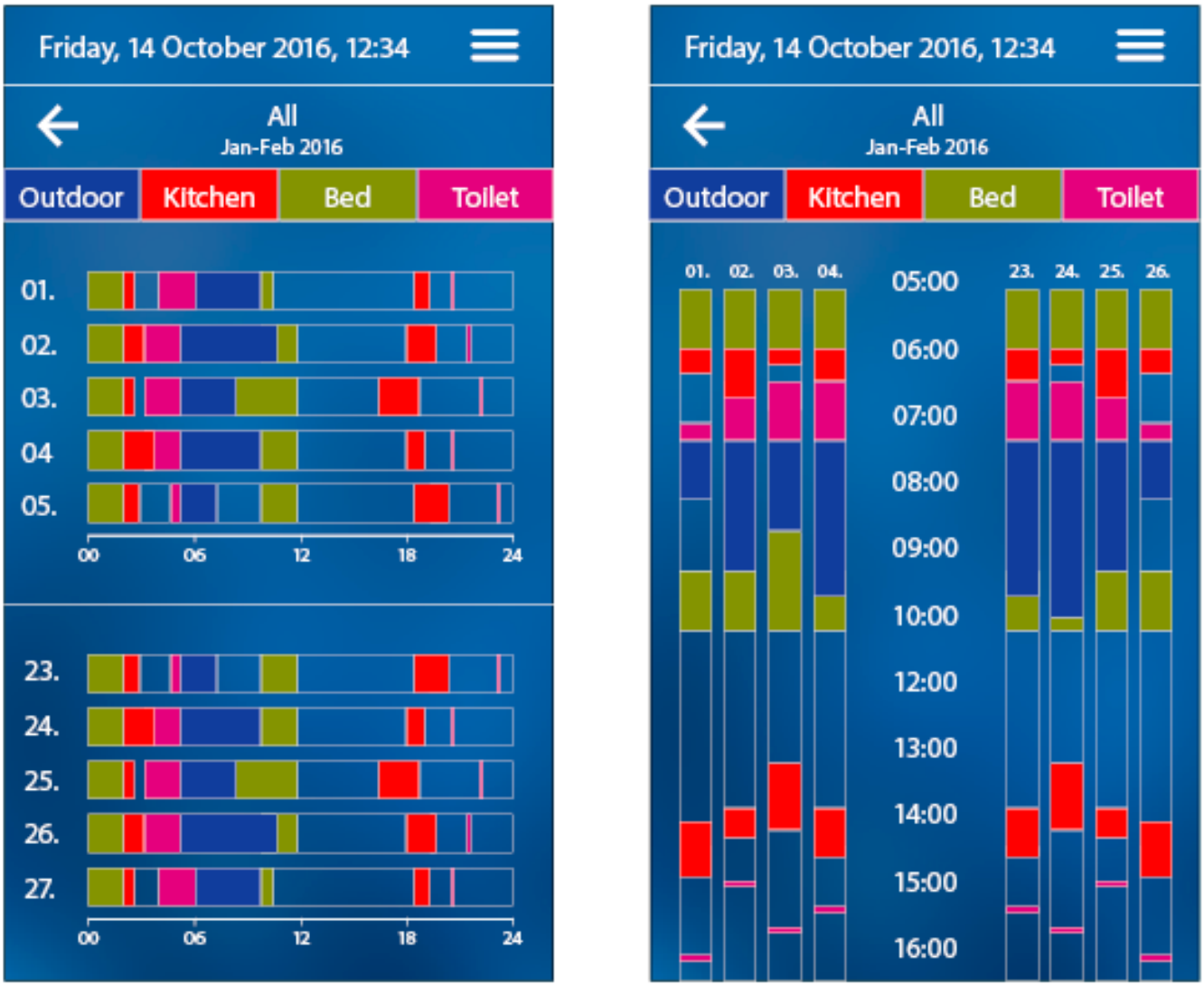

Figure 3 On the left screen the entire day is shown at once (for 5 days per period). The right screen shows only activities between 5 and 16.00 for 4 days per period

The time log: Graphs, table or both?

In comparison to the results of the analysis, the time logs show all results (not only those with significant changes). To provide an unbiased insight into a person's life, the mean frequencies and durations are shown on tabular and graph form.

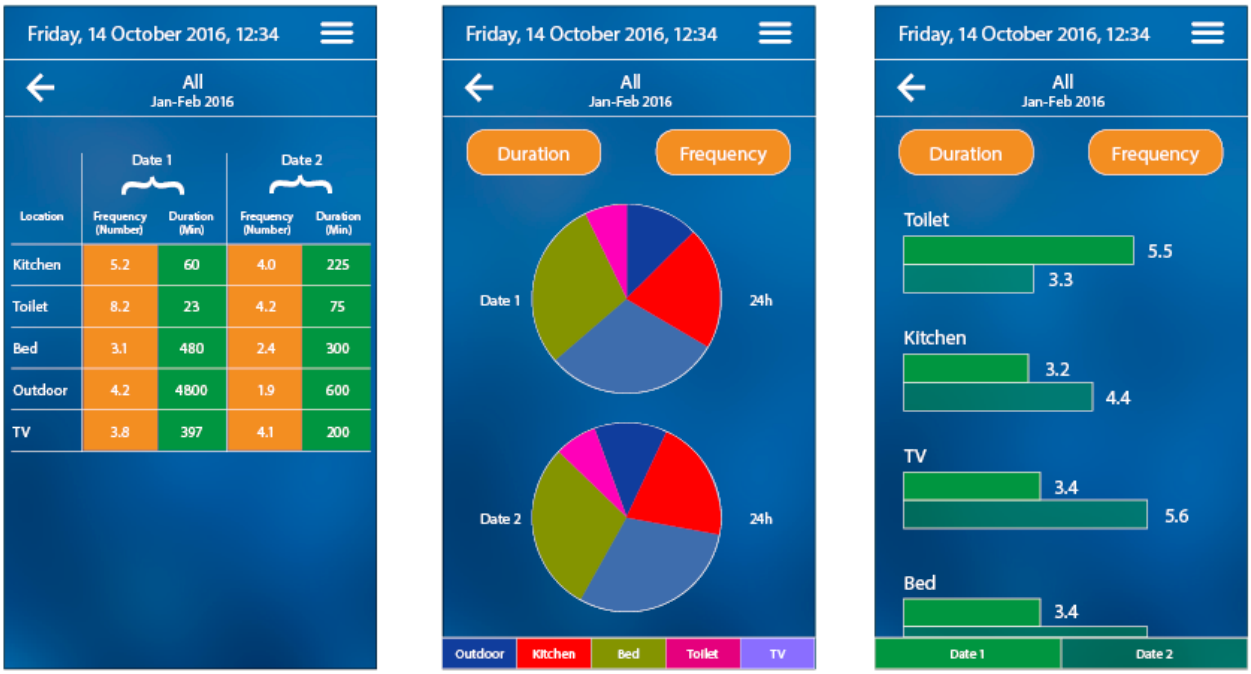

Figure 4 The detailed logs which are accessed through the time log button on the start screen. The left screen show a tabular representation of the mean duration/frequency and duration for both periods for all locations. The middle screens shows the mean durations for all locations. The right screen shows the frequencies in form of bar charts.

Questionnaire

For closed questions please circle or tick your answer. For open questions write your answer below the questions on the provided dotted lines. Thank you.

Part A – General Questions

Gender	□ Male	□ Female		
Age	□ 18 … 25	□ 26 ... 35	□ 36 ... 50	□ 50…
Do you work full time as a caregiver	□ Yes	□ No		
How many patients with dementia do you typically care for simultaneously	----------			
Your experience as caregiver in years	----------			
Use of computer to help monitoring people with dementia	□ Not at all	□ A little	□ Moderate	□ A lot
How often do you use a smartphone	□ Never	□ Weekly	□ Daily	□ Hourly
What smartphone (model & make) do you use?	_____			
How much time do you spend with a patient as a caregiver?	---------- In person/remote			

Part B – Open Questions

Is there any information you can think of that would help you to better understand the PwD's daily activities?

Free comments

Thanks a lot for participating!