



## D4.1 Final Report on the Demonstrators Implementation

Ambient Assisted Living Joint Programme

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## List of abbreviations (alphabetically)

Abbreviation	Full name
AAL	Ambient Assisted Living
AR	Augmented Reality
CNBC	Cyprus National Bioethics Committee
DfA	Design for All

DoW	Description of Work
EEA	European Economic Area
EU	European Union
FRC	Frederick Research Center
GCP	Good Clinical Practice
GDPR	General Data Protection Regulation
HARPO	Harpo Sp. z o. o.
HCI	Human Computer Interaction
ICT	Information and Communication Technologies
IoT	Internet of Things
KARDE	Karde AS
KI-I	Kompetenznetzwerk Informationstechnologie zur Förderung der Integration von Menschen mit Behinderungen
KPI	Key Performance Indicator
MAT	Materia Group
ML	Machine Learning
NGO	Non-Governmental Organisation
PLATUS	Platus Learning Systems GmbH
POI	Point of Interest
QUEST	Quebec User Evaluation of Satisfaction with assistive Technology
SUS	System Usability Scale
TRL	Technology Readiness Level
UD	Universal Design
UCY	University of Cyprus
UI	User Interface
VR	Virtual Reality
WCAG	Web Content Accessibility Guidelines

## Executive summary

The GUIDed project has addressed the challenge of keeping older adults independent and functioning in their own homes for as long as possible by facilitating important activities of daily living through IT solutions. To achieve this, GUIDed offers a selection of smart devices and services integrated in a smart kit based on budget options, while giving heavy emphasis on training the older users on using the service and maximising their benefit.

The service categories of the GUIDed solution are:

- Medication planner service
- Navigation service
- Home control service
- Home sensor service
- Communication service.

An integrated AR-based help function is provided in the GUIDed app. Augmented Reality (AR) functions to identify the correct service to be launched in the GUIDed app, are also provided.

To get more detailed information about the services in the five services categories, the project interviewed 14 primary, 1 secondary and 3 tertiary users in the early phases of the project, i.e. M1-M4. Due to restrictions in social contacts during the COVID-19-crisis, the interviews were conducted via phone, video conferencing or face-to-face.

The GUIDed system was tested in two phases. In Testing phase 1, a low fidelity (paper prototype) and a high fidelity (running mock-up) prototypes were developed and tested, and as part of the testing, living labs experiments were conducted. Testing Phase 2 consisted of two field trial iterations.

Each type of the prototype was developed and tested in all countries: Cyprus, Austria, Poland and Norway. Feedback from paper prototype testing, semi-functional mock-up testing and living labs served as input to the first iteration of field trials of the GUIDed system.

This first iteration of field trials was tested by a total of 35 primary users in all countries. Feedback from these tests was input to the final field trial of the GUIDed system. The second iteration of field trials was tested with a total of 35 primary users & 35 secondary users over a 6 months period and in addition interviews were conducted with 7 tertiary users.

Development and evaluation of the GUIDed system and its services were based on the application of following structured instruments and guidelines:

- System Usability Scale (SUS)
- Usability Heuristics for User Interface Design
- Quebec User Evaluation of Satisfaction with assistive Technology (QUEST Version 2.0)
- Universal Design
- Web Content Accessibility Guidelines (WCAG) 2.0.

The co-creation processes with elderly have resulted in prototypes that have been tested both as paper prototypes, high-fidelity (clickable) prototypes, lab demonstrations and two iterations of real-environment field trials. The field trials have generated input which made it possible to take the GUIDed system to the next level, to a supported product which in the first instances will be marketed and sold in the participating countries: Cyprus, Poland, Austria and Norway.



## 1 Introduction

This document, *D4.1 Final Report on the Demonstrators Implementation*, summarizes the results from user testing in the GUIDed project.

The GUIDed project started on the 1<sup>st</sup> January 2020 and ended on the 31<sup>st</sup> December 2022. The project was originally planned for 30 months, but due to challenges created by the Covid-19 pandemic, the project was approved for a 6 months extension, which also influenced, timewise, the involvement of users in the project and the phases of testing individual iterations of GUIDed prototypes by users.

The GUIDed project is composed by partners from Cyprus, Poland, Austria and Norway. Materia Group from Cyprus is the project coordinator and was also responsible for the user testing in Cyprus. Two other partners from Cyprus, namely, the Frederick Research Centre and the University of Cyprus were involved in the technical developments of the project. Fredrick Research Centre has had the lead in the activities around Augmented Reality (AR), while the University of Cyprus led the development of the communication service. HARPO from Poland is both a technology company, involved in sensor testing and integration and an user partner who conducted the user testing in Poland. From Austria two partners are part of the consortium. KI-I is a research and technology company which has contributed to the implementation of the GUIDed system. KI-I was also responsible for technical development in GUIDed and was a leader for the technical work package in the project. Platus is an SME responsible for business development and user testing in Austria. In Norway, Karde is an SME and has contributed with user testing and technology development, as well as was responsible for the dissemination and exploitation work package.

User recruitment have been rather smooth in all user countries, Cyprus, Poland, Austria and Norway. We have experienced lot of interest towards modern apps for elderly. The ICT-level of the users has been different in the different countries, high in Norway and lower in Cyprus and Poland. However, a common denominator has been curiosity and a will to master modern apps. Elderly see that all levels of societies all over the world become more and more dependent on technology. The rising amount of elderly in all countries and scarce access to health personnel implies that the longer elderly can live independent in their own homes the better. And technology, for nearly all aspects of life, is an enabling factor in this respect.

Our ambition is that GUIDed can contribute to the independence and safety for elderly by increasing their competence and helping them with some tasks in their daily life. To test this hypothesis, during the project progress we implemented 6 rounds of rigorous testing of the GUIDed system, both in lab and real-life settings, 3 of which were a part of Testing Phase 1 and 2 were a part of Testing phase 2. The methodology and results for testing phase 1 can be found in deliverables D2.2 a, b, and c while the present document includes the methodology and results of the final testing rounds, namely Testing phase 2.

## 2 Testing prototype: The GUIDed system

### 2.1 The GUIDed system

GUIDed is a research and development project whose aim was to develop ICT services, called the GUIDed system, for older adults. The ambition was to make the application of existing technology solutions for older end-users more relevant and easier to use. In addition, training solutions have been developed that utilise methods of AR and virtual reality (VR).

The GUIDed system has been designed and implemented respecting the special needs and constraints of older adults to avoid technology abandonment, address technophobia, enable ease of use of the services and promote active and independent living. The GUIDed project has developed and integrated multiple services focused on assisting daily life including:

- Meds planner service: facilitating medication management
- Navigation service: facilitating outdoor roaming with visual and auditory assistance
- Home control service: enabling remote control of home devices
- Home sensor service: allowing the control of home climate and risk parameters
- Communication service: allowing communication with trusted contacts

The system has been developed by a series of surveys and co-design and co-creation activities with end-users:

- Initial idea of GUIDed as laid down in the project proposal
- Survey of previous and on-going AAL-projects
- Initial interviews with potential GUIDed users
- Low-fidelity and high-fidelity paper prototypes to illustrate the system for potential users
- Living lab experiments
- Two real-life field trial iterations.

All of which have contributed to refining and creating the final outcome of the project and the systems development process.

The GUIDed system consists of two parts, the GUIDed Web Portal and the GUIDed app. The Web Portal is used as a gateway for caregivers to configure the GUIDed system for the end-users. The GUIDed app is used for running the services of the GUIDed system. GUIDed system is available in all languages of the partners, Greek for Cyprus, German for Austria, Polish for Poland and Norwegian for Norway.

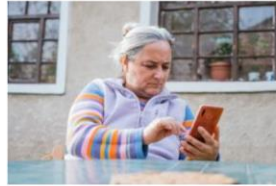
### 2.2 The GUIDed Web portal

The GUIDed Web Portal was developed in Drupal and is a means for primary and secondary users to configure the GUIDed app. The GUIDed Web Portal can be found at <https://guided.roztr.org/>. The user needs to register in the portal to be able to use the GUIDed system and the GUIDed app in particular.

**Log in / Register**



**Communication**



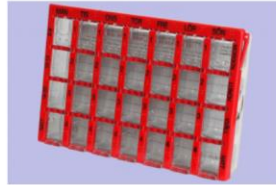
**Navigation**



**Home control and sensors**



**Medication planner**



**Select language**



Figure 1 The GUIDed Web Portal

### 2.3 The GUIDed app

The GUIDed app is running on Android smartphones and tablets and is available as an .apk file (post request).



Figure 2 The GUIDed app

### 3 Brief history of the evolution of the GUIDed system

#### 3.1 Survey of previous and on-going AAL-projects

As a point of departure for the development of the GUIDed system, the GUIDed project analysed 87 AAL-projects awarded in the calls from 2014 until 2018. More than 50% of the projects had in one way or the other addressed the 5 topics chosen by GUIDed. The conclusion from this analyses was that the GUIDed consortium would stick to the original topics from the proposal:

1. Smart nutrition and health service (S1)
2. Smart home control service (S2)
3. Smart city navigation service (S3)
4. Smart home safety service (S4)
5. Smart social communication service (S5).

More information about this can be found in GUIDed deliverable *D2.1 Report on user recruitment procedures, and older adults demands analysis*.

## 3.2 Initial interviews with potential end-users

Very early in the GUIDed-project, M1-M4, the project performed individual end-user consultations for acquisition of additional service demands and priorities to get a better understanding of end-user requirements in the GUIDed countries: Cyprus, Austria, Poland and Norway.

All users were contacted remotely or in one-to-one meetings. MATERIA provided Google forms which included the perspective services of the GUIDed system. The participants were able to see pictures and a short description of each service and freely provide their opinion.

The users interviewed had different IT literacy and needs. Some felt they could not benefit from ICT services with the purpose of enhancing the quality of life and making daily life easier. Others saw potential and had some suggestions for services.

In summary, the user interviews suggested the following functions for each of the GUIDed topics:

### 1. Smart nutrition and health service (S1)

- Reminder-function for pills
- Order function for pills (reminder for re-ordering → doctor → pharmacy)
- Information of medication
- Blood pressure measurement
- Sugar measurement
- Cooking recipes
- Nutritional facts of food
- Information about medication in layman language
- Point at plate or glass and get calorie count
- Scientific information about all new “miracle medicines” and “health vitamins”
- Growing tips for herbs and vegetables.

### 2. Smart home control service (S2)

- Light switch
  - Button in favour of a slider
- Control the television
- Control the front door (with intercom)
- Wake up alarms
- Remote control of house appliances
- Stove watch
- Web camera for remote monitoring
- Energy conservation.

### 3. Smart city navigation service (S3)

- Point of Interest (POI)
- Information about new places of interest in neighbourhood, e.g. new restaurants
- Virtual tours
- Close ups of POI
- Help to find the right direction to walk.

### 4. Smart home safety service (S4)

- Call help service
- Smoke detector
- Gas detector



- Door alarm if door opens during night
- Burglary camera for cottage.

5. Smart social communication service (S5)

- Picture of person to call
- Exchange recipes and chat
- Automatic answering.

More detailed information about this survey can be found in GUIDed deliverable *D2.1 Report on user recruitment procedures, and older adults demands analysis*.

### 3.3 Testing Phase 1

The key objective of Testing Phase 1 was to guarantee that the demands and needs of the older adults would be respected in the hardware configuration of the device and the development of the software platform and services.

In phase 1, a low fidelity paper prototype and a running mock up were developed and tested, and as part of the testing, living labs experiments were conducted. The phase 1 testing is documented in the GUIDed deliverable *D2.2 Report on platform’s experimental evaluation and feedback activities (Testing Phase 1)*.

### 3.4 Low fidelity paper prototype

#### 3.4.1 Number of end-users participating in low fidelity prototope walk through

The walk throughs of the low fidelity paper prototype were both conducted in focus groups and individual interviews.

Country	Total	PU	SU
Cyprus	13	11	2
Norway	10	8	2
Poland	11	8	3
Austria	11	10	1
<b>SUM</b>	<b>45</b>	<b>37</b>	<b>8</b>

Figure 3 Number of participants Low-fi paper prototype

#### 3.4.2 Findings and recommendations

##### 3.4.2.1 User interface

Two alternatives were suggested in the paper prototype.

The recommendation was that rectangular tiles should represent the five services in the app and that the tiles should be of equal size. Contrast needs to be good. Colours in paper prototype seem to be OK.

##### 3.4.2.2 GUIDed services

The test-users had lots of suggestion for other elements of the services and new naming. This may be regarded as innovation suggestions from enthusiastic test-users.

Due to the limitation of both time and resources, many of the suggestions cannot be implemented in the GUIDed project.

##### 3.4.2.2.1 Meds planner

*Meds planner* became the final name of this service, but in the paper prototype it was named *Health and nutrition service*.

There were lots of suggestions for inclusion of additional elements like monitoring blood pressure, blood sugar, count steps, manage appointments with general practioners, etc.

Suggestions which will be implemented is that it should be possible to enter and display the doses for each medicine in the app and to enlarge the medication plan.

#### 3.4.2.2.2 Navigation

Also for Navigation there were lots of suggestions for useful features like getting a signal when facing the wrong way, voice commands, to integrate the service with public transport apps that provide timetables for buses, etc., point to something and get information about it and so on.

Some of the suggestions were implemented like additional navigation help in the form of AR-markers in the road and pavement and voice commands.

#### 3.4.2.2.3 Home control

There are several systems for different aspects of home control commercially available, e.g. controlling lights, sound, heat and entrance door. The test-users had several ideas for GUIDed. Like controlling the system with voice, to check if gas or stove are on, close the shutters in the house, to control TV or front door, to control devices when user is not at home, to be able to check the radiators and doors and on and on.

Due to time and financial and personnel resources the GUIDed project had to concentrate on controlling a limited number of lights and smart contacts. The suggestion to be able to control devices when you are not at home, was implemented in the second iteration in test phase 2 of the project.

#### 3.4.2.2.4 Home sensors

Home sensors (preliminary name: Safety service) deal with security in the home. The test-users suggested to add more sensors like water leakage sensor, motion detectors and front doors sensor to identify and trigger an alarm if unwanted people are in your home. Temperature and humidity monitoring were suggestions for home sensors in the paper prototype, but several test users commented that these were more home control than home security.

The conclusion was that GUIDed project acquired gas and CO-sensors and sensors which indicated the door or window is open or closed. This was economically feasible for the the project.

#### 3.4.2.2.5 Communicaton

Social contact is an important activity for people. Elderly no exception. The test-users had several suggestions like add names under photos, add voice commands, to turn off camera and mute the voice, tap on a picture of a contact should initiate a call, to have a list of people you contact more often (favourite list), have more than two people in the conversation, contact with strangers is worrying for many people.

Lots of these suggestion were implemented in the first and second iteration of testing phase 2. Names under photos, favourite list, initiate call with tapping the photo, contact with strangers have been removed.

### 3.4.3 Conclusion

In conclusion, the results from the first end-user testing of the GUIDed paper prototypes were very promising and insightful. The GUIDed system was rated as easy, intuitive and valuable which will provide a great level of self-confidence, independence and convenience to older adults with some modifications, additions and adjustments.

## 3.5 High Fidelity Mock ups and Living labs

This testing phase is the first contact of end-users with a 'tangible' product of WP3. Thus, this is the first stage that allows them to better understand the essence of the GUIDed system and its objectives and subsequently, better reflect on their wishes, needs and requirements from a technological, ethical



and lifestyle perspective compared to the previous phases. This phase followed the project MTR and therefore, it was a crucial point during the project progress.

The living labs were based on a first mock up of the GUIDed-system. They were conducted in all 4 participant countries. The living labs aimed to initiate an open dialogue during which people could exchange ideas. Therefore, both primary and secondary users participated in the same testing session. The living labs resulted in a concrete set of suggestions and recommendations to improve the mock up so it could be ready for the testing phase 2.

The suggestions and recommendations were analysed by the development team and given priorities: High, Medium, Low and Very Low. This was documented in an internal document for the GUIDed project. This document was used and updated continuously by the project until the end of the project as new suggestions and proposals arised.

### 3.5.1 Number of participants in High Fidelity Mock ups

The High Fidelity Mock ups included both primary, secondary and tertiary users, and also experts. Some of the secondary or tertiary users also had expert competences.

User group	Austria	Cyprus	Poland	Norway
Primary	5	5	5	5
Secondary	3	3	3	3
Tertiary	2	2	2	2
Experts	Per center's availability			

Figure 4 Number of participants in High Fidelity Mock ups

### 3.5.2 Number of participants in Living Labs

The Living Labs included primary, secondary and tertiary users.

User group	Austria	Cyprus	Poland	Norway
Primary	5	5	5	7
Secondary	5	5	5	5
Tertiary	1	1	1	1
Total	11	11	11	13

Figure 5 - Number of participants in Living Labs

### 3.5.3 Conclusion

These last two phases was a key stage in project progress. Two main problematic area were identified by the consortium following the cumulative analysis of the results and also the comments of the MTR which needed to be urgently addressed. The first are was related to the ethics and whether the GUIDed system would be approached as a medical device. This comment was raised by the reviewers and was carefully considered by the consortium. Taking into account all relevant legislations and the fact that GUIDed is nor intended or can provide in any means any diagnostic or interventional features it is not or intended to be a medical device. However, to support this and avoid any use/consumer-related confusion all labels within the GUIDed system that could hint a health app were replaced by more appropriate texts. Secondly, this phase allowed us to shape our marketing strategy and

consecutively our developments in terms of technology. The cumulative analysis of all user feedback yielded very conflicted features and requirements. For example, there were users requesting the development of a teleconferencing platform able to connect them with people all over the world and allowing the exchange of recipes and other material. On the other hand there were users who were afraid of any contact with strangers making the Meet People platform a non-desirable feature. Similarly, there were people who requested us to build features such a navigation service which would allow travelling users to see information, videos and tips when visiting landmarks around the world. On the other hand there were users finding the existing app very nice because it was user friendly and simple and thus, suggested avoiding any more features to avoid overcomplicating the steps to use it, other than to add a voice (apart from the visual) assistant. Therefore, in this phase it was when it became obvious that we were dealing with two very different customer groups among older adults: the trendy group of young old who are active and independent and the less included group of people with lower ICT who needed some help in everyday life and simple applications to assist them. The GUIDed consortium decided to narrow down the customer target in order to be able to prioritise the development of features desirable to the specific target group. Ultimately, the second group of dependent older adults and their caregivers was chosen to be addressed since it is a greater market and has more needs and potential in view of the concurrent demographic changes and disease prevalence among older adults. D5.2b includes further information in this respect. Having narrowed down the key-customer market, the technical developments prioritised features selected by this group (dependent primary users and their caregivers) and also, tried to include more dependent user-caregiver dyads in the final testing phases to ensure the real-life testing of the system with the target personas.

## 4 Augmented reality in the GUIDed project

AR is one of the key innovation points of the GUIDed project, in terms of both the research and business aspects. The aim of the AR functionality as defined in the project was to provide the capability to older adults to efficiently and effectively interact with different smart and assistive technology services, on the basis of the concept of the “one-click” or “one-action” AR interface. Specifically, instead of using the conventional “Menu” mode that required the design and development of several user interfaces, the aim was to provide a “one-click” AR interface that allows scanning an object to interact or control with a user interface (UI) or a smart device.

Based on the concept defined in the project, the partners have followed a co-creation approach that led to the prototype released during the living labs and the first phase of the field trials. This prototype allowed to use machine learning (ML) recognition of 3D objects, e.g., pillbox, smart devices, smart sensors, in order to detect the specific object and present the UI controls for interacting or controlling the devices. The ML recognition method and AR UI controls on top of the camera view were implemented in this first prototype, since the older adults and other key stakeholders showcased their preference to this interaction method during the low-fidelity and high-fidelity prototype focus groups and workshops. The system and the Android prototype were thus able to detect 3D objects and augment UI controls for interacting or controlling the different objects, e.g., smart devices or pillbox.

This method showcased detection accuracy during the laboratory tests of more than 85%, but during real life conditions at the living labs and first phase of the field trials practical limitations have arose. Different light conditions in the room, scanning objects at a distance or at an angle, and the different lamp holders for the smart lights used by older adults created challenges and resulted in false positives while scanning and/or difficulty to recognise the object. Despite additional training performed with thousands of pictures the above real-life varying conditions created serious implications to the detection process and thus to the overall user experience. Additional implementations steps and further steps were contacted that led to several releases but the false positives and the difficulty in recognition in some house settings continued.

The decision was thus made by the partners to switch to AR image recognition that enables the older adults to interact as follows. Each 3D object was associated in the GUIDed mobile application implementation with an AR image tag using the Google ARCore Augmented Images API to create an Augmented Images database for facilitating the recognition process<sup>1</sup>. Small square laminated images were thus created that serve as the AR images that can be strategically place inside the house, e.g., on the coffee table in the living room, on the refrigerator door in the kitchen, on the table next to the bed in the bedroom, so as to efficiently and effectively perform a “one-click” interaction that scans the AR image and augments the UI controls on the camera view so as for the older adult to interact or control the objects, e.g., pillbox, smart sensors, smart devices.

The second prototype released based on the AR images recognition method was then released, while the consortium made the decision once again considering the input and feedback from the users at all stages to implement a second “Menu” interaction method. This provided the capability to the older adults and other users to be able to select the “AR Camera” or the “Menu” interaction method. The technical partners and then the end-user partners performed a rigorous testing of the mobile application once again in order to make sure that issues are resolved before going back to the end-users. Then the second phase of the field trials commenced with the exact same set of services, but with an improved functionality and the second “Menu” interaction method.

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<sup>1</sup> AR Core Augmented Images – <https://developers.google.com/ar/develop/java/augmented-images/guide>

1. **Meds Planner service:** allows scanning the relevant AR image associated to the pillbox and augments in the camera view the schedule and information about the pills to be taken during the day. Automated notifications are sent to the users in the case that a pill or other medication needs to be taken. The “Menu” mode can be used also to interact with the pillbox.
2. **Navigation service:** the AR navigation service allows searching for directions from origin to destination and augments in the camera view (ontop of the real world environment) AR navigation instructions that showcase more realistically to the user how to navigate.
3. **Home Control:** allows scanning the relevant AR image associated to each smart device, e.g., smart plug, smart lights, and augments in the camera view the controls of that device. The “Menu” mode can be used also to interact with the devices.
4. **Home Sensors:** allows scanning the relevant AR image associated to the sensor and augments in the camera view digital information about the sensor, e.g., status, battery life, etc. Automated notifications are sent to the users in the case that a hazard is detected based on the sensor, e.g., smoke or gas or door left open. The “Menu” mode can be used also to interact with the devices.
5. **Communication Service:** allows to socially interact with healthcare experts, family and friends that are part of the older adult’s network/contacts. The service aims to tackle social isolation and decrease loneliness, while the angle lens can be used on the smartphone to provide a more holistic and augmented view and experience when viewing others, e.g., like being together in the same room.

The results of the first and second iteration of the field trials revealed some important research findings and business recommendations based on the feedback with older adults. The key findings and recommendations can be summarised as follows:

1. Overall the user experience has improved with the current stage of the prototype and older adults have showcased their preference with some of the services.
2. The Meds Planner and the Home Control and Home Sensors services were amongst the top preferences of the older adults in all countries.
3. Networking issues and configuration of the smart devices continue to be key issues faced also in the second phase of the trials.
4. AR Expert assistant mode in the mobile application functioned rather well and could be of good help for people who were not ICT literate. For people being used to apps on smartphone, it was not necessary. Specifically:
  - a. The AR Expert assistant mode can help the older adults but it was not used so much after the first 1-2 times since the services were designed with simplicity in mind.
  - b. More importantly, most of the older adults were involved from the beginning and thus they were already familiar from the low-fidelity, high-fidelity focus groups and workshops, and the first phase of the field trials on how the mobile application works.
5. AR in the navigation contributed nicely. Country specific differences were detected such as the fact that in Norway the navigation service received more favourable comments, rather than in Cyprus and Poland. However, the demographic analysis confirmed that older adults in Norway are far more independent users who have a variety of technological products available and even, funded by their government than their Cypriot and Polish counterparts. In the latter cases, also, people confirmed that the Navigation service was not relevant to them because they did not use to drive or go to unfamiliar places anymore. In the case of Cyprus, it is a small island where most of the places are familiar to its inhabitants.
  - a. For walking, GUIDed navigation is better than Google navigation because it finds pathways rather than main streets. Similar functions in Google navigation. This is an

- interesting finding as it could prospectively assist people with Mild Cognitive Impairment in finding their way home with more accuracy than existing apps. Future developments could also include the implementation of an SOS button and localisation options for the caregiver application to monitor their older adults.
- b. The use of the external Mapbox API for directions, which are then visualised in an AR way are better, but using Google Maps to get the directions should be preferred as it provides capabilities not offered by the Mapbox API, e.g., to search by the name of a hotel. Future versions should use the Google Maps API, despite the cost that maybe incurred.
6. The “Menu” mode (traditional app navigation) for Meds Planner, Home Control and Home Sensors was preferred by older adults than the “AR” mode (scanning the AR tag), even if it required more actions from the user to find the room, the smart device and load its UI controls to be able to interact with it.
    - a. The AR image scan although working perfectly without false positives and difficulty in scanning, it was still considered as counterintuitive by the older adults.
    - b. The older adults preferred the “Menu” mode and described it as easier to interact despite the fact that they needed to do more actions on the application.
    - c. At this stage an assumption can be made on the basis of the feedback received that older adults are more familiar with the “Menu” interaction method, and they consider the “AR image scan” method as something “foreign” and counterintuitive since they are not familiar with the technology.
    - d. The “AR image scan” when demonstrated also to younger audience during the Boyz Show 2021 in Cyprus and the European Researchers Night 2022 in Cyprus received very positive comments and especially teenagers showed to be excited about the simplicity of this interaction.
  7. Additional scientific research and market research needs to be conducted in order to determine the exact reasons that older adults preferred the “Menu” interaction method. However, in our case, this preference could be still attributed to the demographics of our target group (dependent older adults with lower levels of ICT literacy).
  8. The communication service received very good comments, while more advanced users, e.g., in Norway and Poland, expressed the opinion that other alternatives are already being used by them, e.g., WhatsApp, Messenger. The wide-angle lens was not widely used although when used it contributed to a better image and visibility. Further developments should include a lens incorporated to the device as a hardware to avoid this extra step of clipping the lens on the camera for the users.

Overall, the GUIDed system and mobile application showcased huge improvement and in fact after the first official APK release, more than 45 updated versions of the mobile application followed. This is because the project has engaged in a rigorous, intensive and continuous co-creation approach, taking into consideration the feedback and comments of older adults and other key stakeholders. The GUIDed system and app are currently at a Technology Readiness Level (TRL) 7 level, since it has been used and tested in real world environment and operational conditions, while the user experience has increased in the second phase of the trials. Services such as Meds Planner, Home Control and Home Sensors were found to be more useful by the end-users, while the Navigation service and Communication Service were also defined as useful by end-users. Different commercialisation and exploitation strategies are considered for the individual services and/or the whole GUIDed system as these are described in the Deliverable D5.2b [M36]. This deliverable provides the final report on the



formulated commercialization and sustainability plan aimed at the commercial exploitation of the GUIDed product.

## 5 Testing Phase 2: Methodology & Results

### 5.1 Protocol and procedures

The total testing duration for the final field trials was 12 months split into two six-month iterations. The first iteration included only primary users and was focused on functional and non-functional system characteristics including ease of use, reliability, usability, utility. The tools used included Portal Heuristic walk through, App Heuristic walk through, Human-Computer Interaction (HCI) portal, HCI app, and Exploitation and Impact questionnaires.

The purpose of this phase was to gather feedback to fine-tune the system, especially in terms of simplicity which is one of our main selling points. The end-user sites provided feedback to the tech team in a continuous manner and fine-tuning, corrections and resolution of bugs took place throughout the iteration to ensure timely addressing of all matters during the longitudinal testing. After the completion of Iteration 1, a new set of primary users, equal numbers with iteration 1, were recruited for iteration 2. During Iteration 2, the researchers visited the primary test-users 3 times during the trial, in month 1, 3 and 5:

- GUIDed application – checked during 1<sup>st</sup> and 3<sup>rd</sup> visit
- GUIDed web portal – 1<sup>st</sup> visit
- Quality of Life – 1<sup>st</sup> and 3<sup>rd</sup> visit
- System Usability Scale (SUS) – 2<sup>nd</sup> and 3<sup>rd</sup> visit
- Exploitation and impact – 2<sup>nd</sup> and 3<sup>rd</sup> visit.

In addition to the visits, the primary test-users were followed up by a researcher over phone every or every second week where the test-user could discuss potential problems with the GUIDed app with the researcher.

Iteration 2 was focused as well on the assessment of functional and non-functional characteristics of the GUIDed system but also included the implementation of experimental protocols to assess the impact of the GUIDed system in older adults' quality of life and the impact of the AR in-system assistant. More specifically, to assess the impact of the GUIDed system, older adults' quality of life was assessed at baseline and post-study completion (6 months after). To assess the older adults' quality of life we used a self-created questionnaire with a single item used to assess the Global Quality of Life and 11 additional items focused on assessing their ICT competency, feelings of confidence, safety and access to information based on a 5-point Likert scale. Furthermore, to assess the impact of the AR-assistant incorporated in the app we implemented a test-control group approach through which half of the participants were assigned into the AR-assistant enabled group and half into the AR-assistant disabled group. In particular, the first group (intervention) received a full training on how to use the AR assistant in case they have issues while using the app while the second group (control) had the AR assistant disabled. Finally, we assessed intentions to purchase, business aspects and usability of the system in three time points, baseline, middle of the study and study completion.

In iteration 2 we involved the whole GUIDed ecosystem of users including older adults (primary users), family members (secondary users) and commercials (tertiary users). In all cases, we strived to include a broad range of demographics and specifically our target market dyad, namely, dependent older adults and their trusted family members to also, test the market potential of the system.

The protocol and procedures are found in Appendix 1: Protocol and procedures for the first iteration of field trials and Appendix 2: Appendix 1: Protocol and procedures for the first iteration of field trials.

### 5.2 Iteration 1

### 5.2.1 Participants

For the first iteration, overall, there were 10 participants from Poland, Cyprus and Norway, and 5 participants from Austria, all primary users.

Age	PL	CY	AU	NO	Total
60-64	2	1	1	3	7
65-69	1	5		1	7
70-74	5	2		6	13
75-79	2	1	1		4
80-84		1	1		2
90->			2		2
SUM	10	10	5	10	35
Av. Age	70,3	69,7	82,6	68,9	71,486
Sex	PL	CY	AU	NO	Total
Male	5	7	2	5	19
Female	5	3	3	5	16

Figure 6 Number of end-users participating in first iteration of field trial

Resort	PL	CY	AU	NO	Total
Urban	5	10	1	9	25
Rural	5	0	4	1	10
Education	PL	CY	AU	NO	Total
Primary	0	0	0	2	2
Secondary	3	0	2	0	5
Prof. School	3	5	3	0	11
University	4	5		8	17
Liv. Status	PL	CY	AU	NO	Total
With spouse	9	9	4	10	32
Alone	1	1	1	0	3
IT-level	PL	CY	AU	NO	Total
Low	5	2	3	3	13
Medium	5	5	1	5	16
High	0	3	1	2	6

Figure 7 Demographic data for participants in first iteration of field trial

### 5.2.2 Results

The overall impression, feedback main points which have arisen during the 1<sup>st</sup> iteration testing could be summarised in the following points:

- App was more used than the portal from older adults which supported the choice of the dependent older adult-caregiver dyad as a key-market group



- Older adults suggested improvements to the product in order to facilitate further their daily activities
- People tended to like Medication reminders and Home control (lights) more than other services
- Communication and Navigation services' use was dependent on older adults' daily life and routines. For example, participants from Cyprus who had frequent physical interactions with people and did not move to unfamiliar places did not find them very useful in contrast with Norwegian users.
- The GUIDed services such as communication and navigation were already covered by competitor alternatives such as Viber and Google Maps for more advanced technology users in contrast with old, old or less advanced users who could not use competitor apps and found GUIDed a simpler alternative.

### 5.2.3 Portal Heuristic walk through

Out of the 35 older users, only 13 provided feedback on the web portal.

Some answers lead to improvements in the GUIDed system:

- Older adults did not use the portal much, a finding expected since the portal is intended for secondary users, namely caregivers connected with the older adults. Some users indicated that they would prefer to have some control through the application but several requested the system to be set up by a trusted third party, further confirming the dependent older adult-caregiver dyad.
- The task "entering landmarks mostly visited by older adults" in the GUIDed portal was difficult since it required the use of geographic coordinates which was not intuitive for older adults.
- The task "entering medication received by the older adult" included many different fields, some of which were flagged as too much information or unnecessary.
- Fix input control for medical, can enter any time. No validation control on input.
- Remove info which is not visible in the app.

Total average score (between 1 and 5): 2.9 which is close to Neutral.

Scores for each item varied between 2.1 and 4.2.

### 5.2.4 App heuristic walk through

There was much feedback on app, all 35 test-users answered, however not on all questions.

Some answers:

- Med alerts at inappropriate times and inaudible.
- Sound too low, should be configurable.
- Understandable language and messages.
- Back and forward - there is no such thing. The user interface is not made that way. However, you may always go home to the start screen.
- Sometimes no connection to server. Due to the stability of the system.
- Didn't need the AR, self explanatory. There is a help menu in the app. Is useful if you are a non experienced smartphone app user. After some use, the need for AR support diminishes. Not necessary if you are experienced. Actually, this is a positive comment about the HCI.
- There is a lack of instructions in individual services for less technologically advanced people. This was supposed to be revealed by the AR help function.
- Communication was not working, and the system did not inform why.

- Too difficult for a person with low technical skills. That is always a risk. More training must be considered. AR support may help.
- There is a lack of instructions in individual services for less technologically advanced people.

Total average score: 3.2 which is close to Neutral.

Scores for each item varies between 1.8 and 4.2.

#### 5.2.5 Portal HCI checklist

Similarly to the heuristic walkthrough, only 7 older adults with high IT literary users answered this questionnaire. All users' feedback was positive in terms of Human Computer Interaction principles testing except for several text elements which were not in participants' native language and needed further translations.

#### 5.2.6 App HCI checklist

Similarly to the portal 100% of the users were positive regarding the GUIDed app compliance with HCI principles. Some users reported problems (as mentioned also in previous sections) related to entering coordinates in portal for navigation. Finally, one participant requested a more vivid colour scheme.

#### 5.2.7 GUIDed Exploitation and Impact

During the 1<sup>st</sup> iteration, the feedback regarding the use and business potential of the GUIDed system can be summarised as follows:

1. How frequently did you use the application and why?
  - Most frequently used service was the Medication planner (almost everyday)
  - Rest of the services were not used frequently mainly because of the absence of such a need. For example, the navigation service is needed only when you have to move outside of the house.
2. What services did you use the most and why?
  - The most commonly used and preferred services were the Home control and Medication reminder, because they provided convenience to the users.
  - For the rest of the services, the use was highly country dependent. For example, many Norwegian users used navigation and 60% of Polish users used the home sensor.
3. What services did you use the least and why?
  - Overall, the least used services were Navigation and Communication, due to the absence of such a need (e.g., among Cypriot users) or due to the use of other alternative apps like Viber and Google Maps among younger users with higher ICT competency.
  - For this question, the use of the services was also dependent on the country. For example, the home sensors were practically not used in Norway because of a lot of alternative competitor service offerings, however, it was appreciated in Poland.
4. Please, select the services from above you will be willing to pay for and provide your reasoning:
  - As expected, the majority of older adults did not express willingness to pay for the system (23 out of 35) and preferred it for free. This finding supports our plan to reach caregivers as the main customer group.
  - Almost 1/7 older adults would be willing to pay for the Home Sensor service to enhance their Home Safety.

- Finally, few people would be willing to pay for the Home control among the Cypriot participants.
5. Would you recommend/suggest this application to other?
    - In terms of likelihood to recommend the application to others, only 1/5 people (25%) answered likely or very likely.
  6. What is a fair price?
    - In terms of pricing, people had difficulty setting an amount. Overall, 100 euros a year was considered as a fair price. Some want it cheaper, 50 and 80 euros were mentioned.
  7. What risks can you identify that are related to the use of the GUIDed application and its services?
    - Overall, people did not see significant risks related to the use of the system. However, some mentioned the need to protect data privacy (e.g., regarding Medication Planner or Navigation) and one person stressed that risks could emerge if the app is unreliable. For example, if a person relies on the Medication Planner and the alert does not go off, then the person might miss their medication. The same goes for emergency calls needed to be performed through the communication app in case the latter malfunctions. These concerns are considered very important and can be attributed to system errors and bugs users experienced during the testing and development phases. However, reliability is considered our main priority for a market-ready product as well as full disclosure that the system is not something users should rely on for their safety (relevant disclaimers and privacy policies already included in the system).
  8. How did the GUIDed application help you in your daily life?
    - With more or less nothing: 23 out of 35, i.e. 66%.
    - 2 persons mentioned that sensors provided safety. 3 that medication reminders were useful.

### 5.2.8 Conclusions

Our system was based on the communication of many different systems including smart lamps, smart sensors, smart plugs, smart sensors (e.g., CO<sub>2</sub>), smart door sensors, android apps (e.g., communication app), augmented reality enabled services and a back-end portal and thus, errors during real-testing phase were expected and occurred due to various, unexpected and uncontrolled real-world conditions including different smartphones used by end-users, different WiFi systems and connectivity errors, signal quality in users' homes and more. This is why the goal of the 1<sup>st</sup> iteration of testing was the testing and resolution of any bugs/errors that might occur in real-environment scenarios. In this phase we included rigorous testing of the app and focused more on independent users to ensure that major bugs were resolved before testing the dependent user-caregiver dyad in the next iteration.

Overall, several users appreciated the innovativeness of the system and reported positive impact on their everyday lives. This impact was related to the use of services that made everyday life activities more convenient such as the medication intake or the smart home control (smart lamps). Also, the impact expressed was highly related to the availability or vice versa the absence of relative services in each country. For example, in Cyprus and Poland, older adults used plastic medication containers or nothing and thus, the presence of a personalised medication planner, translated to their language was a much needed product in their life. However, this was not the case for Norwegian users who already used a high-tech medication dispenser, reminder and manager connected with their doctor and

pharmacist provided for free by their government. The users provided useful feedback to resolve technical difficulties during the 1<sup>st</sup> iteration but the technical difficulties affected their intentions to purchase the system. Finally, the users suggested extra desirable features such as the need to remotely (outside home) control home appliances (e.g., set the home temperature from work).

### 5.2.9 User Recommendations

Most requested fine-tuning/features in the GUIDed system included:

- enter destination points in an easy way in the navigation app
- connect with new communication partners through the app
- validate input so illegal values could not be entered
- delete in the portal services you will not use in the app
- provide translation to the different languages for all texts in the portal.

All requested changes by the users were implemented before the 2<sup>nd</sup> iteration of testing. The only exception was the use of coordinates in the GUIDed portal to set destinations for the primary user....

## 5.3 Iteration 2

### 5.3.1 Participants

The end-users participating in the second and final iteration of field trials were:

- Primary end-users
- Secondary end-users
- Tertiary end-users.

#### 5.3.1.1 Primary end-users

87% of the end-users are between 60 and 79 years of age. In Poland, Cyprus and Norway the average age is around 70 years, in Austria 80 years, and 58% are women.

Age	PL	CY	AU	NO	Total	Per cent
55-59		1			1	2,6 %
60-64	3	3	1	2	9	23,7 %
65-69	4	1		2	7	18,4 %
70-74	1	5		6	12	31,6 %
75-79	1		1	3	5	13,2 %
80-84			1		1	2,6 %
85-90	1				1	2,6 %
90->			2		2	5,3 %
SUM	10	10	5	13	38	100,0 %
Av. Age	68,1	67,3	80,6	70,3	70,287	
Sex	PL	CY	AU	NO	Total	Per cent
Male	3	6	1	6	16	42,1 %
Female	7	4	4	7	22	57,9 %

Figure 8 Number of primary end-users participating in second iteration of field trial

The demographic data tell that Poland has evenly distributed test users from urban and rural areas, Austria has mostly rural participants while Cyprus and Norway have users from urban areas.

Norwegian test users have higher education than users from the other countries. Nearly all test users are living with spouse. The IT level is 60% medium and 24% low.

Resort	PL	CY	AU	NO	Total	Per cent
Urban	6	10	1	11	28	73,7 %
Semi-urban				2	2	5,3 %
Rural	4	0	4	0	8	21,1 %
Education	PL	CY	AU	NO	Total	Per cent
Primary	0	1	3	1	5	13,2 %
Secondary	6	7	0	0	13	34,2 %
Prof. School	3	0	0	4	7	18,4 %
University	1	2	2	8	13	34,2 %
Liv. Status	PL	CY	AU	NO	Total	Per cent
With spouse	7	10	4	13	34	89,5 %
Alone	3	0	1	0	4	10,5 %
IT-level	PL	CY	AU	NO	Total	Per cent
Low	5	1	2	1	9	23,7 %
Medium	5	8	3	7	23	60,5 %
High	0	1	0	5	6	15,8 %

Figure 9 Demographic data for primary end-users participating in second iteration of field trial

The following table presents the demographic data for the total sample divided to dependent and independent groups.

Table 1. Demographic data for primary end-users participating in second iteration of field trial (dependent and independent groups)

	Dependent (n=14)	Independent (n=24)
Age (M,SD)	68.00 (10.52)	71.62 (7.13)
Educational level (M, SD)	2.85 (1.16)*	4.04 (1.46)**
Gender %	64.3 females	54.2 females
Area of residence %	64.3 urban (rest were rural)	79.2 urban (rest were rural and semi-rural)
Living status %	78.6 with spouse (rest alone or with family)	83.3 with spouse (rest alone or with family)
ICT literacy %	50 medium, 42.9 low, 7.1 high	66.7 medium, 12.5 low, 20.8 high

\*Primary education to technical training

\*\* Qualified for university entrance to university education

Above table shows that independent users in our analysis had higher education and tech literacy compared to dependent ones.

### 5.3.1.2 Secondary end-users

The age distribution is much larger in the secondary end-users' group, which is also to be expected. The average age is 45 years, Poland and Cyprus are low, Norway high. Also for secondary users, there are more women than men, 63% vs 37%.

Age	PL	CY	AU	NO	Total	Per cent
20-24	2				2	5,7 %
25-29	1	2			3	8,6 %
30-34	1	4		1	6	17,1 %
35-39	2	1	1	1	5	14,3 %
40-44	3	1	1		5	14,3 %
45-49		1			1	2,9 %
50-54	1		1	1	3	8,6 %
55-59		1	2		3	8,6 %
60-64				2	2	5,7 %
65-69				1	1	2,9 %
70-74				3	3	8,6 %
75-79				1	1	2,9 %
80-84					0	0,0 %
90->					0	0,0 %
SUM	10	10	5	10	35	100,0 %
Av. Age	35,8	35,7	49,4	60,5	44,771	
Sex	PL	CY	AU	NO	Total	Per cent
Male	5	1	1	6	13	37,1 %
Female	5	9	4	4	22	62,9 %

Figure 10 Number of secondary end-users participating in second iteration of field trial

The living areas are more or less equal to the ones for primary end-users, while the education and IT-level are higher for the secondary users than for the primary users. This could also be expected.

Resort	PL	CY	AU	NO	Total	Per cent
Urban	7	10	1	9	27	77,1 %
Semi-urban				1	1	2,9 %
Rural	3	0	4	0	7	20,0 %
Education	PL	CY	AU	NO	Total	Per cent
Primary	0	0	0	0	0	0,0 %
Secondary	3	2	0	0	5	14,3 %
Prof. School	0	0	0	1	1	2,9 %
University	7	8	1	9	25	71,4 %
IT-level	PL	CY	AU	NO	Total	Per cent
Low	0	0	0	0	0	0,0 %
Medium	2	2	2	4	10	28,6 %
High	8	8	3	6	25	71,4 %

Figure 11 Demographic data for secondary end-users participating in second iteration of field trial

### 5.3.1.3 Tertiary end-users

Age	PL	CY	AU	NO	Total	Per cent
35-39		1			1	14,3 %
40-44	1				1	14,3 %
45-49	1		1		2	28,6 %
50-54					0	0,0 %
55-59					0	0,0 %
60-64		1		2	3	42,9 %
SUM	2	2	1	2	7	100,0 %
Av. Age	45	48	60	62	52,857	
Sex	PL	CY	AU	NO	Total	Per cent
Male	1	2	1	0	4	57,1 %
Female	1	0	0	2	3	42,9 %

Figure 12 Number of tertiary end-users participating in second iteration of field trial

	Professional background			Occupation	IT-level
	Years of experience	Sector	Type of enterprise		
PL-1	23	ICT sector	SME	Software developer	High
PL-2	17	Education sector	SME	Special educator, AAC specialist	High
CY-1	6	Biotechnology	SME	CEO	High
CY-2	5	ICTsector. Programmers for betting companies	SME	Director	High
AT-1	20	IT distributor from Germany	SME	Sells IT-devices and computer programs	High
NO-1	32	ICT sector. Board member of Assistive Technology company with investors	SME	ICT-expert, developer, business	High
NO-2	24	ICT sector. Owner and gründer of a small Assistive Technology company	SME	Innovation manager	High

Figure 13 Characteristics of the tertiary end-users

## 5.4 Results

The findings revealed diverse feedback from end-users depending on their country. The biggest difference is between Norway and the other countries. In Norway, the population is well equipped with modern ICT equipment, PCs, tablets and smartphones. Norway has digitised many public services and it is regarded a necessity to use ICT to access the services. The population is rather well educated, has reasonable private economy and is able to purchase modern ICT equipment and services. The population, also the elderly, are using apps for several aspects of their daily living. E.g. pay for parking, buy tickets for public transport, access social media, video phone calls with family and friends, etc.

Also there are several providers of home security systems. Smart home control systems are available in stores selling electronic solutions and gadgets.

As a result of this, Norwegian citizens use a lot of apps, and are aware of free alternatives, and use free alternatives, for some of the solutions GUIDed offers.

In contrast, in Cyprus and Poland, representing the central and eastern European area, older users are less familiar with modern apps and hardware technology. They have minimal access to such devices and software and are not aware in many cases of their existence. Possibly this is the reason many people do not use modern apps, either lifestyle and social, such as social media, Facebook, messenger, WhatsApp, Viber and Google Maps, or health and daily life related such as smart home control, medication management, sensor and climate control and other devices. These users rely into conventional and traditional methods to cater for their medication intake, navigation, communication and home control needs such as plastic pillboxes, paper maps (when needed) or avoidance of new environments, and phone or physical communication and thus, seem to appreciate the impact of R&D efforts such as the GUIDed system more highly than residents of northern and more advanced countries.

This diversity was obvious throughout our study and increased the challenges of the consortium due to the complexity in prioritising and selecting the most desirable features for users with requirements looking conflicting at times. Thus, the GUIDed team had to define the business plans early on in project progress, in order to define the main target market for now and prioritise the developments during the project progress. Research shows that low ICT competent users, with low familiarity with technology represent the greater percentage of the people aged 60+ in the EU. Hence, it was the market of choice for the present project both in terms of market share and expansion and addressing the needs for active and independent aging. However, despite the challenges and our decision to reach the less independent, eastern-central European market for the moment and thus, prioritise related developments, this diversity between northern and eastern European areas and population groups facilitated the transfer of good practices (such as the focus on HCI principles) and the definition of more advanced features for the next product development.

#### 5.4.1 GUIDed application

The figure below gives a summary of the scoring feedback of the GUIDed app. The rating for each task is according to difficulty where 1 is very easy and 5 is very difficult. The answers on each task is structured by visit and country and an average score is calculated for each visit.



Tasks	1st vist - M1					Last visit - M5				
	PL	CY	AT	NO	SUM	PL	CY	AT	NO	SUM
Task 1: The user is to login into the GUIDed application										
Open the GUIDed application	1,3	1,6	1,0	1,0	<b>1,2</b>	1,6	1,0	1,4	1,0	<b>1,3</b>
Try to login with your credentials	1,9	1,6	1,8	1,0	<b>1,6</b>	2,1	1,0	1,2	1,0	<b>1,3</b>
Task 2: The user goes through the AR assistant (NOT APPLY FOR CONTROL GROUP)										
Goes through the services with AR assistant	3,0	1,4	1,4	1,7	<b>1,9</b>	2,5	1,0	1,8	2,2	<b>1,9</b>
Disables AR assistant	1,4	1,0	1,4	1,0	<b>1,2</b>	1,8	1,0	1,2	1,3	<b>1,3</b>
Task 3: The user wants to check what medication he/she needs to take today										
Find the section with the "Meds planner"	1,8	1,0	1,2	1,0	<b>1,3</b>	1,3	1,0	1,2	1,0	<b>1,1</b>
Select and tick on of the medications.	3,9	1,5	2,0	1,0	<b>2,1</b>	2,6	1,0	2,8	1,1	<b>1,9</b>
Task 4: The user wants to go to the local supermarket.										
Search for the local supermarket on the Navigation service.	3,6	2,2	3,8	3,2	<b>3,2</b>	3,6	1,0	2,6	3,2	<b>2,6</b>
Choose walking mode and use it	2,6	1,6	3,4	2,0	<b>2,4</b>	2,6	1,0	2,6	1,3	<b>1,9</b>
Choose AR mode	3,6	3,5	4,2	1,2	<b>3,1</b>	2,3	1,2	3,0	1,9	<b>2,1</b>
Task 5: The user wants to initiate a videocall with one of the researchers										
Search for the name of the researcher in the "Communication" service and videocall them	2,1	1,6	2,8	1,0	<b>1,9</b>	2,4	1,0	2,8	1,1	<b>1,8</b>
Notes - time	29	34	26	30	<b>30</b>	21	13	48	10	<b>23</b>
Task 6: The user wants to control the smart devices										
Turn on the lights in the room and dim them	1,5	1,7	1,8	1,3	<b>1,6</b>	2,3	1,0	1,8	1,1	<b>1,6</b>
Notes - time	23	21	9	25	<b>20</b>	47	9	10	12	<b>20</b>
Switch on the smart plug	1,3	1,5	1,2	1,0	<b>1,3</b>	1,7	1,0	1,2	1,8	<b>1,4</b>
Notes - time	-	-	-	10	<b>10</b>	-	-	-	23	<b>23</b>
Task 7: The user wants to check the Home sensors										
The user wants to check battery life of the Smoke detector, CO detector	3,8	1,3	1,4	1,0	<b>1,9</b>	3,3	1,0	3,6	1,3	<b>2,3</b>
The user wants to check the door sensor status	1,2	1,3	1,6	1,0	<b>1,3</b>	1,7	1,0	1,2	1,1	<b>1,3</b>

Figure 14 Scoring for the GUIDed app

The table tells us that the app is rather easy to use, indicated by low score numbers at almost all tasks. An exception is the Navigation service which seems to be more complicated than the other services. Furthermore, the results indicate that the app is rather learnable since the average difficulty to perform several tasks tended on average to decline from point 1 (baseline assessment) to point 2 (month 6 assessment).

#### 5.4.1.1 GUIDed Web Portal

Not many primary test-users used the GUIDed portal to set up the GUIDed system as intended since in this phase we tested the primary user-secondary user dyad. However, we did want to collect older adults opinion regarding the web portal. Thus, the primary test-users were presented and monitored using the Web Portal in the first visit only. The rating for each task was according to the perceived difficulty where 1 denoted very easy and 5 very difficult. The answers on each task were structured by country and an average score was calculated.

For Poland, only 1 user used the Web Portal. For Cyprus 3 users used the Web Portal. In Norway, all 13 users were introduced to and used the Web portal. One reason for that is that the Norwegian primary users felt ICT competent and had a curiosity towards the portal and as described in previous sections were overall more independent and not in need of a caregiver.

Nearly all users struggled with entering places in the navigation service. The reason why was that coordinates were necessary to identify the place. This functionality, as described in previous sections, was the only requirement not met during the project progress due to its technical complexity and lack of resources to replace it with a more intuitive alternative. However, it is considered a must-have feature for the market app. Also, for the current version of the GUIDed app, we implemented an extra

feature on the GUIDed app to allow users to enter popular destinations without the need for a web portal.

Tasks	1st vist - M1				
	PL	CY	AT	NO	SUM
Task 1: The user is to login into the GUIDed application					
Search for the GUIDed web portal	1,0	1,0	-	4,8	<b>2,3</b>
Change language in user's native language	1,0	1,0	-	1,0	<b>1,0</b>
Register in the GUIDed web portal (primary or secondary account)	1,0	2,0	-	1,2	<b>1,4</b>
Task 2: The user is to login into the GUIDed web portal					
Open the GUIDed application	1,0	1,0	-	1,0	<b>1,0</b>
Try to login with your credentials	1,0	1,0	-	1,0	<b>1,0</b>
Task 3: The user wants to add reminders for the prescribed medicine of the primary user					
Find the section "Medication planner"	1,0	1,0	-	1,0	<b>1,0</b>
Select "add prescribed medicine"	1,0	1,0	-	1,0	<b>1,0</b>
Fill in information for the "new prescribed medicine" and "Save"	2,0	2,3	-	1,5	<b>1,9</b>
Task 4: The user wants to add familiar locations of the primary users in their list of "My places"					
Find the section "Navigation".	2,0	1,3	-	1,0	<b>1,4</b>
Select "add place" and Fill in information for the "new place" and "Save"	5,0	4,3	-	3,2	<b>4,2</b>
Notes - Time	70	345	-	210	<b>208</b>
Task 5: The user wants to add contacts a primary user in their contact list					
Find the section "Communication"	3,0	1,0	-	1,0	<b>1,7</b>
Time	2	3	-	3	<b>3</b>
Select "add new contact" and fill in information to add new contact and "Save"	5,0	1,3	-	2,2	<b>2,8</b>
Time	77	18	-	20	<b>38</b>
Check "my pending contact requests".	5,0	1,0	-	1,0	<b>2,3</b>
Overall question					
What future improvements should be considered?					-

Figure 15 Scoring for the GUIDed Web Portal

The table indicates that the web portal is rather easy to use, something supported by low score numbers rated by the primary users in almost all tasks. An exception was the Navigation service which was considered much complicated due to the geographical coordinates.

#### 5.4.1.2 Quality of Life

The figure below shows the results of the Quality of Life questions. The answers on each question is structured by visit and country and an average score is calculated for each visit.

No	Question	1st visit - M1					Last visit - M5				
		PL	CY	AT	NO	SUM	PL	CY	AT	NO	SUM
1	How would you rate your overall quality of life as a whole 1 very good - 2 good - 3 alright - 4 bad - 5 very bad	-	-	-	1,1	1,1	2,4	1,4	2,2	1,1	1,8
2	How would you rate your access to information? 1 poor - 2 somewhat poor - 3 neither - 4 good - 5 very good	3,7	4,3	3,0	4,5	3,9	3,7	4,1	3,4	3,5	3,7
3	How confident do you feel to use smart devices? 1 none - 2 a little - 3 neither - 4 fairly - 5 very	2,4	3,2	2,8	4,0	3,1	3,2	3,2	3,2	3,8	3,4
4	How independent are you in your daily life? 1 none - 2 a little - 3 neither - 4 fairly - 5 very	3,7	4,7	4,4	5,0	4,5	3,6	4,5	3,8	5,0	4,2
5	How confident do you feel to navigate in your town in the last two weeks? 1 none - 2 a little - 3 neither - 4 fairly - 5 very	4,1	4,7	4,8	5,0	4,7	4,1	4,5	4,8	5,0	4,6
6	How often did you avoid going to new places out of fear you might get lost in the last two weeks? 1 never - 2 rarely - 3 neither - 4 sometimes - 5 often	2,1	2,1	2,2	1,0	1,9	2,0	1,4	1,8	1,0	1,6
7	How safe do you feel in your home in case a fire outbursts in the last two weeks? 1 none - 2 a little - 3 neither - 4 fairly - 5 very	4,0	3,0	4,2	5,0	4,1	4,1	3,0	4,4	3,0	3,6
8	How safe do you feel in your home in the case of CO2 leakage in the last two weeks? 1 none - 2 a little - 3 neither - 4 fairly - 5 very	4,3	3,4	4,0	-	2,9	4,3	3,8	4,6	-	3,2
9	How would you rate your socialization in the last two weeks? 1 none - 2 a little - 3 neither - 4 fairly - 5 very	4,1	4,2	4,2	3,5	4,0	4,0	4,5	3,2	3,7	3,9
10	How frequently did you contact (phone, skype calls/visits) your family members/friends in the last two weeks? 1 never - 2 rarely - 3 neither - 4 sometimes - 5 often	1,8	4,9	4,4	3,4	3,6	4,2	4,5	4,2	3,4	4,1
11	How often do you forget to take your medication in the last two weeks? 1 never - 2 rarely - 3 neither - 4 sometimes - 5 often	2,1	2,0	3,0	1,0	2,0	2,2	1,9	2,6	1,0	1,9
12	How organized do you feel about when and how you take your medicines in the last two weeks? 1 none - 2 a little - 3 neither - 4 fairly - 5 very	4,1	4,0	4,0	5,0	4,3	4,0	4,1	3,8	5,0	4,2

Figure 16 Quality of Life scoring

To assess the impact of the GUIDed system use in older adults' quality of life we conducted repeated measures ANOVA using the available data from 38 participants ( $M=70.28$  years,  $SD=8.58$ , 57.9% women, 63.2% independent in daily life) of the total sample. To assess the impact of the system in our main target group, namely dependent older adults we divided the participants in two groups according to their reporting status as dependent to others to some degree for everyday life activities or completely independent. The results showed that, regarding quality of life ratings, although, both groups had similar scores at baseline, post-intervention, dependent participants rated higher their ICT confidence ( $F(1)=10.947$ ,  $p=.006$ ), compared to independent ones who showed no statistically significant difference in confidence pre and post intervention ( $F(1)=.038$ ,  $p>.05$ ). Furthermore, post-intervention, independent individuals reported lower: a) confidence to navigate outdoors ( $F(1)=21.730$ ,  $p<.001$ ), b) socialization frequency ( $F(1)=28.000$ ,  $p<.001$ ), c) adherence to ( $F(1)=11.321$ ,  $p=.006$ ) and d) organization of medication ( $F(1)=9.989$ ,  $p=.003$ ) compared to dependent people, whose scores were similar to pre-assessment or better (but not statistically significant).

Positive impact for dependent users was also observed in terms of socialisation and more specifically, contacts with family members using the GUIDed system. As seen in the following Fig. 16 and 17 the average of contacts for dependent users increased from baseline to study completion (T2) while an opposite pattern was observed for independent users (Fig. 18 and 19).

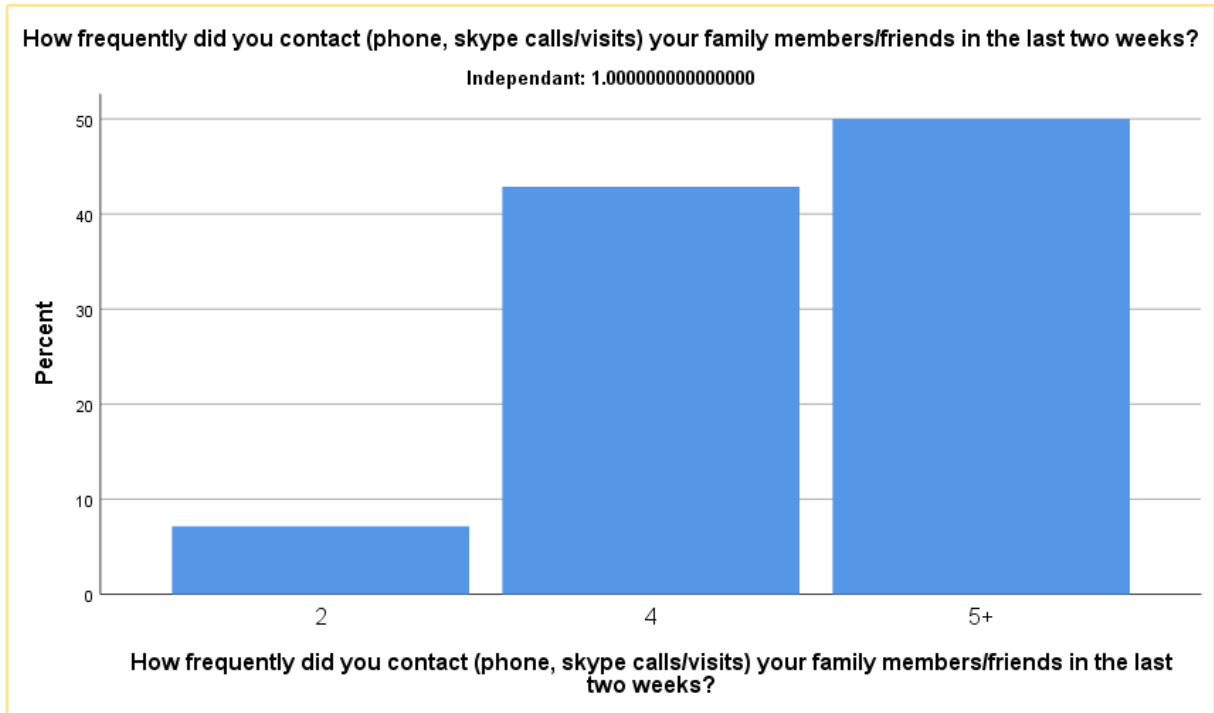


Figure 17. Dependent users: Frequency of contacts at T0

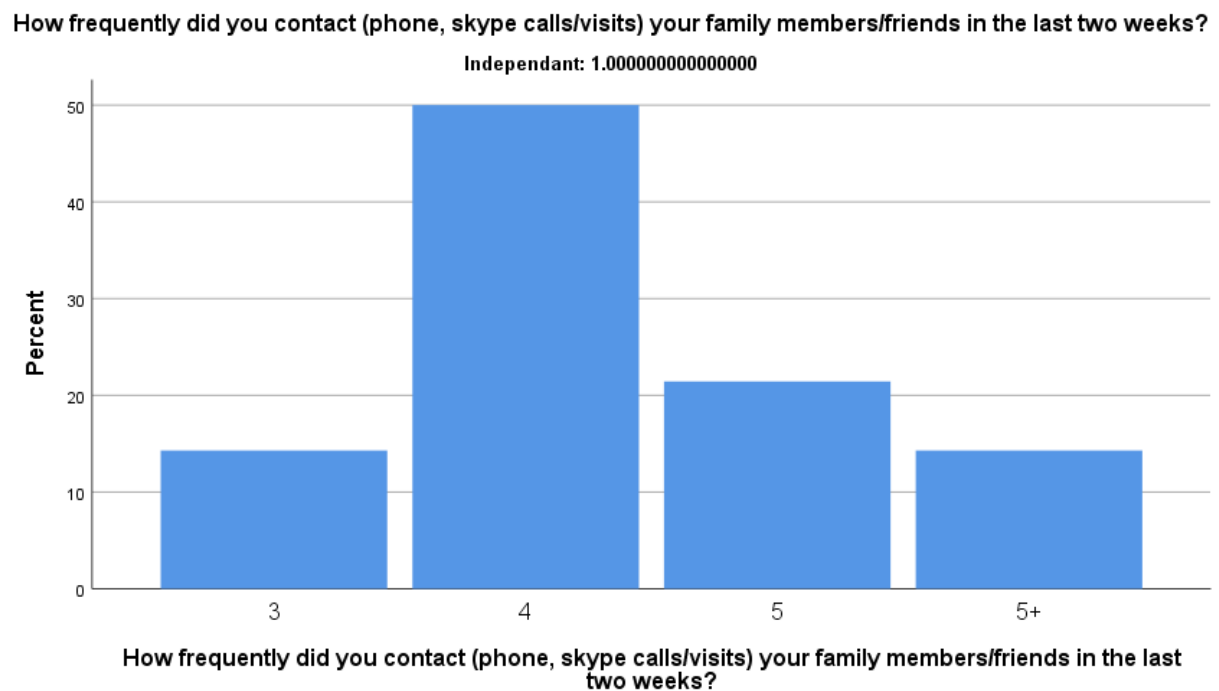


Figure 18. Dependent users: Frequency of contacts at T2

T0

How frequently did you contact (phone, skype calls/visits) your family members/friends in the last two weeks?

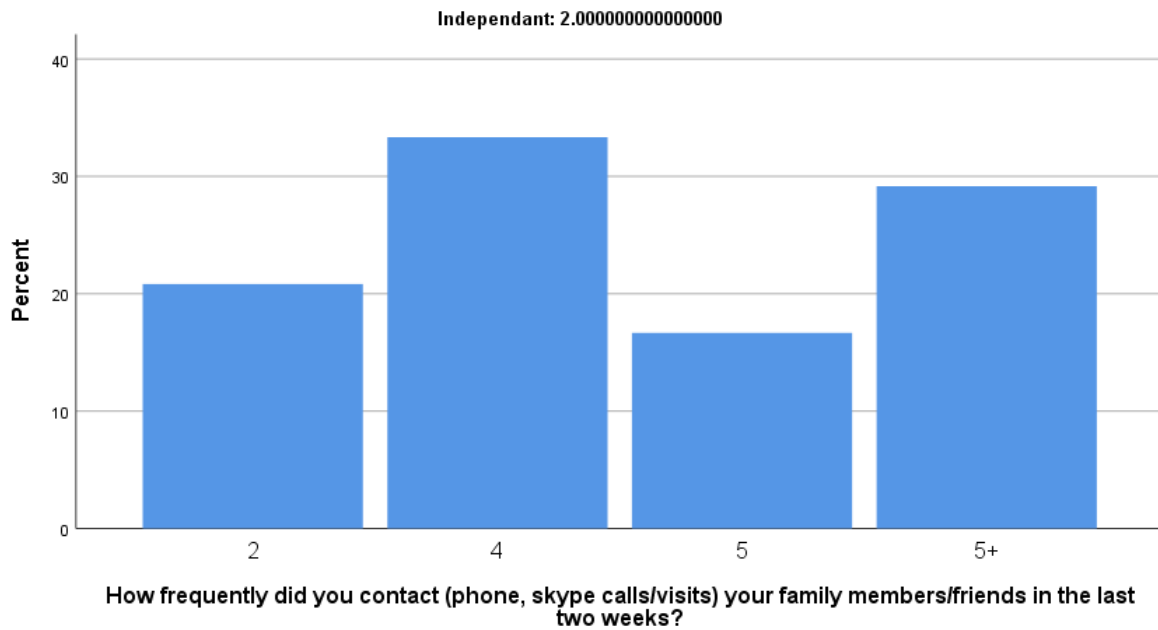


Figure 19. Independent users: Frequency of contacts at T0

How frequently did you contact (phone, skype calls/visits) your family members/friends in the last two weeks?

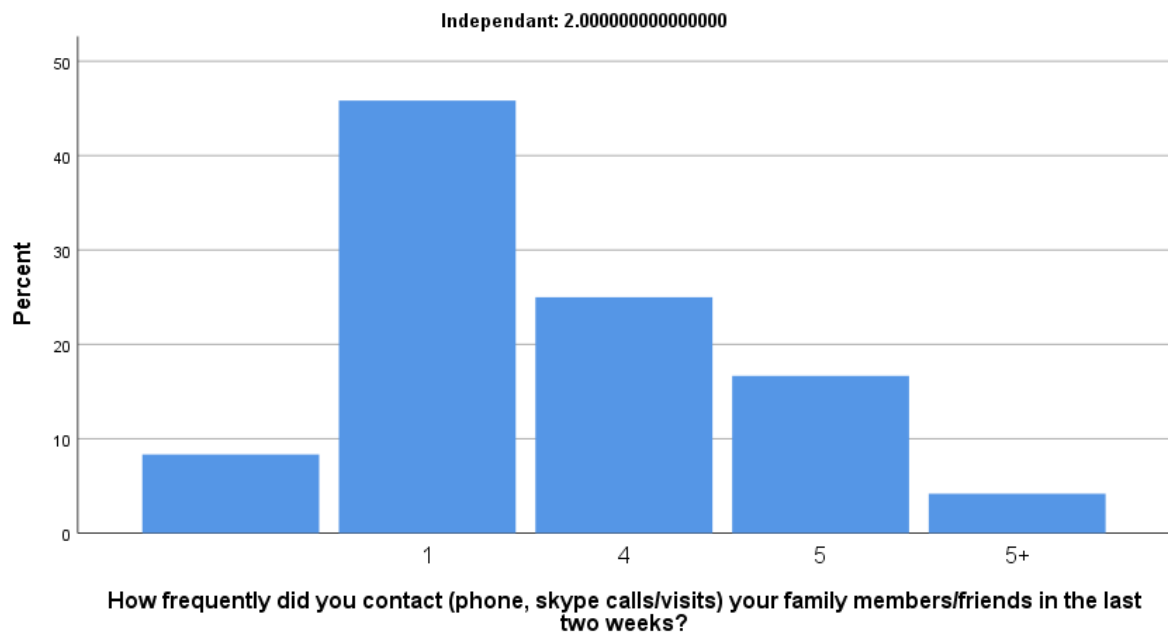


Figure 20. Independent users: Frequency of contacts at T2

Overall, the findings indicate that although older people with some level of cognitive/physical decline have significant technological difficulties, their engagement with ICT systems and particularly, innovative ones, may assist in increasing their ICT familiarity and literacy and even, facilitate the

performance of daily activities, such as medication taking, moving outdoors and socialization and is a promising key performance indicator for our system.

Regarding the system’s frequency of use, our results showed that overall participants tended to use more frequently the system in point 2 compared to point 1 in Austria and Cyprus, while they reported reduced frequency in Poland and Norway. The results are explained by the practical assistance of the system in daily life activities for users from the former countries (e.g., for medication intake) and also, by the advanced (technologically-wise) environment for Norwegian users, making the GUIDed system not so needed and the technical difficulties experience in particular by Polish users (Fig. 20).

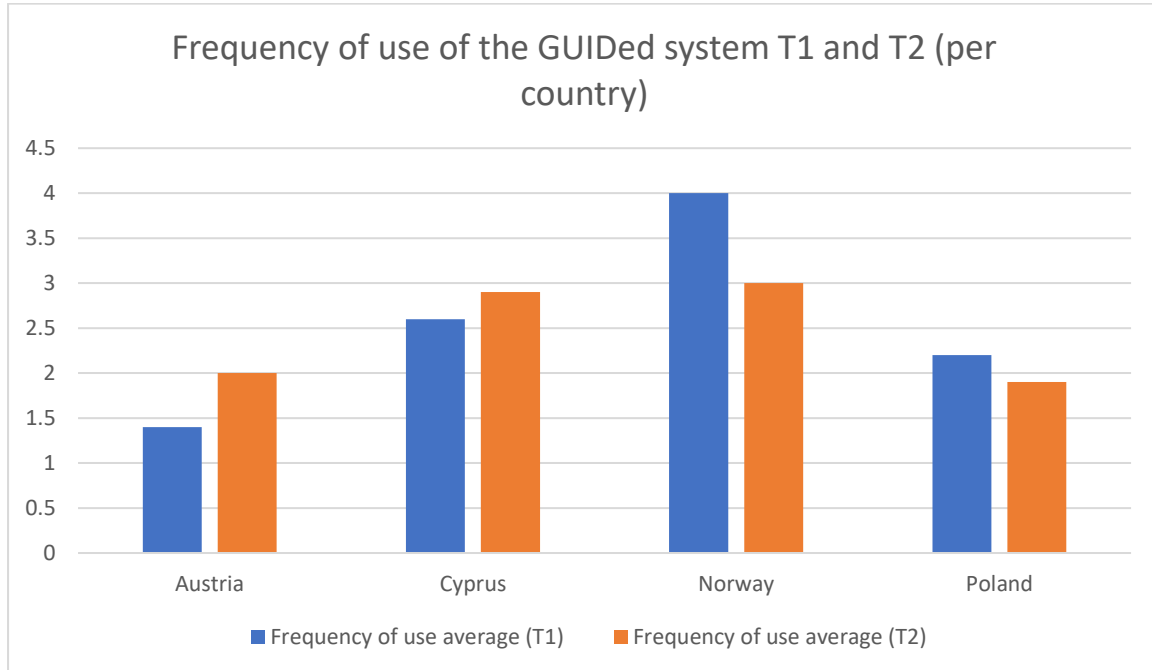


Figure 21. Frequency of use of the GUIDed system across countries and between T1 and T2

### 5.4.1.3 System Usability Scale

The figure below is a summary of the System Usability Scale scoring. Primary test-users were asked to score the GUIDed system according to the standardised questions in the SUS questionnaire. On a grade of 1-5 (1= I highly disagree and 5= I highly agree) the users indicated their level of agreement with the statements in the figure.

No	Statement	2nd visit - M3					Last visit - M5				
		PL	CY	AT	NO	SUM	PL	CY	AT	NO	SUM
1	I think that I would like to use this system frequently.	3,5	3,0	2,6	3,0	<b>3,0</b>	2,9	3,6	3,8	2,6	<b>3,2</b>
2	I found the system unnecessarily complex.	2,9	1,7	3,4	1,0	<b>2,3</b>	3,6	1,3	3,8	1,1	<b>2,5</b>
3	I thought the system was easy to use.	3,4	4,2	3,6	4,1	<b>3,8</b>	2,9	4,6	3,0	4,6	<b>3,8</b>
4	I think that I would need the support of a technical person to be able to use this system.	3,0	1,8	3,6	1,0	<b>2,4</b>	3,7	1,6	3,4	1,0	<b>2,4</b>
5	I found the various functions in this system were well integrated.	2,7	3,8	2,4	3,0	<b>3,0</b>	2,8	4,7	2,2	4,3	<b>3,5</b>
6	I thought there was too much inconsistency in this system.	3,2	2,7	3,2	1,2	<b>2,6</b>	3,2	2,1	2,8	1,1	<b>2,3</b>
7	I would imagine that most people would learn to use this system very quickly.	3,6	3,9	3,2	4,3	<b>3,8</b>	3,3	4,1	3,8	4,8	<b>4,0</b>
8	I found the system very cumbersome to use.	2,8	1,9	3,4	2,1	<b>2,6</b>	3,6	1,3	3,2	2,5	<b>2,7</b>
9	I felt very confident using the system.	2,9	3,9	1,8	4,3	<b>3,2</b>	2,8	4,6	3,8	4,9	<b>4,0</b>
10	I needed to learn a lot of things before I could get going with this system.	3,2	2,0	4,0	1,0	<b>2,6</b>	3,1	1,9	2,4	1,1	<b>2,1</b>

Figure 22 SUS scoring

The figure shows that, overall, the scoring for the statements didn’t change much across the trial. It is however interesting to observe all the ratings of the system increased throughout the iteration such as the frequency of system usage, the perceived integration of system functions, the system

learnability and the confidence in using the system. Likewise, other parameters decreased such as the feeling that the system had inconsistency and the need to learn a lot of things to use the system. From statement 10, we can interpret that using the system has resulted in some acquired app skills for the test-users. Overall, the rating of the tool was 64.86 points (SD=19.05) for the first point of measurement (middle of the study) and 68.12 points (SD=25.22) for the second point of measurement (end of the study) indicating an increasing learnability and ease of use across the trial.

In terms of demographic segmentation, correlational analyses showed that dependency to others was correlated with participants' SUS ratings with independent individuals tending to rate the tool higher in terms of ease of use and learnability than dependent ones (T1:  $r(36)=.350$ ,  $p=.036$ , T2:  $r(36)=.530$ ,  $p=.001$ ). A statistically significant correlation was yielded and in terms of gender with women tending to rate the system lower than men ( $r(36)=-.336$ ,  $p=.045$ ) but only in the first point of measurement. Also, in terms of area of residence, people living in rural/semi-rural areas tended to rate the system lower than urban inhabitants (T1:  $r(36)=-.503$ ,  $p=.002$ , T2:  $r(36)=-.336$ ,  $p=.045$ ). Finally, people with higher ICT literacy rated higher the system in SUS (T1:  $r(36)=.646$ ,  $p<.001$ , T2:  $r(36)=.623$ ,  $p<.001$ ). The aforementioned impact of demographic data on ease of use and learnability of the system are expected and replicated in previous studies.

#### 5.4.1.4 Exploitation at impact

Exploitation and impact were addressed both in the second and last visit. This questionnaire is a qualitative one with 12 questions and an option to give additional comments. The answers to the questionnaires were more or less the same at the 2<sup>nd</sup> and last visit.

#### **Question 1: How frequently did you use the application and why?**

*Poland:*

The answers vary a lot. Some used the GUIDed system almost every day, mainly to check medications and control sensors at home. Some used the Home control service to control the light and the fan by using of the smart plug. Others used it more seldom, two or three times per week. Some users got frustrated due to instability of the system.

*Cyprus:*

Answers vary from every day to two or three times a week. Some used it even more seldom.

*Austria:*

Not very frequent use.

*Norway:*

Nearly all the test users used GUIDed every day because of medication reminders, and some used it to control lights.

#### **Question 2: What services did you use the most and why?**

*Poland:*

All services were used. Home sensors and Home control - to check if everything is okay, if the door is closed and control lights. Meds planner, for reminders and because it is helpful when you have to take multiple medications. Communication was used for quick contact. Navigation for frequent travels.

*Cyprus:*

Home control and Home sensors seem to be the favourites, but all services were used.

*Austria:*

Home Sensor, Home Control and Meds planner were used. No one claimed to use Navigation and Communication.

*Norway:*

Medication was the favourite, as someone said: “reminders automatically pops up”. Some found Home control to be ok because it was convenient to manage lights and smart contact from the sofa.

**Question 3: What services did you use the least and why?**

*Poland:*

Very few used navigation. Because they didn’t need it. They never go to places they do not know. Some did not use Meds planner because they fixed their medicines themselves. Other answered Communication, Home control and Home sensors. No specific service was least used, apart from Navigation.

*Cyprus:*

Navigation because people use other apps. Communication, friends are not there. Home sensors and Meds planner were also mentioned.

*Austria:*

Test-users mentioned Navigation, use other alternatives, and Meds planner.

*Norway:*

All test-users didn’t use Home sensors. They subscribe to home security services. Some said they didn’t use Navigation because there are other alternatives.

**Question 4: Please, select the services you would be willing to pay to have in your everyday life. Please explain your choice.**

*Poland:*

Home sensors. Because it is convenient and gives you a sense of security.

Home control. If I have vision problems, I will be able to control it easily.

Med planner because it is helpful when you have to take multiple medications.

Communication. For quick contact.

Navigation. Because it makes it easier to move around when traveling frequently. Useful when I drive a car.

*Cyprus:*

40 % are willing to pay for all services, 60 % say none.

*Austria:*

Meds planner and Home control.

*Norway:*

No one is willing to pay for any of the GUIDed services. Arguments are the existence free services for meds reminders (e.g. Google calendar), navigation (e.g. Google maps) and communication. Home control is too limited, better commercial alternatives available. Home sensors are not needed because of commercial security services.



**Question 5: Price: 9.90 euros per month or 100 euros per year, excluding the devices. Is this a fair price and why?**

The answer to this depends very much on the individual's economy and if they find the services worth the price. Opinions differ.

*Poland:*

Nearly all Polish test-users think this is too expensive. They don't have the financial resources.

*Cyprus:*

The price is fair if customers want the services.

*Austria:*

50% think the price is ok, 50% think that it is too expensive.

*Norway:*

Fair price if services are needed.

**Question 6: Buy devices separately or provided to you with a small extra fee incorporated in your monthly subscription. Which of the two would you prefer?**

*Poland:*

One user says: 1) I do not agree to the monthly subscription. 2) I choose rather the device for which the manufacturer provides the application. For messages and medication reminders, I would choose a regular reminder on the phone or a calendar. You don't need to buy an app for this.

Apart from this, 5 users say bundled with subscription, 2 users want to buy separately and 1 user would prefer to have the freedom to choose.

*Cyprus:*

50 % wanted a bundled solution, 50 % wanted to buy separately.

*Austria:*

100% will buy the devices separately.

*Norway:*

80% will buy the devices separately. Requires that devices are easy to get from the shop. 20% will buy bundled with subscription.

**Question 7: Would you recommend/suggest this application to others?**

	1-highly unlikely	2-unlikely	3-likely	4-very likely	5-extremely likely
<b>Poland</b>	1	3	5	1	
<b>Cyprus</b>			8	1	1
<b>Austria</b>		2		3	
<b>Norway</b>	10				
<b>SUM</b>	11	5	13	5	1
<b>Per cent</b>	31 %	14 %	37 %	14 %	3 %

*Figure 23 Recommendations to buy GUIDed from primary test-users, 2nd visit, including Norway*

	1-highly unlikely	2-unlikely	3-likely	4-very likely	5-extremely likely
Poland	2	4	1	1	
Cyprus	1	2	5	3	
Austria		1	3	1	
Norway	10				
SUM	13	7	9	5	0
Per cent	38 %	21 %	26 %	15 %	0 %

Figure 24 Recommendations to buy GUIDed from primary test-users, last visit, including Norway

These figures show that Norway reduces the percentages for recommendations to buy dramatically. We think the reason that Norwegian test-users do not recommend the GUIDed app, is that there are several free alternatives on the market and Norwegian elderly are rather ICT literate and therefore think that the GUIDed system is too simplistic.

If we remove Norway from the recommendation tables, then the numbers become more favourable for GUIDed. In any case, the percentage of users willing to buy, use or recommend GUIDed in the future greatly increased compared to iteration 1 which can be attributed to two things a) the intensive efforts from the technical team to adapt the application to end-user requirements and address related technical issues experienced during the first iteration and b) the narrowing down of the target group to include more dependent users and the primary-secondary dyad.

	1-highly unlikely	2-unlikely	3-likely	4-very likely	5-extremely likely
Poland	1	3	5	1	
Cyprus			8	1	1
Austria		2		3	
Norway					
SUM	1	5	13	5	1
Per cent	4 %	20 %	52 %	20 %	4 %

Figure 25 Recommendations to buy GUIDed from primary test-users, 2nd visit, excluding Norway

	1-highly unlikely	2-unlikely	3-likely	4-very likely	5-extremely likely
Poland	2	4	1	1	
Cyprus	1	2	5	3	
Austria		1	3	1	
Norway					
SUM	3	7	9	5	0
Per cent	13 %	29 %	38 %	21 %	0 %

Figure 26 Recommendations to buy GUIDed from primary test-users, last visit, excluding Norway

**Question 8: What risks can you identify that are related to the use of the GUIDed application and its services?**

*Poland:*

Technology and network may fail.

*Cyprus:*

90% say no risk. 10% say medication reminders may be lost.

*Austria:*

Doubt if services can be trusted 100%.

*Norway:*

Privacy, especially medication. Private info get in hands of people and organisations, e.g. insurance companies. However, GUIDed is more trusted than, e.g. American services like Google and Facebook. 60% say no risk.

**Question 9: How did the GUIDed application help you in your daily life?**

*Poland:*

Medicine reminders. Easy Communication. Once the smoke detector was triggered (while cooking) - the system worked. It made it easier to control the house. Switch lights from the sofa.

*Cyprus:*

Medicine reminders. Home control. 50% say services are not so useful.

*Austria:*

Medicine reminders. Control lights.

*Norway:*

Medicine reminders 100%. Convenient to operate lights 50%.

**Question 10: How often did you use the AR assistant? (If applicable)**

AR assistant is useful in the beginning to help the users mastering the app. Polish comment is very relevant.

*Poland:*

Two views were expressed: 1) Almost never - it is only needed at the beginning to learn. Later you know what to do. 2) Almost never - these messages only disturbed and obscured the screen.

*Cyprus:*

AR assistant not used.

*Austria:*

AR assistant not used.

*Norway:*

Not used. The apps were rather self evident.

**Question 11: From 1 to 5 How useful did you find the AR assistant? (If applicable)**

Poland: Score 1.8.

Cyprus: Score 2.6.

Austria: Score 2.2.

Norway: Score 1.1.

**Question 12: GUIDed is a modular system. What kind of services do you think would be good to include?**

- ❖ Maybe TV control. Maybe a notebook, but rather everything is on the phone now.
- ❖ Medication and health services, reminders and recommendations in this regard, but only when it will work properly.
- ❖ Cooking recipes
- ❖ Online shopping.
- ❖ Voice notifications for people with vision problems.
- ❖ There are so many applications and data in the mobile phone that no more is needed.
- ❖ Perhaps an emergency signal - connecting with a family member or an ambulance.

- ❖ Notebook and calendar.
- ❖ Maybe blood glucose test/TV control.
- ❖ A language translator for foreign nurses.
- ❖ Blood / sugar measurement.
- ❖ TV-Control / Front door Control.
- ❖ More services under the home control.
- ❖ Services of finding cleaners and carers.
- ❖ Control an electric broom when you are in or out of the house.
- ❖ More home control services.
- ❖ More home sensors services, i.e. alarm, lights with cameras.
- ❖ To find carers and home cleaners.
- ❖ Medical: blood sugar.
- ❖ Games.
- ❖ Entertainment.
- ❖ Training apps.

#### 5.4.2 Feedback from secondary users

As shown in the protocol, section 8.2, the secondary end-users were asked several questions, in addition to those in the demographic questionnaire, during the trial period. The researchers visited the secondary test-users 2 times during the trial, in month 1 and 5:

- GUIDed web portal – checked during 1<sup>st</sup> and 2<sup>nd</sup> visit
- Quality of Life – 1<sup>st</sup> and 2<sup>nd</sup> visit
- First impression questionnaire – 1<sup>st</sup> visit
- System Usability Scale (SUS) – 2<sup>nd</sup> visit
- User experience – 2<sup>nd</sup> visit
- Exploitation and impact – 2<sup>nd</sup> visit
- Socioeconomic – 2<sup>nd</sup> visit.

In addition to the visits, the secondary test-users were followed up by a researcher over phone every or every second week where the test-user could discuss potential problems with the GUIDed app or web portal with the researcher.

##### 5.4.2.1 GUIDed web portal

The rating for each task is according to difficulty where 1 is very easy and 5 is very difficult.

Tasks	1st vist - M1					Last vist - M5				
	PL	CY	AT	NO	SUM	PL	CY	AT	NO	SUM
Task 1: The user is to login into the GUIDed application										
Search for the GUIDed web portal	1,7	1,1	1,0	3,6	1,9	2,4	1,0	1,0	1,0	1,4
Change language in user's native language	1,0	1,4	1,0	1,0	1,1	1,3	1,0	1,0	1,0	1,1
Register in the GUIDed web portal (primary or secondary account)	1,8	1,5	1,0	1,2	1,4	2,4	1,0	1,0	1,0	1,4
Task 2: The user is to login into the GUIDed web portal										
Open the GUIDed application	1,1	1,0	1,0	1,0	1,0	1,2	1,0	1,0	1,0	1,1
Try to login with your credentials	1,2	1,3	1,0	1,0	1,1	1,7	1,0	1,0	1,0	1,2
					-					
Task 3: The user wants to add reminders for the prescribed medicine of the primary user										
Find the section "Medication planner"	1,4	1,4	1,0	1,0	1,2	1,3	1,0	1,0	1,0	1,1
Select "add prescribed medicine"	1,4	1,6	1,0	1,0	1,3	1,4	1,2	1,0	1,0	1,2
Fill in information for the "new prescribed medicine" and "Save"	2,4	2,4	2,6	2,3	2,4	3,0	1,4	2,4	1,0	2,0
Task 4: The user wants to add familiar locations of the primary users in their list of "My places"										
Find the section "Navigation".	1,3	1,2	1,0	1,0	1,1	1,2	1,1	1,0	1,0	1,1
Select "add place" and Fill in information for the "new place" and "Save"	3,0	3,6	4,0	4,4	3,8	4,1	1,7	3,0	4,2	3,3
Notes - Time	168	176	-	240	195	272	59	154		162
Task 5: The user wants to add contacts a primary user in their contact list										
Find the section "Communication"	1,3	1,0	1,0	1,0	1,1	1,3	1,0	1,0	1,0	1,1
Time	16	3	-	5	8	8	-	-	2	3
Select "add new contact" and fill in information to add new contact and "Save"	2,4	1,3	3,0	2,4	2,3	3,3	1,2	1,8	1,3	1,9
Time	130	18	-	90	79	74	49	52	28	51
Check "my pending contact requests".	1,8	1,0	3,0	1,0	1,7	3,9	1,0	3,2	1,0	2,3
Overall question										
What future improvements should be considered?										

Figure 27 Scoring for Web portal by secondary test-users

The table tells us that the portal is rather easy to use, indicated by low score numbers at almost all tasks.

One exception is to add place in the Navigation service. This has to do with the user having to enter coordinates for the place you want to go to. This is inconvenient and cumbersome. The project group has been aware of this problem for some time, and the enter place functionality is now implemented in the app which make the whole process simpler.

#### 5.4.2.2 Quality of Life – 1<sup>st</sup> and 2<sup>nd</sup> visit

The Quality of Life questionnaire contained three questions:

1. Are you worried that something bad is going to happen to them when they are home?
2. How much do you worry that they can get lost when they go outside?
3. How much do you worry that they will take their medication correctly?

	Q1: Are you worried that something bad is going to happen to them when they are home?			Q2: How much do you worry that they can get lost when they go outside?			Q3: How much do you worry that they will take their medication correctly?		
	No	Sometimes	Yes	No	Sometimes	Yes	No	Sometimes	Yes
PL	1	6	3	8	1	1	7	1	2
CY	4	0	6	8	2	0	7	2	1
AT									
NO	9	0	1	9	0	1	9	0	1
SUM	14	6	10	25	3	2	23	3	4
Per cent	47 %	20 %	33 %	83 %	10 %	7 %	77 %	10 %	13 %

Figure 28 Quality of Life for secondary test-users, 1st visit

	Q1: Are you worried that something bad is going to happen to them when they are home?			Q2: How much do you worry that they can get lost when they go outside?			Q3: How much do you worry that they will take their medication correctly?		
	No	Sometimes	Yes	No	Sometimes	Yes	No	Sometimes	Yes
PL	0	7	3	8	1	0	6	1	3
CY	3	0	6	7	2	0	6	2	1
AT	3	2	0	4	1	0	5	0	0
NO	10	0	0	9	1	0	6	3	1
SUM	16	9	9	28	5	0	23	6	5
Per cent	47 %	26 %	26 %	85 %	15 %	0 %	68 %	18 %	15 %

Figure 29 Quality of Life for secondary test-users, last visit

To statistically analyse the results, we conducted repeated measures ANOVA comparing participants' average scores on each item before and after the intervention. We also calculated a summary variable by averaging participants answers in all three items before and after the intervention, named Stress Index 1 and Stress Index 2, respectively. The sample was analysed comparing secondary users of dependent older adults, secondary users of independent older adults and all the secondary users. Analysing the total sample of secondary users did not yield any statistically significant differences in their stress levels from T0 to T2. However, we found that, post intervention, secondary participants had overall a statistically significant reduced Stress Index ( $F(1)=8.240, p=0.12$ ) and more specifically in regards to their stress of older adults getting lost outdoors ( $F(1)=5.559, p=0.33$ ), but only for the independent group of primary users. More details regarding the average ratings of each group per item can be found in Table 2. This finding gives a new insight regarding the commercial potential of the GUIDed system. It signals that although the system is targeted towards dependent older adults in terms of simplicity and functionalities, it could also be commercialised as a tool to assist caregivers whose proteges are declining towards some level of dependence.

Table 2. Average stress levels of secondary users before and after the intervention (dependent and independent primaries)

	Q1. Worry at home (T0)	Q1. Worry at home (T2)	Q2. Worries getting lost (T0)	Q2. Worries getting lost (T2)	Q3. Worries about medication (T0)	Q3. Worries about medication (T2)	Stress Index 1	Stress Index 2
Secondary of independent users	2.07 (1.33)	1.20 (1.42)	0.93 (0.79)	0.33 (0.72)	1.20 (1.37)	0.40 (0.82)	1.40 (0.79)	0.64 (0.55)
Secondary of dependent users	1.40 (0.82)	1.55 (1.53)	0.33 (0.61)	0.40 (0.82)	0.53 (1.12)	0.65 (1.40)	0.75 (0.64)	0.98 (1.01)
All secondary users	1.73 (1.14)	1.40 (1.47)	0.63 (0.76)	0.37 (0.77)	0.87 (1.27)	0.74 (1.24)	1.07 (0.78)	0.83 (0.85)

Also, many responded “for now” in their answers, indicating a fear of deterioration at functional level as time goes by.

### 5.4.2.3 First impressipon questionnaire – 1<sup>st</sup> visit

The first impression questionnaire consisted of 18 questions. The scoring for each question was on a scale from 1 to 5 where 1 is Highly disagree and 5 is Highly agree.

No	Question	PL	CY	AT	NO	Average
1	I believe the application would be useful for me to be able to help someone in my care more effectively	3,5	4,1	3,0	2,9	3,4
2	I believe the application will help improve the quality of life of the person in my care	3,3	3,9	2,0	3,0	3,1
3	I believe the application would help the person in my care in their daily life	3,1	3,6	2,8	3,1	3,2
4	I would recommend this application to other caregivers	3,5	4,1	3,8	2,9	3,6
5	I would recommend this application to older people over 60	3,0	4,1	3,8	3,0	3,5
6	I would recommend this application to friends and family	3,0	3,6	3,2	2,9	3,2
7	I found the application to be innovative	3,5	3,8	5,0	3,5	4,0
8	I think the GUIDed application is safe to use	3,7	4,0	3,0	4,7	3,9
9	I think that the data of the person in my care are protected	3,5	4,3	3,0	4,8	3,9
10	The web portal includes all the features and functions that I need.	3,0	3,2	4,0	3,7	3,5
11	The web portal is easy to use	2,8	4,5	3,6	3,6	3,6
12	The design of the web portal is pleasant	2,6	4,3	4,0	4,0	3,7
13	I think that all the information provided to the older adults is transparent and clear	2,9	4,5	3,4	3,0	3,5
14	I found the Medication planner Service to be useful for both me and to the person for whose benefit I was operating the service	3,6	4,7	4,0	4,1	4,1
15	I found the Navigation Service to be useful for both me and to the person for whose benefit I was operating the service	2,9	4,0	3,0	2,3	3,1
16	I found the Home control Service to be useful for both me and to the person for whose benefit I was operating the service	3,5	4,3	2,6	3,6	3,5
17	I found the Home sensors Service to be useful for both me and to the person for whose benefit I was operating the service	3,9	4,7	4,0	1,0	3,4
18	I found the Communication Service to be useful for both me and to the person for whose benefit I was operating the service	3,0	4,3	3,2	3,5	3,5

Figure 30 First impression data from secondary test-users

The table shows that the secondary test-users were rather positive towards GUIDed system. All scores are above average.

### 5.4.2.4 System Usability Scale (SUS) – last visit

The figure below is a summary of the System Usability Scale scoring. Secondary test-users were asked to score the GUIDed system according to the standardised questions in the SUS questionnaire. On a grade of 1-5 (1= I highly disagree and 5= I highly agree) the users indicated their level of agreement with the statements in the figure.

No	Statement	Last visit - M5				
		PL	CY	AT	NO	SUM
1	I think that I would like to use this system frequently.	2,2	3,6	3,2	1,7	<b>2,7</b>
2	I found the system unnecessarily complex.	4,0	1,6	3,6	1,7	<b>2,7</b>
3	I thought the system was easy to use.	2,3	4,2	1,2	4,3	<b>3,0</b>
4	I think that I would need the support of a technical person to be able to use this system.	2,8	2,2	2,6	1,2	<b>2,2</b>
5	I found the various functions in this system were well integrated.	2,3	4,2	2,0	3,4	<b>3,0</b>
6	I thought there was too much inconsistency in this system.	4,1	2,0	4,2	1,7	<b>3,0</b>
7	I would imagine that most people would learn to use this system very quickly.	2,8	3,7	1,6	4,2	<b>3,1</b>
8	I found the system very cumbersome to use.	4,1	2,0	4,0	1,7	<b>3,0</b>
9	I felt very confident using the system.	2,2	4,3	1,8	3,9	<b>3,1</b>
10	I needed to learn a lot of things before I could get going with this system.	2,8	1,9	2,2	1,6	<b>2,1</b>

Figure 31 SUS data from secondary test-users

The SUS tells us that the system is not a very difficult system to learn based on the responses in statement numbers 4 and 10. Secondary users were rather not in favor of using the system regularly (statement 1). Apart from those, the responses are rather neutral with some variations between the countries.

#### 5.4.2.5 User experience – 2<sup>nd</sup> visit

For the assessment of the GUIDed system, the secondary users were asked to fill out the following questionnaire. The questionnaire consists of pairs of contrasting attributes that may apply to the GUIDed system. The scoring scale is 1 to 7. For dimension no 1, annoying vs enjoyable, a score of 1 means the leftmost alternative, i.e. annoying, while a score of 7 indicates the rightmost alternative, i.e. enjoyable. A score of 4 indicates neither annoying or enjoyable, which became the outcome for dimension 1. We see from all answers some differences in the countries' responses, but at a total the scores are around 4, i.e. neither nor.



No	Dimension	PL	CY	AT	NO	Average
1	annoying - enjoyable	2,6	4,9	4,0	4,2	3,9
2	not understandable - understandable	3,5	5,9	3,6	5,5	4,6
3	creative - dull	3,9	3,0	2,4	4,2	3,4
4	easy to learn - difficult to learn	4,0	2,0	3,6	1,8	2,9
5	valuable - inferior	3,8	2,9	3,2	3,4	3,3
6	boring - exciting	3,1	4,8	4,2	4,1	4,1
7	not interesting - interesting	3,1	5,7	5,0	4,2	4,5
8	unpredictable - predictable	3,0	5,6	1,6	6,5	4,2
9	fast - slow	3,7	3,0	3,2	1,7	2,9
10	inventive - conventional	4,2	3,0	2,4	3,9	3,4
11	obstructive - supportive	3,1	5,6	3,4	5,6	4,4
12	good - bad	3,8	1,4	1,8	3,7	2,7
13	complicated - easy	3,0	6,0	2,8	6,4	4,6
14	unlikable - pleasing	3,2	5,3	4,4	4,9	4,5
15	usual - leading edge	3,8	4,6	5,2	3,8	4,4
16	unpleasant - pleasant	3,2	5,2	3,4	5,6	4,4
17	secure - not secure	3,4	2,0	2,6	1,9	2,5
18	motivating - demotivating	4,7	3,0	3,4	4,1	3,8
19	meets expectations - does not meet expectations	5,2	2,7	3,4	4,2	3,9
20	inefficient - efficient	3,2	4,9	4,8	5,0	4,5
21	clear - confusing	5,1	2,1	3,2	1,4	3,0
22	impractical - practical	4,0	5,7	4,2	4,0	4,5
23	organised - cluttered	4,1	1,6	2,6	1,7	2,5
24	attractive - non attractive	4,3	2,7	2,4	4,1	3,4
25	friendly - unfriendly	5,1	2,4	2,8	1,7	3,0
26	conservative - innovative	4,7	2,4	4,8	4,0	4,0

Figure 32 User experience data from secondary test-users

The user experience exercises have to a large degree ended with average scores around 4. However, some interesting observations can be done.

Cyprus and Norway think that the GUIDed system is more understandable, easy to use, predictable, supportive and pleasant than the other countries. This may have to do with ICT literacy and also expectations. If you expect a close to perfect and reliable product without flaws you become disappointed when you see that the product is experimental and doesn't function 100% of the time. If you expect and accept that the product is developed inside a research project, you become more forgiving to unreliability and not optimal functioning.

#### 5.4.2.6 Exploitation and impact – 2<sup>nd</sup> visit

Exploitation and impact were addressed in the last visit. This questionnaire is a qualitative one, more or less similar to the one which was used for the primary test-users, with 12 questions and an option to give additional comments. The two first questions and question 9 and 10 are different from the ones posed to the primary users.

#### Question 1: What is your most favourite service and why?

*Poland:*

Meds planner, Home control and Home sensors were mentioned. Due to security and convenience. No one mentioned Navigation and Communication.

*Cyprus:*

Meds planner, Home control and Home sensors were most often mentioned (80%). Some also mentioned Navigation and Communication (20%).

*Austria:*

As for Poland, Austrian users mentioned Meds planner, Home control and Home sensors. No one mentioned Navigation and Communication.

*Norway:*

Meds planner - Reminder every day (80%). Home control is convenient (30%).

**Question 2: What would you change to the system to make it adapted to your needs and the primary users?**

*Poland:*

Synchronization with Google Maps. Simplification. Adaptation for people with vision, hearing, etc. problems, e.g. voice notifications. Reliability. Proper translations.

*Cyprus:*

One user suggests to give notification if something is wrong with primary user, by use of sensors. Another user suggests to add a watch for most of the services instead of a smartphone. Reliability.

*Austria:*

Reliability. Simplification.

*Norway:*

No suggestions apart from one, fix the coordinates issue in Navigation.

**Question 3: What is your least favourite service and why?**

*Poland:*

60% said navigation, mainly because it is too complicated. 30% said Communication, they don't need it because they have a phone. 1 test-user said Medication because it is too complicated.

*Cyprus:*

2 users said Navigation because they use other apps. 2 users said Communication because they also use other apps. One user said all services are important.

*Austria:*

3 test-users mentioned Navigation due to complexity and that simpler alternatives are around. 3 users mentioned Communication. They have their phone.

*Norway:*

90% of secondary test-users don't see the need for Home sensors. They subscribe to home security services. One user said Navigation and another Home control.

**Question 4: Please, select the services you would be willing to pay to have in your everyday life. Please explain your choice.**

*Poland:*

60% said Home sensors. Give safety and security. 50% said Home control. Helps you at home. 30% said Med planner – it contributes to correct medicine intake.

30% said none because of quality of the services, costs and availability of free apps.

*Cyprus:*

1 user would pay for Meds planner. 60% are willing to pay for all services if needed and if helpful for parents, i.e. primary users.

*Austria:*

1 user said Home control. 4 users said none.

*Norway:*

No one is willing to pay for any of the GUIDed services. Because of free alternatives.

**Question 5: Price: 9.90 euros per month or 100 euros per year, excluding the devices. Is this a fair price and why?**

The answer to this depends very much on the individual's economy and if they find the services worth the price. Opinions differ.

*Poland:*

Nearly all Polish secondary test-users think this is too expensive. Economy for retired people and free alternatives are used as reasons.

*Cyprus:*

6 users think it is a fair price. 1 of them suggests a 2-3 months free trial and another one suggests that government should subsidise. 3 users think it is too expensive, in relation to free alternatives.

*Austria:*

All users think that it is too expensive. Free alternatives are mentioned.

*Norway:*

80% think price is fair. One user suggests half price, 50 euros because the services do not represent something fantastic new.

**Question 6: Buy devices separately or provided to you with a small extra fee incorporated in your monthly subscription. Which of the two would you prefer?**

*Poland:*

50% prefer subscription, 20% would like to have a choice between the two models and 1 person wants one time payment.

*Cyprus:*

100% of the secondary users in Cyprus want a subscription model.

*Austria:*

100% of the secondary users will buy the devices incorporated in the subscription. It is interesting to remember that the primary Austrian users wanted to buy separately.

*Norway:*

100% will buy the devices separately. Requires that devices are easy to get from the shop.

**Question 7: Would you recommend/suggest this application to others?**

	1-highly unlikely	2-unlikely	3-likely	4-very likely	5-extremely likely
Poland	3	3	4	1	
Cyprus			5	1	3
Austria		2	3		
Norway	10				
SUM	13	5	12	2	3
Per cent	37 %	14 %	34 %	6 %	9 %

Figure 33 Recommendations to buy GUIDed from secondary test-users, last visit, including Norway

These figures show that Norway reduces the percentages for recommendations to buy dramatically. We think the reason that Norwegian test-users do not recommend the GUIDed app, is that there are several free alternatives on the market and Norwegian elderly are rather ICT literate and therefore think that the GUIDed system is too simplistic.

If we remove Norway from the recommendation table, then the numbers become more favourable for GUIDed. This suggests that southern Europe may be a better market segment for GUIDed than Scandinavia. However, we must have in mind that the number of users is low and it could be inappropriate to make to strong statement about market possibilities.

	1-highly unlikely	2-unlikely	3-likely	4-very likely	5-extremely likely
Poland	3	3	4	1	
Cyprus			5	1	3
Austria		2	3		
Norway					
SUM	3	5	12	2	3
Per cent	12 %	20 %	48 %	8 %	12 %

Figure 34 Recommendations to buy GUIDed from secondary test-users, last visit, excluding Norway

**Question 8: What risks can you identify that are related to the use of the GUIDed application and its services?**

*Poland:*

Data protection and integrity. Especially important for Meds planner, but also for other private data. Reliability, the GUIDed should work correctly at all times.

Some think there are no or few risks.

*Cyprus:*

100% say no risk.

*Austria:*

Reliability and data protection.

*Norway:*

Privacy, especially medication. Apart from that, no risks.

**Question 9: What would you like to see in the system to trust it?**

*Poland:*

Assistance. Reliable operation, protection of personal data, simplification of functionality. Adaptation for people with disabilities. App for iOS. Big screen for an older person. Proper Polish. Intuitive procedure to add meds, new places to navigate, simple configuration.

*Cyprus:*

To have a free trial use.

*Austria:*

Reliability. Change settings in the app, not the portal.

*Norway:*

Map combined with gps signal for safety and security. Most Norwegian secondary test-users trust the system as it is.

**Question 10: How frequently did you use the system during the last six months?**

*Poland, Cyprus and Austria:*

Not frequent use. Almost never or less than two times per week.

*Norway:*

Once a week, every second week.

**Question 11: What tasks did you use it for?**

*Poland:*

Help primary user. Only for testing. Help to configure the app.

*Cyprus:*

Communication.

*Austria:*

Only for testing. Help to configure the app.

*Norway:*

Home control experiments. Assisting primary user.

**Question 12: GUIDed is a modular system. What kind of services do you think would be good to include?**

- Health monitoring, the ability to call for help.
- Medication finder with pictures and more detailed descriptions for ease.
- Voice control. Calendar/event planning.
- Scheduling medical appointments, e.g. Remember you have a doctor in 2 days.
- Calendar with important events for reminders.
- Emergency button.
- Ability to order at home from the supermarket.
- Voice commands for devices all over the house.
- Notifications for doctors appointments.
- Notifications when I need to buy new pills.
- Tracking system of the elderly.
- Communication groups for the elderly to communicate and interact with each other.
- Watch that can measure the pulse and oxygen and notifying in case of below allowed limits and localization on the watch if needed for some people.
- Button to call ambulance or the fire department or police.
- Monitoring of blood sugar.
- Some kind of entertainment, e.g. music, games, sudoku, crossword.

*5.4.2.7 Socioeconomic – 2<sup>nd</sup> visit*

The socioeconomic questionnaire was handled in the last visit and consisted of five questions.

Questions 1-4 had scoring:

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

No	Question	PO	CY	AT	NO	Average
1	System may maintain independence of the older adults.	2,9	1,8	3,2	1,2	2,3
2	System may improve primary users' confidence of navigating around the city.	3,3	2,1	4,0	1,5	2,7
3	System may help in improving the communication between me and my primary user (older adult).	2,8	1,6	4,4	3,4	3,1
4	System may help correct medication intake of the older adults. Why?	2,3	2,1	2,2	1,0	1,9
5	What would you like us to improve in the system?					

Norway was rather positive regarding independence (question 1) and the arguments were because of medication, mobility and communication because of loneliness issues. Cyprus was also positive without expressing any special features.

For improvements, the main input was reliability. The system did from time to time suffer from instability which caused some frustration, especially in Poland and Austria. It seems that Polish and Austrian test-users had an expectation that all functions and user interfaces should work as if you had bought the product from the shop. Test-users in Norway and Cyprus were more forgiving since GUIDed is a research project, and that the nature of demonstrators and prototypes are that they are far from production ready products. Another aspect increasing the instability of the product was that the end-user sites allowed the end-users in many cases to use their own smartphones (variable in terms of Android OS and technical characteristics) instead of the mobile phone (same model/OS) purchased for testing purposes. This undoubtedly increased the instability of the system but helped us gain more ground in terms of compability and bug resolution for a range of models and devices.

#### 5.4.3 Feedback from tertiary users

The tertiary users were asked 16 questions. There were two tertiary users from Poland, Cyprus and Norway, while one was from Austria, 7 in all. In the following the responses from the tertiary users will be presented, question by question. No 1 and 2 are from Poland, no 3 is from Austria, no 4 and 5 are from Cyprus and no 6 and 7 are from Norway.

**Question 1: What approach would you suggest for this system? B2B or B2C. Please explain your answer.**

1. B2B - Distributed sales and technical support by local companies.
2. B2C - The customer will be able to purchase the application according to his/her needs.
3. B2B - Distributes IT devices and special computer programs.
4. Depends who is the most willing to pay at the end of the day, and that will be the target.
5. I would say both for more sales, and to nursing companies and to individuals who may need it.
6. I don't think consumers will buy GUIDed. Because there are to many apps which provide these services. Impossible to compete with Google and Apple. Sell the software to larger Assistive Technology company which could professionalise it or parts of it.
7. B2C. Some services might have a potential for consumers.

**Question 2: Based on our current business model, the average price for the GUIDed application will be 9.90euros per month or 100euros per year (discounted), excluding the devices. Do you think it is a fair price and why?**

1. The price is acceptable provided that the devices are delivered.
2. The price is ok, close to the prices of this type of applications.
3. The price is OK for the functions of the app.
4. If it is something useful for someone I think it is a fair price.
5. It's expensive, it's better to be cheaper for reaching by bigger audience.
6. I don't think they can sell it. Unfinished and sloppy design. No price would be fair. I don't understand how GUIDed can provide a clever lightening systems. As lot of providers and Smart home technologies provide elegant control boxes (white and glossy). Small black boxes, Raspis, will not be attractive. The whole solution must be designed, elegant, appealing. GUIDed is not.
7. If we get it into the social welfare system the price could be 1000 euros for 5 years. Municipalities order it from the welfare service and deliver it to the customer. Don't think it is possible to sell directly to the consumer market.

**Question 3: Which services of the GUIDed app do you think the customers will be willing to pay to use (Please tick as many as you like)? Why?**

1. Med planner and Home sensors - The selected services are the most unique.
2. Med planner, Home control and Home sensors - The others are available free of charge.
3. Home sensors, Home control - These functions are on a hype nowadays SMART HOME.
4. Whatever it is helpful for them and thay can't find it somewhere else for free.
5. Med planner and Home sensors.
6. Customers will not pay for any of the GUIDed servces. It will not be sellable in Nordic countries. There are so many plug and play solutions for Smart homes.
7. The ergotherapist will recommend services in the model. Medication, safe navigation, communication. E.g. communication for follow up with clients/customers.

**Question 4: Who do you think would be our main customers in Cyprus/Norway/Poland/Austria?**

1. Local businesses/centres supporting the elderly.
2. Carers/Children of single parents.
3. Elderly centres.
4. Maybe elderly caring centers.
5. The carers and the relatives of the elderly.
6. Norway, nobody.
7. The largest municipalities.

**Question 5: How best do you feel can this product be commercialized? E.g. what channels to pursue (social media, mouth to mouth, newspapers etc.)?**

1. Social media, press, demo for aid centers and companies.
2. Social media, TV.
3. "Social media (Facebook, Instagram, TikTok) and press media (special newspapers about elderly care)".
4. Mouth to mouth between my partners.
5. Mouth to mouth and magazines/publications for the elderlies.
6. Sell the product to a larger company with commercial muscles. It can not be sold by social media and mouth to mouth. Tiny companies cannot sell this unfinished product.

7. Via the professional product databases for AT products in welfare directorate. I don't think anybody purchase this in stores for electronics.

**Question 6: What are the key challenges you foresee in promoting this application and reaching profitability / viability in your country?**

1. Exorbitant price. Reluctance of older people to IT solutions.
2. The correct operation of the application + relatively high digital exclusion of seniors.
3. "There are a lot of alternative apps that are free to use (WhatsApp, Google Maps,...). It will be difficult to promote it as a new invention".
4. To convince the end user to use it.
5. Communicating what the app can do & Promote it before someone else do the same app.
6. The readiness of the solution. The huge supply of ready products. The flow of free apps doing the same.
7. Telling how it is superior to other things in market. Make this information available in some social media groups, e.g. for ergotherapists and welfare technology groups.

**Question 7: What are the key improvements that we must carry out for each of the services and for the application as a whole at this stage / before commercialization?**

1. None (not known).
2. Make sure that the application and services work properly and reliably.
3. None.
4. I don't know I need to use it first.
5. Make it viable & cameras for monitoring remotely if something is going wrong at the home of the elderly.
6. Bug fixing. Harmonised design between all apps so they look like a product, not prototypes. Base the Smart home solution on standard equipment in all shops, also groceries, as usual in Norway. Get everything well communicated in local language.
7. All apps have to function perfectly.

**Question 8: What information (facts, features) would you need to persuade you to incorporate the GUIDed system in your practice?**

1. Decent price. Demo version for trial period.
2. Reliability of the application, its readability (especially Med planner service).
3. A demo version to test the app and the functions.
4. If the target customers for this app are into my customers list.
5. Can't think of anything right now.
6. Can't see this happen. Reason are explained in questions 1-7.
7. That the system is superior to all other free apps.

**Question 9: Which channels do you trust to learn about new products like the GUIDed system, for your organisation (e.g. social media, mouth to mouth, newspapers etc.)?**

1. Media + verbal communication + user reviews.
2. Social media and user recommendations.
3. Social Media and the reviews of users.
4. Mouth to mouth from my partners mainly and users reviews.
5. Websites and publications for the elderlies.
6. Companies' web pages which tell about their products. Technical sheets, user guides, etc. Definitely not social media, Tik-Tok, Instagram, Facebook.
7. Personal and professional network of other small companies in the Assistive Technology business. I will ask what they know about other competing products.



**Question 10: Which of the services of the GUIDed system would you be interested to exploit in a B2B manner?**

1. Med planner.
2. Med planner.
3. Home sensors and Med planner.
4. Not sure about that, I need to use it and think about it.
5. Depends on preference, but I think I would want to exploit it as a whole not as independent services.
6. Sell to a large company. Let this company decide. There are so many options for similar services.
7. Don't do B2B.

**Question 11: Which purchase model you (as business partner) will be interested to exploit with the GUIDed consortium (e.g. purchase specific services from GUIDed such as the Smart Navigation to resell it? and at what price)?**

1. Purchase of the Med planner service for PLN 10/month (it is about EUR 2.15).
2. It's hard to say.
3. Purchase of the Home sensors and Med planner for 2,99 EUR / month.
4. I can't say right now, it take though.
5. I don't know, depends on too many different factors.
6. None. Already answered.
7. No cure, no payment. A percentage of factual profit. Must probably sell high volumes to get profit.

**Question 12: Would you be likely to sell this product?**

1. 3 – likely.
2. 2 – unlikely.
3. 3 – likely.
4. 3 – likely.
5. 3 – likely.
6. 1 – highly unlikely.
7. 1 – highly unlikely. It looks very hard to sell. The product looks unfinished.

**Question 13: Would you recommend/suggest this application to customers?**

1. 4 – very likely.
2. 2 – unlikely.
3. 3 – likely.
4. 3 – likely.
5. 5 – extremely likely.
6. 1 – highly unlikely.
7. 4 – very likely. Of course, if it was a part of our product portfolio. But it has to be finalised and neat.

**Question 14: What risks can you identify that are related to the use of the GUIDed application and its services?**

1. Making the application work dependent on network access.
2. High unreliability of services, the need for a senior to have and be able to use a smartphone, the need to introduce changes through the website.
3. When Wifi problems appear or something else, the user can not do anything.

4. Nothing specific.
5. Can't think of anything.
6. If it was in use, I would be mostly worried about the medication. Because trusting any system for medication is scary. Medicine not necessarily taken or wrongly taken in spite of the support.
7. All apps need to have professional disclaimers. Apart from that, nothing special.

**Question 15: What would you like to see in the system to trust it?**

1. Operation of the application in critical conditions (no network, no electricity).
2. I would expect very high reliability.
3. What happens with the app, when the connection fails. What can the user do in such situations.
4. Pilot results from users.
5. I don't know.
6. No general mistrust, only the medication.
7. How to explain privacy information to users. Follow GDPR.

**Question 16: Finally, GUIDed is a modular system meaning that in the future we plan to include more services from which a user can choose according to their needs. What kind of services do you think would be good to include?**

1. Monitoring of pets (e.g. GPS in the collar).
2. Reminders of the daily schedule.
3. A calendar with notifications and a measure tool of blood sugar, ...
4. That is depend on the user.
5. Biometric features, calendar to note anything, e.i. doctor's appointment, day and time of favourite series, not using only phones but also something like 'Alexa'.
6. Health related news (scientific facts presented in a popular way). Hints for cheap and healthy food.
7. Entertainment. Some elements of fun.

*5.4.3.1 Lessons learned from the tertiary user feedback*

- B2B rather than B2C.
- Sell the software to larger Assistive Technology company which could professionalise it or parts of it.
- Concentrate on Home control, Home sensors and Med planner. There are lot of international available alternatives for Communication and Navigation.
- Sell via local businesses and to centres supporting the elderly (maybe via local retailers).
- Use following sales channels: Media, social media, verbal communication (mouth to mouth), user reviews, decent product leaflets.

It will up to the process after the project to decide which routes to follow.

## 5.5 Recommendations

Stability of the GUIDed system has been an issue.

Recommendation 1: Make the GUIDed system reliable and robust.

Several users ask about privacy, data security and integrity.

Recommendation 2: Describe these mechanisms in a white paper.

Some users think it is a hassle to have both an app and a web portal. The web portal is there allowing secondary users to configure and administer the GUIDed system on behalf of the primary user. However, GUIDed is meant for independent primary users and they should be able to configure and administer GUIDed by themselves. An AR assistant could be of big help to manage these tasks. If GUIDed should become a commercial system on the market, a help center should be established in each country to help GUIDed users.

Recommendation 3: Make two versions of GUIDed. One for independent users where everything could be done in the app. The other with a web portal where secondary users can assist. These systems must not be two separate ones. It should be easy to go from the only GUIDed app system to a system which has an app and a web portal. The present AR assistant should be further developed to also assist in configuration and administering the app.

In the trials, both primary and secondary users have provided several suggestions for expansion of the functionality of GUIDed.

Recommendation 4: Go carefully through the lists in Question 12 in sections 5.4.1.4 and 5.4.2.6 of this document to investigate through user surveys which suggestions are asked for and are feasible to implement in reasonable time and cost.

Input has been collected from tertiary users on how to get GUIDed to market. This is described in section 5.4.3.

Recommendation 5: Go through the suggestions from the tertiary users and enhance the business plan according to this input and lessons learned from the project and user testing.

## 6 Conclusion

The GUIDed project has in good collaboration spirit between partners and fruitful co-creation processes with potential users developed a prototype product in line with was described in the project proposal.

The project received a half year extension due to the Covid-19 epeidemic and has run for 36 months from 1<sup>st</sup> January 2020 to 31<sup>st</sup> December 2022.

Through the development process the prototype has been gradually refined, and at the end of the project partners are collaborating to decide what should happen after the project. This will be described in deliverable D5.2b - Final Business plan and business model.

## 7 Appendix 1: Protocol and procedures for the first iteration of field trials

### 7.1 User test protocol – GUIDed project

Version 1.0

8th November 2021

Responsible for the document: Karde (Terje Grimstad)

This document gives a short introduction to the GUIDed system and actions you are asked to perform during the test period.

#### 7.1.1 Introduction

The main target group for the GUIDed system is well functioning elders, above 60 years of age.

The GUIDed system consists of:

- an app supposed to run on a rather modern Android smartphone (version 10 and higher). It must support AR (Augmented Reality)
- a web portal service used to configure the GUIDed system
- equipment to be installed in the test users' home.

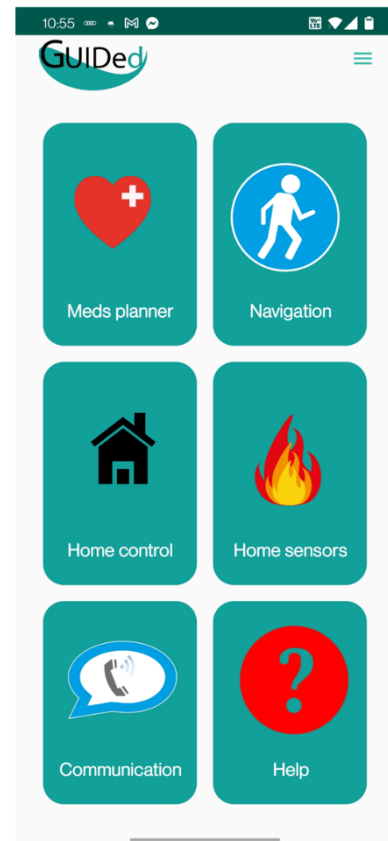
The user test will run approximately 5 months.

### 7.1.2 The GUIDed app

The GUIDed app is downloaded to your smartphone.

The services of the app are:

- Medication planner  
Used to remind the users to take which medicine when.
- Navigation  
Helps the user to navigate outdoors, walking and driving.
- Home Control  
Used to control smart gadgets in your home. For this user test lightning is implemented. You can control dimmable lamps and coloured lamps.
- Home Sensors  
Used to get the status of monitoring sensors in your home. For this user test CO<sub>2</sub>, smoke and door/window sensors are provided.
- Communication  
Used for video calls with other users who are registered to the GUIDed system and have the GUIDed app.
- Help  
Provide the user with help functions. Explains how the system is supposed to be used and work.



### 7.1.3 The GUIDed web portal

The GUIDed web portal is used for configuring and controlling the apps. The URL to the GUIDed web portal is <https://guided.roztr.org/>

In the GUIDed system there are two user roles:

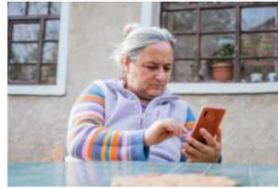
1. Primary user, the person who GUIDed is meant for
2. Secondary user, a person who may help the Primary user to configure the GUIDed system.

A Primary user could also take the role of a Secondary user. This will be the normal scenario when the Primary user is ICT literate and can manage the ICT on its own.

### Log in/Register



### Communication



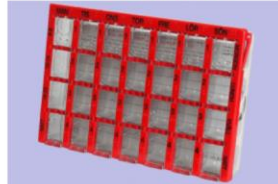
### Navigation



### Home control & sensors



### Medication planner



### Select language



There are six items in the GUIDed web portal:

- **Login/Register**  
Used to Register an account the first time and afterwards for logging in to the portal.
- **Communication**  
The social communication service aims to offer a sense of real-life physical presence between you and your family, health carers and friends. By using the service, you may keep in contact with family and friends while engaging in everyday activities such as eating together, drawing and knitting!

In the web portal you may:

- Find your contacts: you may see your contacts list. For a contact to appear in the GUIDed app, the is Favourite checkbox must be checked so that the contact is included in your favourite contacts list
- Find your pending contacts requests (in order to accept them or not)
- Make a new contact request
- Check out all the users you are assigned as a helper to. You may be assigned as a helper to another primary user.

All registered GUIDed users having a GUIDed app may in principle communicate with each other.

- **Navigation**  
The Navigation service lets you create predefined places with addresses and coordinates that can be recalled by the primary user in the navigation app. The app will then assist the primary user in wayfinding.  
When you are logged in to the portal, you can:
  - add a new place to the primary user's "inventory" of places
  - see all places in the "inventory" of the primary user.
- **Home Control and Sensors**  
The Home Control and sensors lets you manage your smart services. Providers of the

GUIDed system can register and edit Raspberry Pi Smart Hubs. Raspberry Pi is a device which, together with the smart plug, controls the smart equipment in your apartment. The Raspberry Pi should be connected with a cable to the router and the smart plug should be connected to an electrical outlet.

- Providers can link users with these Smart Hubs.
- End-users can view their Raspberry Pi data.
  
- Medication planner  
The Medication planner lets you set up a schedule for taking medication. You may also enter some Information about medication to guide proper usage. You can:
  - Get an overview of your medication plan
  - Enter new medicine and intake times to your medication plan.

#### 7.1.4 Equipment for the user test

The equipment consists of:

- An Android smartphone with AR functionality, type Samsung A20
- Lenses which can be connected to the smartphone to get wider angles for the camera, a feature which may be used in the Communication service
- A folding desktop phone stand which gives you the possibility to have a video conversation without holding the telephone in your hands, e.g. useful if you want to dine with someone in another location or play a table game
- Two dimmable lamps which can be controlled from the GUIDed app
- One coloured lamp which can be controlled from the GUIDed app
- One CO-detector to detect gas leakage which can be monitored from the app, e.g. to see the status
- One smoke-detector to detect smoke from fire which can be monitored from the app, e.g. to see the status
- One window/door sensor which tells you if the door is open or closed
- A Raspberry Pi which should be connected with cable to your wifi-router
- One smart plug which must be connected to an electric outlet. It makes the sensor system in GUIDed more robust.

#### 7.1.5 Actions in the user test

##### Setting up the equipment in your home

This will be done by a representative from the GUIDed project.

It is also possible to use GUIDed services without smart equipment installed in your home. Then you will get access to the Medication planner, Navigation and Communication. You will not get access to the services for Home control and Home sensors.

##### Login/Register

###### First time

You need to register as a user. Use the web portal which has the URL <https://guided.roztr.org/>. It is recommended that you establish a bookmark for this page, the URL may be difficult to remember. Depending on your role, you may create a Primary or a Secondary user.

###### Later

When you are registered as a user, then you log in.

## Medication planner

The Medication planner service is NOT dependent on the smart devices in your home. It can be used from anywhere as long as you have a connection to the internet, either through wifi or gsm (the smartphone needs a SIM-card).

For Med planner the Web portal look like this:

**Medication planner**

The **Medication planner** service lets you set up and manage medication planning.

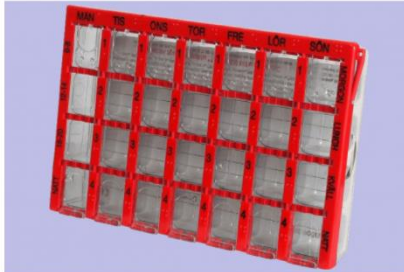
To see your own medication planner, press the button below:

[My medication planner](#)

To add a medicine to a MedPlan, you start out by giving it a mnemonic name (consisting of the username of the primary user the MedPlan is for, followed by the name of the medication). Then fill in the rest of the form, There is a help text for each field, providing instructions about what to put there.

[Add prescribed medicine](#)

You can find information about most medication on the website [Drugs.com](http://Drugs.com).



### Steps for user test:

1. Set up your medication plan.  
This is done in the Web portal. You must be logged in to the portal.  
You enter your medicines by clicking the button **Add prescribed medicine**.  
For each medicine it is possible to enter several intake times per day.  
You get an overview of your intake plan by clicking the button **My medicine planner**.
2. When medicines are entered in the GUIDed system, the GUIDed app will remind you to take medicine at the intake times. The reminder is accompanied by a sound.
3. When medicine is taken, you must tick the box that medicines are taken. If you don't tick that medicine is taken, the GUIDed app will keep reminding you for 15 minutes.  
The medicine plan where you can tick medicine taken, is shown on your smartphone if you scan the doset or click the Display-button.
4. If your medication plan changes, please update the plan in the web portal.
5. You should use the meds planner every day and report back to the national responsible for the GUIDed project of any problems.

### Navigation

The Navigation service is NOT dependent on the smart devices in your home. It can be used from anywhere as long as you have a connection to the internet. Since navigation is happening outdoors, you need to have a SIM-card with data quota installed in your smartphone.

Today, it is not possible to enter places to navigate to in the GUIDed app. Places must be entered from the Web portal.

For Navigation, the Web portal looks like this:



## Navigation

This page provides the user interface that lets you manage the Navigation service. The service lets you create predefined places with addresses and coordinates that can be recalled by the primary user in the navigation app. The app will then assist the primary user in wayfinding.

To add a new place to the primary user's "inventory" of places, click on the button "Create place".

The primary user can see all places in his or her "inventory" by clicking on the button "My places".

Add place

My places



### Steps for user test

1. First you must define some places which you plan to navigate to.  
This is done in the Web portal. You must be logged in to the portal.

You click the **Add place** button.

Here there is one tricky part. You must enter the coordinates of the place you want to define. This is done by using Google maps. Find the place at Google maps. Left click on the red indicator of the place. Then you get a list of options. The top one is the coordinates. Left click on the coordinates. Then the coordinates are copied to the clipboard.

Then go to the Add place form and paste the coordinates to the Latitude and Longitude fields.

Fill in the other information and click **Save**.

When you are logged in as a Primary user, you get an overview of places you have defined or which are defined for you by a Secondary user, by clicking the **My places** button.

2. Navigate when you are outdoors to places you have defined.

You can select two modes: Walking or driving.

You can use to views, camera view or map view.

In camera view you get spoken commands in your language which tells you how to navigate. In addition you get extra help by the AR-function which with red and yellow indicators on your screen tells you how to turn.

3. You should navigate to one of your defined places once a week and report back to the GUIDed project responsible for any problems.
4. You should use the Navigation service every week and report back to the national responsible for the GUIDed project of any problems. You may well navigate to the same place, the important thing as that you use the service.

### Home control and Home sensors

The smart devices and sensors are dependent on the Raspberry Pi by being installed. The Raspberry Pi must be connected by cable to your wifi router.

# Home control & sensors

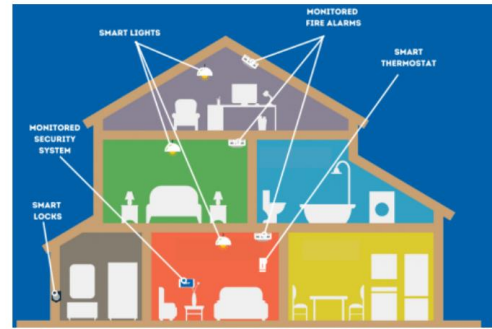
This page provides the user interface that lets you manage the Home control services. Here providers of the GUIDed system can register and edit Raspberry Pi Smart Hubs. Furthermore, providers can link users with these Smart Hubs. End-users can view their Raspberry Pi data.

To register a new Raspberry Pi, click on the button "Add RaspberryPi". To list all Raspberry Pis and do edits, click on the button "My Raspberry Pis".

Add Raspberry Pi

My Raspberry Pis

All Raspberry Pis



Here only one button is relevant for the test user.

**My Raspberry Pi** tells the registration number on the Raspberry Pi which is installed in the PU's home. You must be logged in as a PU to get this information.

The other buttons are for project representatives who configure the Raspberry Pi system for the user.

The smart equipment in your home can not be controlled or monitored if the Raspberry Pi is not installed.

Valuable user feedback from these user tests includes:

- User experience when controlling the devices
- Connection stability and response time of devices.

## Home Control

For home control you have this equipment:

- Two dimmable light bulbs
- One coloured light bulb
- One Smart plug.

Steps for user tests:

1. Turn both dimmable lights on and off every day and adjust the intensity of the light by using the GUIDed app.
2. Turn coloured light on and off every day and adjust the color.
3. Find some equipment, e.g. a normal lamp, and connect it to the smart plug. Use the GUIDed app to turn the Smart plug on and off and such controlling if the light is on or off. You may also connect a fan which you could turn on and off by connecting it to the smart plug.
4. Report back to the national responsible for the GUIDed project of any problems.

## Home sensors

For home sensors you have this equipment:

- One smoke detector (detects smoke from a fire)
- One gas detector, CO2 detector (detects gas leakage)
- One door/window sensor (detects id door/window is open or closed)

The smoke and gas sensors may be mounted in the ceiling, however, they may also be located on a table or a shelf.

The door/window sensor may be mounted to the entrance door or one of the doors inside your house.

Steps for user tests:

1. The sensors should be checked regularly.
2. The smoke and gas detectors should be tested manually once every 2 weeks the first 2 months and then monthly. You press the button on the detector, you hear an alarm and then you will get a notification in the GUIDed app.
3. The door/window sensor can be checked when needed or similarly to the alarm sensor to see if door/window is open or closed.
4. Report back to the national responsible for the GUIDed project of any problems.

## Communication

# Communication

The social communication service aims to offer a sense of real-life physical presence between you and your family, health carers and friends. By using the service, you may keep in contact with family and friends while engaging in everyday activities such as eating together, drawing and knitting!

You may find your contacts here:

[My Contacts](#)

You may find your pending contacts requests (in order to accept them or not) here:

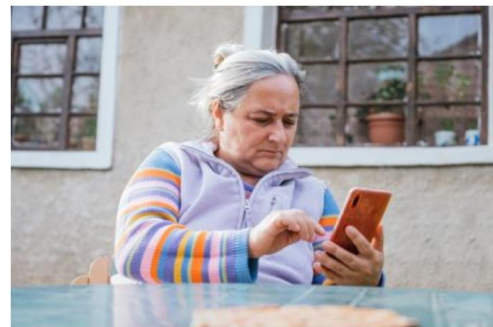
[Contact Requests](#)

Make a new contact request here:

[New Contact Request](#)

Check out here all the users you are assigned as a helper to them:

[Assisted Users](#)



The communication service is NOT dependent on the smart devices in your home. It can be used from anywhere as long as you have a connection to the internet, either through a WiFi connection or data networks (the smartphone needs a SIM-card).

You must be logged in to the web portal to configure contacts. The tasks you can do here are: create a new contact request to another GUIDed user, view and accept contact requests from others, view your contacts, and manage all the users you are assigned as a helper to.

In addition, talk to family and friends to encourage them to download the GUIDed app, ask them to register on the Web portal and become part of your communication network.

In the test kit, there is a lens which should be connected to the smartphone. It will provide an augmented viewing experience.

Steps for user test:

1. First you must use the web portal to make new contacts. A contact can be a family member, a friend, a social connection of yours, and actually anyone who has downloaded



the GUIDed app and have registered themselves as a Primary or Secondary user to the GUIDed system.

Make a new contact request by clicking the **New Contact Request** button.

Fill in the mnemonic name (any title will do) and the fields "My Username" and "GUIDed Username" (the other GUIDed user to connect with).

The other GUIDed user needs to view and accept the request; however, if the "Accepted" checkbox is checked, then the connection between you and the other GUIDed user is already accepted.

2. Make the contact a favourite: both you and the other GUIDed user need to go to the web portal to MyContacts page and click "edit" for the new contact and then tick the "Is Favourite" checkbox. This is needed so that the new contact appears in the communication service within the app, as only favorite contacts appear within the app. Then, you and the other GUIDed user are connected and are able to communicate.
3. Make a video call to one of your communication friends every week.
4. For some communication sessions, please use the lens which provides an augmented viewing experience.
5. Report back to the national responsible for the GUIDed project of any problems.

## 7.2 GUIDed – Field trials 1<sup>st</sup> iteration procedures

### 7.2.1 Part A – Demographic questionnaire

OFFICE USE ONLY	
Participant ID:	

Gender: Please tick the box that applies to you.	
Male	
Female	
Other/would rather not say	

Age: How old are you?

Area of residence: Please tick the box that applies to you.	
Rural	
Urban	
Semi Urban	

Education: Please select only the highest education level achieved.	
Elementary school	
Professional school / Apprenticeship	
General qualification for university entrance	
University	

Living status: Please select only one answer.	
Alone	
With spouse/ partner only	

With spouse/ partner and other family members	
With other members of my family	
In a retirement home	
Other – please specify	

Country of residence. Please tick the box that applies to you.	
I currently live in Cyprus	
I currently live in Poland	
I currently live in Austria	
I currently live in Norway	

What is your IT level? Please tick the box that applies to you.	
<b>Low</b> , I don't use or I use some devices like smart phone, computer, tablet and internet with a lot of difficulty.	
<b>Medium</b> , I use a lot of devices like smart phones, computer, tablet, internet and apps and I can perform a broad array of IT related functions with a low level of difficulty such as using social media	
<b>High</b> , I use devices like smart phones, computer, tablet, internet and apps and I am capable to resolve any technical issues that might arise	



7.2.2 Part B – GUIDed Heuristic walkthrough

OFFICE USE ONLY	
Participant ID:	

This exercise is designed to examine the GUIDed users’ opinions and experiences from the use of the GUIDed prototype.

The GUIDed "app family" is suitable for older adults. It is aimed to support independence by providing several applications (apps) on a touch screen device (tablet PC or smartphone), in following areas:

1. Navigation Service
2. Meds planner Service
3. Home control Service
4. Home sensors Service
5. Communication Service

Please rate the claims concerning GUIDed system for both of its parts separately (i.e., the administration web and the app with services 1-5), given that the question is relevant in the context of your testing of the system. Also, please explain your experience and suggest improvements in your own words.

**PART 1: The GUIDed web portal**

**\*Note: Administer only if the primary user have used it**

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
<b>The GUIDed web portal:</b>					
<b>1. Visibility of the GUIDed system status</b>					
<b>Always keep users informed about what is going on</b>	1	2	3	4	5
<b>Provides appropriate feedback within reasonable time</b>	1	2	3	4	5
Want to explain your rating to the statements above?					
<b>2. Match between the GUIDed system and the real world</b>					
<b>Speaks the users' language, with words, phrases and concepts familiar</b>	1	2	3	4	5

to the user, rather than system-oriented terms.					
Follows real-world conventions, making information appear in a natural and logical order.	1	2	3	4	5
Please comment and suggest how to improve:					
<b>3. User control and freedom</b>					
Users often choose system functions by mistake.	1	2	3	4	5
Provides a clearly marked "out" to leave an unwanted state without having to go through an extended dialogue.	1	2	3	4	5
Supports undo and redo.	1	2	3	4	5
Please comment and suggest how to improve:					
<b>4. Consistency and standards</b>					
Users should not have to wonder whether different words, situations, or actions mean the same thing.	1	2	3	4	5
Its functionally (open, close buttons, view, etc.) is similar to apps I already know.	1	2	3	4	5
Please comment and suggest how to improve:					
<b>5. Error prevention</b>					
Does not have significant errors and bugs	1	2	3	4	5
Please comment and suggest how to improve:					
<b>6. Recognition rather than recall</b>					



<b>All objects, actions, and options are visible.</b>	1	2	3	4	5
Has instructions for me in case I forget or do not know how to do something	1	2	3	4	5
Please comment and suggest how to improve:					
<b>7. Flexibility and efficiency of GUIDed use</b>					
Is appropriate for my skills and capacity as a technology user (speed, font size, etc)	1	2	3	4	5
I can modify the way I view things or other options	1	2	3	4	5
Please comment and suggest how to improve:					
<b>8. Aesthetic and minimalistic design in GUIDed</b>					
Dialogues contain information which is irrelevant or rarely needed.	1	2	3	4	5
The information provided is as much as needed	1	2	3	4	5
Please comment and suggest how to improve:					
<b>9. Help to recognise, prevent and recover from errors</b>					
All info is expressed in plain language	1	2	3	4	5
When I do something wrong system informs me about it	1	2	3	4	5
Please comment and suggest how to improve:					

<b>10. Help and documentation</b>					
System provides adequate help for me	1	2	3	4	5
Help information is easy to search	1	2	3	4	5
Please comment and suggest how to improve:					

### PART 2: The GUIDed app with the 5 services

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
<b>The GUIDed application:</b>					
<b>1. Visibility of the GUIDed system status</b>					
Always keep users informed about what is going on	1	2	3	4	5
Provides appropriate feedback within reasonable time	1	2	3	4	5
Want to explain your rating to the statements above?					
<b>2. Match between the GUIDed system and the real world</b>					
Speaks the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms.	1	2	3	4	5
Follows real-world conventions, making information appear in a natural and logical order.	1	2	3	4	5
Please comment and suggest how to improve:					
<b>3. User control and freedom</b>					

<b>Users often choose system functions by mistake.</b>	1	2	3	4	5
Provides a clearly marked "out" to leave an unwanted state without having to go through an extended dialogue.	1	2	3	4	5
Supports undo and redo.	1	2	3	4	5
Please comment and suggest how to improve:					
<b>4. Consistency and standards</b>					
<b>Users should not have to wonder whether different words, situations, or actions mean the same thing.</b>	1	2	3	4	5
<b>Its functionally (open, close buttons, view, etc.) is similar to apps I already know.</b>	1	2	3	4	5
Please comment and suggest how to improve:					
<b>5. Error prevention</b>					
<b>Does not have significant errors and bugs</b>	1	2	3	4	5
Please comment and suggest how to improve:					
<b>6. Recognition rather than recall</b>					
<b>All objects, actions, and options are visible.</b>	1	2	3	4	5
Has instructions for me in case I forget or do not know how to do something	1	2	3	4	5
Please comment and suggest how to improve:					
<b>7. Flexibility and efficiency of GUIDed use</b>					

Is appropriate for my skills and capacity as a technology user (speed, font size, etc)	1	2	3	4	5
I can modify the way I view things or other options	1	2	3	4	5
Please comment and suggest how to improve:					
<b>8. Aesthetic and minimalistic design in GUIDed</b>					
Dialogues contain information which is irrelevant or rarely needed.	1	2	3	4	5
The information provided is as much as needed	1	2	3	4	5
Please comment and suggest how to improve:					
<b>9. Help to recognise, prevent and recover from errors</b>					
All info is expressed in plain language	1	2	3	4	5
When I do something wrong system informs me about it	1	2	3	4	5
Please comment and suggest how to improve:					
<b>10. Help and documentation</b>					
System provides adequate help for me	1	2	3	4	5
Help information is easy to search	1	2	3	4	5
Please comment and suggest how to improve:					

7.2.3 Part C – GUIDed HCI checklist for primary users

OFFICE USE ONLY	
Participant ID:	

This ambition in the GUIDed project is to create a minimalistic and functional design for the GUIDed system. The parts of the GUIDed system are:

1. GUIDed web portal
2. GUIDed service [Meds planner]
3. GUIDed service [Navigation]
4. GUIDed service [Home control]
5. GUIDed service [Home sensors]
6. GUIDed service [Communication]
7. GUIDed [Help] in the app

Please answer the questions below concerning the interfaces and usability of the GUIDed system.

**The GUIDed [app](#)**

**Texts and fonts**

Question	Yes	No	Cannot answer
1. <b>Are the texts in the GUIDed app understandable and in an everyday language?</b>			
If <b>No</b> , please specify in which service(s):			
2. <b>Did you find any abbreviations or terminology that you did not understand?</b>			
If <b>Yes</b> , please specify:			
3. <b>Did you find any text elements that are not in your native language?</b>			
If <b>Yes</b> , please specify:			
<b>Other comments:</b>			

--	--	--	--

### Contrast

Question	Yes	No	Cannot answer
4. Are the contrasts between text elements or icons and their backgrounds sufficient?			
If <b>No</b> , please specify which are not:			

### Navigation

Question	Yes	No	Cannot answer
5. To navigate correctly, did you find the advice that you needed (e.g., what to do next)?			
If <b>No</b> , please specify which are not:			
6. Were you able to return to go "home", go "back" and feeling that quit exit without failure or a feeling that something went wrong?			
If <b>No</b> , please explain what happened:			
<b>Other comments:</b>			

### Design

Question	Yes	No	Cannot answer
7. Is the colour scheme of the GUIDed system pleasant?			
If <b>No</b> , please describe how you would change it:			
8. Did you manage to scroll the screen when necessary?			
If <b>No</b> , please specify where you had problems:			

9. Was the format of information presented correct according to your native standards (e.g., date, time, decimal etc.)?			
If <b>No</b> , please specify where you found errors:			
10. Did the interface adapt to your device/screen?			
If <b>No</b> , please specify what you experienced:			
11. Do you find any overload of information of the screens?			
If <b>Yes</b> , please specify where you found overload(s):			
<b>Other comments:</b>			

## The GUIDed web portal

### Texts and fonts

Question	Yes	No	Cannot answer
1. Are the texts in the GUIDed app understandable and in an everyday language?			
If <b>No</b> , please specify:			
2. Did you find any abbreviations or terminology that you did not understand?			
If <b>Yes</b> , please specify:			
3. Did you find any text elements that are not in your native language?			
If <b>Yes</b> , please specify:			
<b>Other comments:</b>			

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### Contrast

Question	Yes	No	Cannot answer
4. Are the contrasts between text elements or icons and their backgrounds sufficient?			
If No, please specify which are not:			

### Navigation

Question	Yes	No	Cannot answer
5. To navigate correctly, did you find the advice that you needed (e.g., what to do next)?			
If No, please specify which are not:			
6. Were you able to return to go "home", go "back" and feeling that quit exit without failure or a feeling that something went wrong?			
If No, please explain what happened:			
Other comments:			

### Design

Question	Yes	No	Cannot answer
7. Is the colour scheme of the GUIDed system pleasant?			
If No, please describe how you would change it:			
8. Did you manage to scroll the screen when necessary?			
If No, please specify where you had problems:			



<p>9. Was the format of information presented correct according to your native standards (e.g., date, time, decimal etc.)?</p>			
<p>If <b>No</b>, please specify where you found errors:</p>			
<p>10. Did the interface adapt to your device/screen?</p>			
<p>If <b>No</b>, please specify what you experienced:</p>			
<p>11. Do you find any overload of information of the screens?</p>			
<p>If <b>Yes</b>, please specify where you found overload(s):</p>			
<p>12. Did you experience problems using the GUIDed administration web in your favourite browser?</p>			
<p>If <b>Yes</b>, please describe what happened:</p>			
<p>13. Did language choices work for you and you were able to make the whole service set-up in your own language?</p>			
<p>If <b>No</b>, please specify where you had problems:</p>			
<p>14. If you use the administration web on a tablet, do you experience any challenges concerning the smaller screen than a PC/Mac?</p>			
<p>If <b>Yes</b>, please specify where you found errors:</p>			
<p>15. Is all guidance on the web portal sufficient to support the set-up of the services?</p>			
<p>If <b>No</b>, please specify what you experienced:</p>			
<p><b>Other comments:</b></p>			

7.2.4 Part D – Exploitation and impact questionnaire

<b>OFFICE USE ONLY</b>	
<b>Participant ID:</b>	

**How frequently did you use the application and why?**

**What services did you use the most and why?**

**What services did you use the least and why?**

**The GUIDed application is consisted of:**

- **Meds planner**
- **Navigation**
- **Home control**
- **Home sensors**
- **Communication**
- **AR tags**

**Please, select the services from above you will be willing to pay for and provide your reasoning:**

**Based on our current business model, the average price for the GUIDed application will be 9.90euros per month or 100euros per year (discounted). Do you think it is a fair price and why?**

**Would you be likely to pay for this product?**

1- highly unlikely

2- unlikely

3- likely

4-very likely

5-extremely likely

<b>Would you recommend/suggest this application to others??</b>	<b>1- highly unlikely</b>	<b>2- unlikely</b>	<b>3- likely</b>	<b>4-very likely</b>	<b>5-extremely likely</b>
<b>What risks can you identify that are related to the use of the GUIDed application and its services?</b>					
<b>How did the GUIDed application help you in your daily life?</b>					
<b>Other comments:</b>					

## 8 Appendix 2: Protocol and procedures for the second and final iteration of field trials

### 8.1 GUIDed – Field trials 2<sup>nd</sup> iteration – Primary users

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## Timeline

- First visit (training): 1 – 10 June 2022
- Phone follow up calls (1 per week)
- Second visit (follow-up): 11 July – 9 September 2022 (M2-3)
- Phone follow up calls (1 per week)
- Last visit: 11-24 October 2022 (M5)

## Procedure

### **First visit - Day 1**

1. Check that the participants comply with the inclusion/exclusion criteria as defined in D2.2 for more information.

#### Quick reminder:

- No of participants: 10 (\*5 for PLATUS)
  - Age: 60+
  - IT level: All groups but Higher % with lower and medium IT literacy
  - Gender: balance representation
  - Education: Broad representation
  - Area of living: variety of Urban, semi-urban and rural status
2. Briefly explain to the participants the objectives of the GUIDed project and system and the purpose and procedure of this testing phase. You may provide a smaller summary if the participant has already participated in the previous tests.
  3. Explain to participants the goal of this testing stage and procedure.
  4. Obtain participants' **informed consent** (applicable if the participant has not already participated in previous testing phases).
  5. Obtain the participants' demographic data through the **demographic questionnaire**.
  6. Set up GUIDed system in the participant's house.
    - I. For participants that do not have associated secondary users and are independent/tech savvy to use the GUIDed portal proceed with their registration on the Web portal by adding together the medication on Meds planner service, add places in the navigation system and add some contacts in the communication service.
    - II. For participants that have secondary users associated with them, make sure that secondary users have been approached first to register them on the system or be present during the first visit to the primary users house for the registration.
  7. Use the **training protocol** to train the participant on how to use the GUIDed system. For the control group (5 participants for MAT, KARDE, HARPO and 2 for PLATUS) do not show the AR assistant and disable the AR assistant feature in the application.
  8. Ask the participant(s) if they have any questions or if they would like to see any of the service demonstrated again.
  9. Proceed with the **Task List GUIDed Web portal - Think Aloud Protocol** if the Primary users participated in their registration and then proceed to the **Task List GUIDed Application - Think Aloud Protocol** to evaluate the understanding of the participant and performance with the system.
  10. Then proceed with baseline assessment of the **Quality of life questionnaire**
  11. Thank the participant for their involvement.

**\*\*\*Follow up with participants once a week via phone call or physical presence according to their needs and use Follow up form to remind them to use the system and report any bugs.**

### **Second visit - M2**

1. Arrange a meeting to visit the participant in their home.
2. Ask the participant(s) if they have any questions or if they would like to see any of the service demonstrated again.
3. Then administer the **SUS scale** and **Exploitation and impact questionnaire.**
4. Thank the participant.

**\*\*\*Follow up with participants once a week via phone call or physical presence according to their needs and use Follow up form to remind them to use the system and report any bugs.**

### **Last visit - M5**

1. Arrange the last visit to the participant in their home.
2. Proceed with the **Task List GUIDed Application - Think Aloud Protocol** and then with the **Quality of life questionnaire.**
3. Then administer the **SUS scale** and **Exploitation and impact questionnaire.**
4. Thank the participant and inform them that you will invite them to the next Ethics Workshop for evaluation of the GUIDed system.



Follow up call Form

Follow Up Call - Participant ID:					
Date					
a. Did you have any problems with the GUIDed app?					
b. What types of problems?					

## Demographic questionnaire

OFFICE USE ONLY	
Participant ID:	
Group:	<ul style="list-style-type: none"> <li>● With AR assistant</li> <li>● Without AR assistant</li> </ul>

### Type of primary participant

- Independent participant
- Paired with SU Number \_\_\_\_\_

Country of residence. Please tick the box that applies to you.	
I currently live in Cyprus	
I currently live in Poland	
I currently live in Austria	
I currently live in Norway	

Gender: Please tick the box that applies to you.	
Male	
Female	
Other/would rather not say	

Age: How old are you?

Area of residence: Please tick the box that applies to you.	
Rural	
Urban	
Semi Urban	

Education: Please enter total years of education (primary, secondary or higher-do not count vocational, technical training, seminars or other informal training received)



Living status: Please select only one answer.	
Alone	
With spouse/ partner only	
With spouse/ partner and other family members	
With other members of my family	
In a retirement home	
Other – please specify	

What is your IT level? Please tick the box that applies to you.	
<b>Low</b> , I don't use or I use some devices like smart phone, computer, tablet and internet with a lot of difficulty.	
<b>Medium</b> , I use a lot of devices like smartphones, computer, tablet, internet and apps and I can perform a broad array of IT related functions with a low level of difficulty such as using social media	
<b>High</b> , I use devices like smartphones, computer, tablet, internet and apps and I am capable to resolve any technical issues that might arise	



## Training protocol

(See uploaded in the folder - to be updated after delivery of 2nd prototype)

## GUIDed application - Task list and Think Aloud protocol

OFFICE USE ONLY	
Participant ID:	

### ***Task 1: The user is to login into the GUIDed application***

#### ***Open the GUIDed application***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes: (Please note if the user cannot perform the task, any observations or participant's comments)

- ***Try to login with your credentials***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

### ***Task 2: The user goes through the AR assistant (DO NOT APPLY FOR THE CONTROL GROUP)***

- ***Goes through the services with AR assistant***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- *Disables AR assistant* **(DO NOT APPLY FOR THE CONTROL GROUP)**

*Rating task difficulty (1 very easy – 5 very difficult):*

1 2 3 4 5

Notes:

**Task 3: The user wants to check what medication he/she needs to take today**

- *Find the section with the “Meds planner”*

*Rating task difficulty (1 very easy – 5 very difficult):*

1 2 3 4 5

Notes:

- *Select and tick on of the medications.*

*Rating task difficulty (1 very easy – 5 very difficult):*

1 2 3 4 5

Notes:

**Task 4: The user wants to go to the local supermarket.**

- *Task – Search for the local supermarket on the Navigation service.*

*Rating task difficulty (1 very easy – 5 very difficult):*

1 2 3 4 5

Notes:

- **Task – Choose walking mode and use it**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- **Task – Choose AR mode**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

**\*\*THIS IS A TIMED TASK-Task 5: The user wants to initiate a videocall with one of the researchers**

- **Task – Search for the name of the researcher in the “Communication” service and videocall them**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Take a chronometer and time the task in seconds from the moment the user is in the Home menu until the other person answers the call (write down the time in seconds 00:00):

Notes:

**\*\*THIS IS A TIMED TASK-Task 6: The user wants to control the smart devices**

- **Task – Turn on the lights in the room and dim them**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Take a chronometer and time the task in seconds from the moment the user is in the Home menu until the lights are turn on (write down the time in seconds 00:00):

Notes:

- **Task – Switch on the smart plug**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

#### **Task 7: The user wants to check the Home sensors**

- **Task – The user wants to check battery life of the Smoke detector, CO detector**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- **Task – The user wants to check the door sensor status**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

1. *How did you find the system? Was it easy or difficult for you? Please, explain*
  
2. *Do you think that you can remember to do those tasks again by yourself? Please, explain.*
  
3. *We showed you two different ways to control the GUIDed devices: One was the Camera one-scanning the device with the camera of your phone and one was the Menu one-pressing the buttons to control the device. (Remind in practice if user has forgotten) Which one is better for you? Please, explain.*
  
4. *We showed you those icons (AR tags) that you can put around your home to easily control your devices (lamps, see your medication box, etc.). If you were about to keep GUIDed forever, where in your house would you prefer to place:*
  - *the Meds planner tag:*
  - *the Navigation tag:*
  - *the Home control tag:*
  - *the Home sensors tag:*
  - *the Communication tag::*
  
5. *How would you prefer those to be supplied from our team? Tell us which of the below options is the most convenient for your lifestyle or feel free to suggest another.*
  - *Stickers*
  - *Laminated cards*
  - *Plastic cards*
  - *List plastic boxes*
  - *Other*

Task List GUIDed web portal - Think aloud protocol

OFFICE USE ONLY	
Participant ID:	

**\*DO NOT USE IF PRIMARY USER DID NOT ENGAGE WITH WEB PORTAL\***

*Task 1: The user is to register into the GUIDed web portal*

- *Search for the GUIDed web portal*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- *Change language in user's native language*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- *Register in the GUIDed web portal (primary or secondary account)*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:



**Task 2: The user is to login into the GUIDed web portal**

- **Open the GUIDed application**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- **Try to login with your credentials**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

**Task 3: The user wants to add reminders for the prescribed medicine of the primary user**

- **Find the section “Medication planner”.**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- **Select “add prescribed medicine”.**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- *Fill in information for the “new prescribed medicine” and “Save”.*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

**Task 4: The user wants to add familiar locations of the primary users in their list of “My places”**

- *Find the section “Navigation”.*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- *Select “add place” and Fill in information for the “new place” and “Save”.*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Take a chronometer and time the task in seconds from the moment the user select “add place” until they pressed save/submit:

Notes:

**Task 5: The user wants to add contacts a primary user in their contact list**

- *Find the section “Communication”.*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Duration until completion of the task:

Notes:

- **Select “add new contact” and fill in information to add new contact and “Save”.**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Take a chronometer and time the task in seconds from the moment the user select “add new contact” until they pressed save/submit:

Notes:

- **Check “my pending contact requests”.**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

*What future improvements should be considered?*

Quality of Life questionnaire

OFFICE USE ONLY	
Participant ID:	

**Single item - global QoL\*:**

Thinking about both the good and bad things that make up your quality of life, how would you rate the quality of your life as a whole? Your quality of life as a whole is:

1-Very good 2-Good 3-Alright 4-Bad 5-Very bad

**Please provide your rating in the following questions. During the last 2 weeks:**

<b>How would you rate your access to information?</b>
1 - 2 - 3 - 4 - 5
poor - somewhat poor - neither - good - very good
<b>How confident do you feel to use smart devices?</b>
1 - 2 - 3 - 4 - 5
none - a little - neither - fairly - very
<b>How confident do you feel to use smart devices?</b>
1 - 2 - 3 - 4 - 5
none - a little - neither - fairly - very
<b>How confident do you feel to navigate in your town in the last two weeks?</b>
1 - 2 - 3 - 4 - 5
none - a little - neither - fairly - very
<b>How often did you avoid going to new places out of fear you might get lost in the last two weeks?</b>
1 - 2 - 3 - 4 - 5
never - rarely - neither - sometimes - often
<b>How safe do you feel in your home in case a fire outbursts in the last two weeks?</b>
1 - 2 - 3 - 4 - 5
none - a little - neither - fairly - very
<b>How safe do you feel in your home in the case of CO leakage in the last two weeks?</b>
1 - 2 - 3 - 4 - 5
none - a little - neither - fairly - very

<b>How would you rate your socialization in the last two weeks?</b>
1 - 2 - 3 - 4 - 5
none - a little - neither - fairly - very
<b>How frequently did you contact (phone, skype calls/visits) your family members/friends in the last two weeks?</b>
1 - 2 - 3 - 4 - 5+
<b>How often do you forget to take your medication in the last two weeks?</b>
1 - 2 - 3 - 4 - 5
never - rarely - neither - sometimes - often
<b>How organized do you feel about when and how you take your medicines in the last two weeks?</b>
1 - 2 - 3 - 4 - 5
none - a little - neither - fairly - very

\*OPQOL-brief: Copyrighted @ A. Bowling. This questionnaire is free to use and no permissions are needed. The request is that the source is credited:

Bowling A, Hankins M, Windle G, Bilotta C, Grant R. (2013). A short measure of quality of life in older age: The performance of the brief Older People's Quality of Life questionnaire (OPQOL-brief). Archives of Geriatrics and Gerontology, 56, 1: 181-187.

<http://dx.doi.org/10.1016/j.archger.2012.08.012>



### System Usability Scale (SUS)

OFFICE USE ONLY	
Participant ID:	

System Usability Scale					
On a grade of 1-5 (1= I highly Disagree and 5= I highly Agree) please indicate your level of agreement with the following statements:	1	2	3	4	5
I think that I would like to use this system frequently.					
I found the system unnecessarily complex.					
I thought the system was easy to use.					
I think that I would need the support of a technical person to be able to use this system.					
I found the various functions in this system were well integrated.					
I thought there was too much inconsistency in this system.					
I would imagine that most people would learn to use this system very quickly.					
I found the system very cumbersome to use.					
I felt very confident using the system.					
I needed to learn a lot of things before I could get going with this system.					

Exploitation and impact questionnaire

OFFICE USE ONLY	
Participant ID:	

**1. How frequently did you use the application and why?**

- Almost every day
- Two-three times per week
- Less than two times per week
- Almost never

---

**2. What services did you use the most and why?**

---

**3. What services did you use the least and why?**

---

**4. The GUIDed application is consisted of:**

- Meds planner
- Navigation
- Home control
- Home sensors
- Communication

Please, select the services from above you would be willing to pay to have in your everyday life. Please explain your choice

---

**5. Based on our current business model, the average price for the GUIDed application will be 9.90euros per month or 100euros per year (discounted), excluding the devices. Do you think it is a fair price and why?**

---

6. The devices could be purchased separately or provided to you with a small extra fee incorporated in your monthly subscription. Which of the two would you prefer?

7. Would you recommend/suggest this application to others??

1- highly unlikely

2- unlikely

3- likely

4- very likely

5- extremely likely

8. What risks can you identify that are related to the use of the GUIDed application and its services?

9. How did the GUIDed application help you in your daily life?

10. How often did you use the AR assistant? (If applicable)

- Almost every day
- Two-three times per week
- Less than two times per week
- Almost never

11. From 1 to 5 How useful did you find the AR assistant? (If applicable)  
(not useful at all) 1 2 3 4 5(very useful)

12. GUIDed is a modular system meaning that in the future we plan to include more services from which a user can choose according to their needs. What kind of services do you think would be good to include?

13. Other comments:





## 8.2 GUIDed – Field trials 2<sup>nd</sup> iteration – Secondary users

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## Procedure

### First Visit -Day 1

1. Check that the participants comply with the inclusion/exclusion criteria as defined in D2.2 for more information.
  - No of participants: 10 (\*5 for PLATUS)
  - IT level: broad representation of IT literacy
  - Matched with primary are preferred
  - Gender: balance representation
2. Briefly explain to the participants the objectives of the GUIDed project and system and the purpose and procedure of this testing phase.
3. Explain to participants the goal of this testing stage and procedure.
4. Obtain participants' **informed consent, if they haven't participated in the previous stages of testing.**
5. Obtain the participants' demographic data through the **demographic questionnaire and Quality of life questionnaire.**
6. Demonstrate a video demo of how the GUIDed system should work.
7. Proceed to set up GUIDed secondary account for them:
  - I. For participants that do not have associated primary users proceed with their registration on the Web portal by registering together their account and also one testing account for primary. Involving them in the adding "fake" medication on Meds planner service, add places in the navigation system and add some contacts in the communication service.
  - II. For participants that have primary users associated with them, make sure that primary users will be involved in the trials and then proceed with the registration of their primary users on the system.
8. Ask the participant(s) if they have any questions or if they would like to see any of the service demonstrated again.
9. Proceed with the **Task List GUIDed Web portal - Think Aloud Protocol.**
10. Then proceed with the **First Impression questionnaire.**
11. Thank the participant for their involvement.

**\*\*\*Follow up with participants once every 1 month via phone call or physical presence according to their needs and use Follow up form.**

### Last visit - M5

1. Arrange the last visit to the participant.
2. Proceed with the **Task List GUIDed Web portal - Think Aloud Protocol.**
3. Then administer the **SUS scale, User experience questionnaire and Exploitation and impact questionnaire.**
4. **Then proceed to the Quality of life questionnaire and then the socioeconomic questions.**
5. Thank the participant and inform them that you will invite them to the next Ethics Workshop for evaluation of the GUIDed system.

## Timeline

- First visit (training): 23-27 May 2022
- Phone follow up calls or visits (1 per 2 months)
- Last visit: 11-24 October 2022 (M5)



### Follow up call Form

Follow Up Call - Participant ID:					
Date					
a. Did you have any problems with the GUIDed app or portal?					
b. What types of problems?					

## Demographic questionnaire

OFFICE USE ONLY	
Participant ID:	

Type of secondary participant

- Independent participant
- Paired with PU Number \_\_\_\_\_

Country of residence. Please tick the box that applies to you.	
I currently live in Cyprus	
I currently live in Poland	
I currently live in Austria	
I currently live in Norway	

Gender: Please tick the box that applies to you.	
Male	
Female	
Other/would rather not say	

Age: How old are you?

Area of residence: Please tick the box that applies to you.	
Rural	
Urban	
Semi Urban	

Distance from primary's residence in Kilometres (km): How many km away do you live from the person you care for (older adult)?
_____ km

Education: Please enter total years of education (primary, secondary or higher-do not count vocational, technical training, seminars or other informal training received)

What is your IT level? Please tick the box that applies to you.
---

<p><b>Low</b>, I don't use or I use some devices like smart phone, computer, tablet and internet with a lot of difficulty.</p>	
<p><b>Medium</b>, I use a lot of devices like smart phones, computer, tablet, internet and apps and I can perform a broad array of IT related functions with a low level of difficulty such as using social media</p>	
<p><b>High</b>, I use devices like smart phones, computer, tablet, internet and apps and I am capable to resolve any technical issues that might arise</p>	

Task List - GUIDed web portal (Think aloud protocol)

OFFICE USE ONLY	
Participant ID:	

***Task 1: The user is to register into the GUIDed web portal***

- ***Search for the GUIDed web portal***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- ***Change language in user's native language***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- ***Register in the GUIDed web portal (primary or secondary account)***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

***Task 2: The user is to login into the GUIDed web portal***

- ***Open the GUIDed application***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- ***Try to login with your credentials***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

***Task 3: The user wants to add reminders for the prescribed medicine of the primary user***

- ***Find the section “Medication planner”.***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- ***Select “add prescribed medicine”.***

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- *Fill in information for the “new prescribed medicine” and “Save”.*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

***Task 4: The user wants to add familiar locations of the primary users in their list of “My places”***

- *Find the section “Navigation”.*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

- *Select “add place” and Fill in information for the “new place” and “Save”.*

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Take a chronometer and time the task in seconds from the moment the user select “add place” until they pressed save/submit:

Notes:

***Task 5: The user wants to add contacts a primary user in their contact list***

- *Find the section “Communication”.*



Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Duration until completion of the task:

Notes:

- **Select “add new contact” and fill in information to add new contact and “Save”.**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Take a chronometer and time the task in seconds from the moment the user select “add new contact” until they pressed save/submit::

Notes:

- **Check “my pending contact requests”.**

Rating task difficulty (1 very easy – 5 very difficult):

1 2 3 4 5

Notes:

What is your overall impression of the web portal?

Do you have any recommendations on how to improve the web portal further?



Quality of life questionnaire

OFFICE USE ONLY	
Participant ID:	

1. Are you worried that something bad is going to happen to them when they are home?
2. How much do you worry that they can get lost when they go outside?
3. How much do you worry that they will take their medication correctly?



First impression questionnaire

OFFICE USE ONLY	
Participant ID:	

First impression questionnaire for Secondary User						
On a grade of 1-5 (1= I highly Disagree and 5= I highly Agree) please indicate your level of agreement with the following statements:						
		1	2	3	4	5
1	I believe the application would be useful for me to be able to help someone in my care more effectively					
2	I believe the application will help improve the quality of life of the person in my care					
3	I believe the application would help the person in my care in their daily life					
4	I would recommend this application to other caregivers					
5	I would recommend this application to older people over 60					
6	I would recommend this application to friends and family					
7	I found the application to be innovative					
8	I think the GUIDed application is safe to use					
9	I think that the data of the person in my care are protected					
10	The web portal includes all the features and functions that I need.					
11	The web portal is easy to use					
12	The design of the web portal is pleasant					
13	I think that all the information provided to the older adults is transparent and clear					
14	I found the Medication planner Service to be useful for both me and to the person for whose benefit I was operating the service					
15	I found the Navigation Service to be useful for both me and to the person for whose benefit I was operating the service					
16	I found the Home control Service to be useful for both me and to the person for whose benefit I was operating the service					
17	I found the Home sensors Service to be useful for both me and to the person for whose benefit I was operating the service					
18	I found the Communication Service to be useful for both me and to the person for whose benefit I was operating the service					



### System Usability Scale (SUS)

OFFICE USE ONLY	
Participant ID:	

System Usability Scale					
On a grade of 1-5 (1= I highly Disagree and 5= I highly Agree) please indicate your level of agreement with the following statements:	1	2	3	4	5
I think that I would like to use this system frequently.					
I found the system unnecessarily complex.					
I thought the system was easy to use.					
I think that I would need the support of a technical person to be able to use this system.					
I found the various functions in this system were well integrated.					
I thought there was too much inconsistency in this system.					
I would imagine that most people would learn to use this system very quickly.					
I found the system very cumbersome to use.					
I felt very confident using the system.					
I needed to learn a lot of things before I could get going with this system.					

## User Experience Questionnaire (UEQ)

For the assessment of the GUIDed system, please fill out the following questionnaire. The questionnaire consists of pairs of contrasting attributes that may apply to the GUIDed system. The circles between the attributes represent gradations between the opposites. You can express your agreement with the attributes by ticking the circle that most closely reflects your impression.

### Example:

attractive	○	⊗	○	○	○	○	○	unattractive
------------	---	---	---	---	---	---	---	--------------

This response would mean that you rate the system as more attractive than unattractive.

Please decide spontaneously. Don't think too long about your decision to make sure that you convey your original impression.

Sometimes you may not be completely sure about your agreement with a particular attribute or you may find that the attribute does not apply completely to the particular product. Nevertheless, please tick a circle in every line.

It is your personal opinion that counts. Please remember: there is no wrong or right answer!

Please assess the GUIDed system now by ticking one circle per line.

	1	2	3	4	5	6	7		
annoying	○	○	○	○	○	○	○	enjoyable	1
not understandable	○	○	○	○	○	○	○	understandable	2
creative	○	○	○	○	○	○	○	dull	3
easy to learn	○	○	○	○	○	○	○	difficult to learn	4
valuable	○	○	○	○	○	○	○	inferior	5
boring	○	○	○	○	○	○	○	exciting	6
not interesting	○	○	○	○	○	○	○	interesting	7
unpredictable	○	○	○	○	○	○	○	predictable	8
fast	○	○	○	○	○	○	○	slow	9
inventive	○	○	○	○	○	○	○	conventional	1 0
obstructive	○	○	○	○	○	○	○	supportive	1 1

good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	bad	1 2
complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	easy	1 3
unlikable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	pleasing	1 4
usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	leading edge	1 5
unpleasant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	pleasant	1 6
secure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not secure	1 7
motivating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	demotivating	1 8
meets expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	does not meet expectations	1 9
inefficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	efficient	2 0
clear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	confusing	2 1
impractical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	practical	2 2
organized	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	cluttered	2 3
attractive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	unattractive	2 4
friendly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	unfriendly	2 5
conservative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	innovative	2 6

<https://www.ueq-online.org/>

Laugwitz, B., Schrepp, M. & Held, T. (2008). Construction and evaluation of a user experience questionnaire. In: Holzinger, A. (Ed.): USAB 2008, LNCS 5298, pp. 63-76. Show on Research Gate

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Schrepp, M.; Hinderks, A. & Thomaschewski, J. (2017). Construction of a benchmark for the User Experience Questionnaire (UEQ). International Journal of Interactive Multimedia and Artificial Intelligence, Vol. 4, No. 4, pp. 40-44. Show on Research Gate

Schrepp, Martin; Hinderks, Andreas; Thomaschewski, Jörg (2017): Design and Evaluation of a Short Version of the User Experience Questionnaire (UEQ-S). In: IJIMAI 4 (6), pp. 103–108. Show on Research Gate



OFFICE USE ONLY	
Participant ID:	

<p><b>1. What is your most favourite service and why?</b></p>
<p><b>2. What would you change to the system to make it adapted to your needs and the primary users?</b></p>
<p><b>3. What is your least favourite service and why?</b></p>
<p><b>4. The GUIDed application is consisted of:</b></p> <ul style="list-style-type: none"> <li>● Meds planner</li> <li>● Navigation</li> <li>● Home control</li> <li>● Home sensors</li> <li>● Communication</li> </ul> <p>Please, select the services from above you would be willing to pay for and provide your reasoning:</p>
<p><b>5. Based on our current business model, the average price for the GUIDed application will be 9.90euros per month or 100euros per year (discounted), excluding the devices. Do you think it is a fair price and why?</b></p>
<p><b>6. The devices could be purchased separately or provided to you with a small extra fee incorporated in your monthly subscription. Which of the two would you prefer?</b></p>



7. Would you recommend/suggest this application to others??	1- highly unlikely	2- unlikely	3- likely	4- very likely	5- extremely unlikely
8. What risks can you identify that are related to the use of the GUIDed application and its services?					
9. What would you like to see in the system to trust it?					
10. How frequently did you use the system during the last six months?					
<ul style="list-style-type: none"> <li>i. Almost every day</li> <li>ii. Two-three times per week</li> <li>iii. Less than two times per week</li> <li>iv. Almost never</li> </ul>					
11. What tasks did you use it for?					
12. GUIDed is a modular system meaning that in the future we plan to include more services from which a user can choose according to their needs. What kind of services do you think would be good to include?					

Socioeconomic Impact Questionnaire

<b>Socioeconomic Impact Questionnaire</b>	
<i>Please, rate how much you agree or disagree with the following statements</i>	
System may maintain independence of the older adults.	
<ul style="list-style-type: none"> <li>1- Completely agree</li> <li>2- Somewhat agree</li> <li>3- Neither agree nor disagree</li> <li>4- Somewhat disagree</li> <li>5- Completely disagree</li> </ul>	Why?
System may improve primary users' confidence of navigating around the city.	
<ul style="list-style-type: none"> <li>1- Completely agree</li> <li>2- Somewhat agree</li> <li>3- Neither agree nor disagree</li> <li>4- Somewhat disagree</li> <li>5- Completely disagree</li> </ul>	Why?
System may help in improving the communication between me and my primary user (older adult).	
<ul style="list-style-type: none"> <li>1- Completely agree</li> <li>2- Somewhat agree</li> <li>3- Neither agree nor disagree</li> <li>4- Somewhat disagree</li> <li>5- Completely disagree</li> </ul>	Why?
System may help correct medication intake of the older adults. Why?	
<ul style="list-style-type: none"> <li>1- Completely agree</li> <li>2- Somewhat agree</li> <li>3- Neither agree nor disagree</li> <li>4- Somewhat disagree Completely disagree</li> </ul>	
What would you like us to improve in the system?	

## 8.3 GUIDed – Field trials 2nd iteration – Tertiary users

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#### Procedure

##### **M6**

1. Check that the participants comply with the inclusion/exclusion criteria as defined in D2.2.
  - No of participants: 2-5 participants according to availability
  - Broad representation of sectors according to the definition provided for each country in D2.2
2. Briefly explain to the participants the objectives of the GUIDed project and system and the purpose and procedure of this testing phase.
3. Explain to participants the goal of this testing stage and their involvement.
4. Obtain participants' **informed consent** , if they haven't participated in the previous stages of testing.
5. Obtain the participants' demographic data through the **demographic questionnaire**.
6. Demonstrate a video demo of how the GUIDed system should work.
7. Ask the participant(s) if they have any questions or if they would like to see any of the service demonstrated again.
8. Then proceed with the **Interview**.
9. Thank the participant for their involvement.

#### Timeline

- 1 Session: 7-14 Nov 2022 (M6)

## Demographic questionnaire

OFFICE USE ONLY	
Participant ID:	

Country of residence. Please tick the box that applies to you.	
I currently live in Cyprus	
I currently live in Poland	
I currently live in Austria	
I currently live in Norway	

Gender: Please tick the box that applies to you.	
Male	
Female	
Other/would rather not say	

Age: How old are you?

Professional Background	
Years of experience	
Sector	
Type of enterprise	<ul style="list-style-type: none"> <li>● SME</li> <li>● Large enterprise</li> <li>● NGO</li> <li>● other (explain)</li> </ul>

Occupation: What is your profession?

What is your IT level? Please tick the box that applies to you.

**Low**, I don't use or I use some devices like smart phone, computer, tablet and internet with a lot of difficulty.

**Medium**, I use a lot of devices like smart phones, computer, tablet, internet and apps and I can perform a broad array of IT related functions with a low level of difficulty such as using social media

**High**, I use devices like smart phones, computer, tablet, internet and apps and I am capable to resolve any technical issues that might arise

## Interview

OFFICE USE ONLY	
Participant ID:	

Our Business plan:

According to the feedback received through the iterative testing phases of the GUIDed system so far, we plan to market the system in a B2C manner. Primary customers would be people caring for older adults such as family members or informal caretakers. Tech-competent, younger and independent older adults could also be a secondary target customer group. The means to sell the product software (app) will be mainly website and Google App Store. Users' will be requested to pay a monthly or yearly subscription to the application to use all of its features. The respective hardware will be provided in a one-off payment or will be incorporated in the subscription plan as a fee (including technical support and upgraded equipment when needed).

—show value proposition canvas or lean canvas for feedback—

**1. What approach would you suggest for this system?**

- B2B
- B2C

**i. Please, explain your answer:**

**2. Based on our current business model, the average price for the GUIDed application will be 9.90euros per month or 100euros per year (discounted), excluding the devices. Do you think it is a fair price and why?**

**3. Which services of the GUIDed app do you think the customers will be willing to pay to use (Please tick as many as you like)? Why?**

- Meds planner
- Navigation
- Home control
- Home sensors
- Communication

**4. Who do you think would be our main customers in Cyprus/Norway/Poland/Austria?**

**5. How best do you feel can this product be commercialized? E.g. what channels to pursue (social media, mouth to mouth, newspapers etc.)?**

**6. What are the key challenges you foresee in promoting this application and reaching profitability / viability in your country?**

**7. What are the key improvements that we must carry out for each of the services and for the application as a whole at this stage / before commercialization?**

**8. What information (facts, features) would you need to persuade you to incorporate the GUIDed system in your practice?**

**9. Which channels do you trust to learn about new products like the GUIDed system, for your organisation (e.g. social media, mouth to mouth, newspapers etc.)?**

**10. Which of the services of the GUIDed system would you be interested to exploit in a B2B manner?**

<p><b>11. Which purchase model you (as business partner) will be interested to exploit with the GUIDed consortium (e.g. purchase specific services from GUIDed such as the Smart Navigation to resell it? and at what price)?</b></p>					
<p> </p>					
<p><b>12. Would you be likely to sell this product?</b></p>	<p><b>1-highly unlikely</b></p>	<p><b>2-unlikely</b></p>	<p><b>3-likely</b></p>	<p><b>4-very likely</b></p>	<p><b>5-extremely likely</b></p>
<p><b>13. Would you recommend/suggest this application to customers?</b></p>	<p><b>1-highly unlikely</b></p>	<p><b>2-unlikely</b></p>	<p><b>3-likely</b></p>	<p><b>4-very likely</b></p>	<p><b>5-extremely likely</b></p>
<p><b>14. What risks can you identify that are related to the use of the GUIDed application and its services?</b></p>					
<p> </p>					
<p><b>15. What would you like to see in the system to trust it?</b></p>					
<p> </p>					
<p><b>16. Finally, GUIDed is a modular system meaning that in the future we plan to include more services from which a user can choose according to their needs. What kind of services do you think would be good to include?</b></p>					
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