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Abstract (for dissemination)	This document describes the methodology, the procedure and the results of the user needs analysis for the T&Tnet navigation solution. The resulting requirements serve as guidelines for the generation of business models, creation of scenarios and the development of the first T&Tnet prototype.

T&Tnet

Travel & Transport solutions through emotional-social NETworking

T&Tnet: Travel & Transport solutions through emotional-social NETworking

AAL-4-032

Deliverable **D1.1**
User needs analysis

Public

VERSION HISTORY

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1 Introduction

T&Tnet, Travel & Transport solution through emotional and social networking, is a project concerned with the development of a mobile application that aims to assist senior citizens in their daily and leisure navigation tasks. The goal of the present deliverable is to offer a detailed description of the methodology, the processes and the results of user needs analysis for T&Tnet. The structure of this deliverable is organized as follows:

- Section 1 offers a short introduction to the topic of mobile navigation technology and seniors.
- Section 2 defines the goals and the research questions addressed in the User Analysis study.
- Section 3 includes a description of the end-user groups, their involvement in T&Tnet User Needs Analysis and the recruitment process.
- Sections 4, 5 refer to the User Needs Analysis methodology and the procedures as followed by Consortium partners in Austria (AT), Norway (NO), Spain (ES), France (FR).
- Section 6 provides the schedule of the user needs analysis study.
- Sections 7, 8, 9 include the results, the summary and the conclusions drawn by User Needs Analysis.
- Annexes A, B, C, D include the informed consent, the questionnaires and the focus group and user observation manuals.
- Annex E contains the interview guides for secondary users.
- Annex F includes the personas created from each country out of the results.
- The transcribed interviews with secondary users can be found in Annex G.

1.1 Background (Introduction)

Navigation applications are nowadays widely available in various formats; in websites, in GPS devices suitable for cars, and naturally also in mobile applications. One of the most well-known that has a global geographical coverage is the Google maps application available as a website, smartphone and tablet app. The Google Maps content varies be-

tween different locations but in general it provides information regarding traffic, an actual photographic map of an area called 'street view', public transit, walking, biking and driving directions and local business search and reviews.

Various other local and global navigation applications are developed for different platforms and with a different scope: many are targeted for use within cars, allowing offline use of the maps and voice guided navigation, such as TomTom[1] (Figure 1) navigation devices; local navigation applications containing all the information for public transit, e.g. Qando[2] for the city of Vienna; touristic applications; applications designed to facilitate individuals with visual impairments such as Walky Talky[3] and Intersection Explorer[4] by utilizing touch and audio modalities; applications that allow search of accessible points of interest (cafes, hotels, museums etc.) while offering navigation services, such as Wheelmap[5] (Figure 2).

This list is by no means exhaustive but offers an overview on how navigation is customized - in regards to platform, content and interaction techniques - according to the context and her/his needs. Despite the variety of applications developed for different scopes and contexts, until today, to best of our knowledge, seniors' needs and requirements are not addressed by any navigation application, at least at a commercial level. One plausible explanation is that seniors form a diverse target group, featuring different levels of computer literacy and often characterized by impairments of different extent and nature. Domains of impairment relevant to navigation technology are visual and hearing abilities, mobility, haptic sense and manual dexterity (for the use of mobile devices) and cognitive impairment (for managing the cognitive load of a navigation task).

Nevertheless, there is evidence that a navigation application for senior citizens would be increasingly valuable. First of all, because the population is aging; by 2050, there will be 3.2 adults aged 60 or older for every child aged 4 years old or younger [2]. Mobility, both for mundane tasks and for social or family events is cited by seniors as an important ele-

[1] http://www.tomtom.com
[2] http://www.qando.at
[3] https://play.google.com/store/apps/details?id=com.googlecode.eyesfree.walkytalky&hl=en
[4] http://www.appbrain.com/app/intersection-explorer/com.google.android.marvin.intersectionexplorer
[5] http://wheelmap.org/en

ment of their life quality, linked to independence [4]. Bowling Ann found that engaging in social activities is considered one of the key factors for life quality and physical mobility is cited as one of the things that would improve quality of life, according to seniors [1], confirming thus Coughlin's results [4]. Drivers tend to prefer automobile, while non-drivers choose to ride with a friend or a family member to cover their mobility needs as they consider public means of transportation and/or walking a less attractive solution [4]. From all the above, it becomes evident that supporting seniors' mobility is a crucial issue that can be examined by different viewpoints: from the medical perspective, to explore ways to assist their physical mobility; from the infrastructure point of view, to address urban accessibility and improve means of transportation and last, but not least, through information and usability, to enable seniors to benefit from the existing infrastructure and means of transportation to the greatest possible extent.

Therefore, the scope of T&Tnet project is to facilitate mobility from the latter perspective; that is, it aims at designing a comprehensible and easy-to-use application by combining various types of information (public transit, infrastructure, weather etc.) and different modalities (visual, audio, touch, text input, etc).

Figure 1. the TomTom navigation system.

Figure 2. A web and mobile application that provides accessibility information for wheelchair users

1.2 Scope of user needs analysis deliverable

The scope of this deliverable is to provide an overview of the needs and wishes of the target users of T&Tnet as well as the methodologies used to analyze them. The first step towards this goal is the detailed definition of our target users: primary, secondary and tertiary (Section 3). The target user definition is based upon the initial T&Tnet project idea that involves a mobile navigation application for senior citizens, and its premises (e.g. that the seniors should be capable of operating a mobile platform).

The target user definition is followed by identifying our research goals, namely our expectation from the user needs analysis (Section 2). The next step is to develop a methodology that will allow end users to provide us with insights relevant to our goals (Sections 4, 5). The methods used for this purpose for T&Tnet are questionnaires, focus groups and user observations. Section 7 contains a detailed description of the results of the User Needs Analysis activities.

2 Focus of research

The focus of research in Austria, Norway, France and Spain deals with various research goals which are described in the following section.

2.1 Research goals

The scope of T&Tnet is to facilitate users in planning routes and in way-finding. For this purpose, several types of platforms, interaction techniques and various use cases were initially suggested according to the T&Tnet project idea. The added value of a product however, is not proportional to the amount of functionality that it includes; the user should be able to understand without much effort and use effectively the functionality provided to complete his tasks. Otherwise, unnecessary complexity can reduce the benefits of the application by overwhelming the user. This user needs analysis aims to explore this vast area of possibilities and gain insights on the following aspects of T&Tnet:

- **The content:** The content focus axis refers to information and functionality of T&Tnet. Our target user group is diverse in limitations, skills, interests and navigation goals. Therefore a good understanding of this diversity is needed in order to find out which types of information facilitate the navigation tasks of our target users and then, prioritize them and customize the application accordingly. The content are most intensively addressed within **the focus groups**, **the questionnaire** (within the focus groups) and **the interviews with secondary users**.
- **User-system interaction:** The user system interaction axis includes the different platforms, modalities and interaction techniques (vibration, sound, oral instructions, graphical interface, text, touch etc.) into which the T&Tnet content will be mapped. Various insights regarding interaction immerse during **the focus groups (**in the separate discussion dedicated to mobile interaction techniques) and the **user observations**.
- **User's conceptual or mental model:** The third domain in which we aspire to gain insights into is the user's conceptual or mental model. According to Alan Cooper [3] user's mental model is *'the way users perceive the jobs they need to do and how the program helps them do it is their mental model of interaction with this soft-*

ware'. In the case of T&Tnet, we are interested in getting insights on how the user perceives her/his navigation tasks and mobile applications. The cognitive model is addressed by the **user observations** where the user will perform a short navigation task thinking-aloud.

2.2 Research questions

Our research goals, namely to acquire insights on content, interaction and user's mental model, require exploration of users' personal experiences, opinions and wishes. Therefore, the research questions are concerned with aspects on which our primary end users (seniors) have a minimum level of familiarity and experience:

- **Mobile technology:**
    - To what extent seniors understand and benefit from mobile technology and its elements (GPS, WiFi, applications etc.)?
    - Are they motivated to use mobile technology and under which circumstances their motivation becomes stronger (tasks, goals etc.)?
- **Mobility:**
    - What is their motivation for mobility (leisure, life maintenance, social activities etc.) and which means of transportation do they use?
    - What hinders their mobility? 'What' refers to physical barriers, like roadworks, their own limitations, like pain and tiredness and in general any parameter that could prevent them from being mobile and active.
    - How do they plan a route? 'How' refers to route planning tools and to reasoning and way of thinking before getting down the road.
    - How do they find their way? 'How' refers to on-the-spot problem solving and the challenges involved.
- **Navigation technology:**
    - What is their experience with navigation tools, both analogue and digital? When and how would they use them?
    - What are the problems and difficulties when using current navigation tools (such as Google Maps, one of the most common digital navigation tools available)?

- **User System interaction:**
    - Which modalities are preferred and for which type of information are they suitable?
    - Which platform (tablet or smartphone) they prefer for navigation purposes and why?

Moreover it is particularly interesting to observe how the culture, the infrastructure and the acquaintance with technology will affect the insights that will occur from the focus groups in the four different countries: AT, NO, FR, ES.

3 Target user specification and recruitment procedure

The next section defines the different target user groups of T&Tnet and the recruitment procedure.

3.1 End-user groups

According to AAL Joint Programme[6], there are three end-user categories directly or indirectly involved with ICT applications developed for AAL (such as T&Tnet) – those are:

- ***Primary end-user*** *is the person who is actually using an AAL product or service, a single individual, "the well-being person". This group directly benefits from AAL by increased quality of life.*
- ***Secondary end-users*** *are persons or organizations directly being in contact with a primary end-user, such as formal and informal care persons, family members, friends, neighbours, care organizations and their representatives. This group benefits from AAL directly when using AAL products and services (at a primary end-user's home or remote) and indirectly when the care needs of primary end-users are reduced.*
- ***Tertiary end-users*** *are such institutions and private or public organizations that are not directly in contact with AAL products and services, but who somehow contribute in organizing, paying or enabling them. This group includes the public sector service organizers, social security systems, insurance companies. Common to these is that their benefit from AAL comes from increased efficiency and effectiveness which result in reducing or capping in the mid and long term.*

3.1.1 Primary end-users

In this section, the profile of the primary end-user and T&Tnet approach towards her/him will be discussed. Here, it should be noted that in the following sections of the present document **primary end-users** will be mentioned as **target users**.

The main characteristics of T&Tnet target users are:

[6] http://www.aal-europe.eu/

- **Age:** She/he is older than 65 years.
- **Cognition:** She/he is seemingly healthy, possibly with age-related symptoms of mental, cognitive and memory decline. Seniors with specific mental and cognitive impairments (e.g. MCI, Alzheimer`s, Dementia) are excluded from lab and field trials and consequently, they will not be considered in user needs Analysis.
- **Mobility:** She/he has a good level of mobility and independence that allow her/him to come to the experiment facilities without assistance.
- **Experience with ICT:** Prior experience with computers is not necessary, but she/he should be at least motivated to use technology and specifically, a cell phone (or a laptop, depending on visual capability and own wishes).
- **Sensory system:** She/he has possibly age related restrictions in her/his sensory system and/or impairments, but not profound hearing or vision loss. Moreover, she/he has good haptic sense and she/he is able to tap on a smartphone screen with precision.
- **Literacy:** She/he is literate as she/he should be able to read and understand instructions.

T&Tnet target user can possibly have health problems and/or use walking aids (e.g. walker, mobility scooter, wheelchair) as long as they do not substantially limit her/his mobility and capability to use a smartphone. The traits of our target user are based on the capabilities and the limitations of the technology of our end product, a mobile application. T&Tnet is designed to assist seniors in their navigation tasks with routes tailored to their accessibility and comfort preferences; it does not aim to increase the physical mobility of the seniors. Therefore, it is necessary to assume a certain level of mobility and independence for T&Tnet target users.

3.1.2 Secondary end-users

The T&Tnet application assumes a good level of mobility and capability of using mobile technology; therefore it is designed on the needs of relatively healthy and independent older individuals. Thus, in the case of T&Tnet, the **secondary users** do not have the role of the carer, but are mostly engaged in mutual social interactions with the primary users, are interested in their well-being and available to support them if needed. Such users

are family members, friends and relatives' of the target users as well as organizations which support seniors' well-being and mobility (e.g. travel agencies organizing trips for seniors).

3.1.3 Tertiary end-users

For the T&Tnet Project, **tertiary users** are organizations or enterprises which deal directly or indirectly with seniors, technology, mobility and/or tourism: e.g. public transport organizations, city councils, organizations supporting technology usage for seniors (such as Seniornett, member of T&Tnet Consortium), organizations that promote seniors' well-being, touristic organizations. Many of the tertiary users handle information crucial for the successful outcome of T&Tnet Project:

- **Public Transport Organizations**: they hold the absolutely necessary for T&Tnet **transportation timetables and data**.
- **City Councils and other state organizations for people with various impairments:** they hold information related to accessibility; **accessible entrances to metros and public buildings with lifts and escalators, architectural barriers, road works, pavements, public toilets** etc. This type of information is necessary in order to accommodate the accessibility and comfort needs of the target users. Moreover, information about **weather** conditions is also extremely important input for T&Tnet in order to provide recommendations for routes.
- **touristic organizations:** they own information related to tourism: sightseeing timetables, price and historic information, and location of restaurants and café. Possibly this information is also available through specific interest websites.

The Consortium will approach tertiary users that hold necessary information for T&Tnet, in order to discuss the terms under which this type of information will become available to the consortium members. The tertiary users will benefit directly or indirectly from a positive outcome of T&Tnet Project, as they will be able to offer to their clients/members/tourists advanced travelling services.

3.2 Recruitment procedure

The primary target users are approached to offer their insights about T&Tnet through the recruitment procedure. The role of the recruiters is to ensure that the selected participants in the User Needs Analysis studies fulfil the criteria as stated in section 3.1.1:

- **Age, literacy**: These criteria are easily verifiable due to the fact that recruiters have such information for individuals they have contacted in the past for similar studies.
- **Mobility**: Their presence to the focus group facilities without escort indicates that the prospective participant has presumably a good level of mobility.
- **Cognition, experience with ICT, sensory system**: 'Do you use a mobile phone?' is a question that will indicate that the prospective participant possesses the required haptic, visual and hearing abilities as well as a basic level of experience with technology. For the user observations, an additional requirement is that the selected participants own and use a smartphone.

Primary users in are recruited by CURE in Austria, by Seniornett in Norway, by APHP in France and by ITA in Spain. During the recruiting phase CURE, Seniornett, APHP and ITA will use existing contacts from other projects and will get in touch with new contacts by applying diverse strategies (e.g. phone calls, flyers, newsletters, etc.). The secondary end-users recruited in Austria, Norway and France were representatives of organizations which organize group events and trips for seniors. Table 1 gives an overview on the planned number of participants for the user studies with primary users in Austria (AT), Norway (NO), France (FR) and Spain (ES).

Table 1. A summary of the user studies that run in ES, AT

methods	Spain (ITA)	Austria (CURE)	France (AP-HP)	Norway (KARDE, Seniornett)
questionnaire	16 participants	11 participants	6 participants	16 participants
focus group	16 participants	11 participants	6 participants	16 participants (2 focus group sessions)
User observation	-	4 participants	1 participant	-
Interview with secondary users	1 representative of Zaragoza Tourism Office)	2 representatives of seniors' leisure organizations)	-	3 representatives of seniors' leisure organizations

4 Methods

The methodology used to gather user needs mainly focuses on primary target users, as by definition, they are considered independent in their mobility and they need little or no support by carers and family. For the collection of secondary users' requirements, interviews with representatives of organizations specialized in seniors' travel and leisure activities are conducted. The tertiary users will be approached throughout the course of the project, as they hold various types of information needed for T&Tnet (e.g. public transit timetables) and they can also contribute to the project's dissemination.

4.1 Primary target users

The methodology is according to the regulations and requirements of AAL projects regarding participation of primary end users in user studies. It mainly consists of three parts: a questionnaire, a focus group and a user observation study.

The methodology aims to facilitate users in expressing their needs, wishes and opinions regarding navigation through different ways: questionnaires, discussions, brainstorming and thinking-aloud during an actual navigation task. As described in the section 1, the methodology is built around four major thematic categories: **mobile technology, mobility, navigation technology, user system interaction** and aims to provide the Consortium with useful feedback on the desired **content** and **interaction** of T&Tnet and on how to map those according to user's **cognitive model**. Gathering insights on these four topics through various methods, ensures that the users will have the chance to express themselves in the most appropriate for them way and that issues that appear from multiple sources (e.g. from both focus group and observation) are emphasized. The three research instruments used for this purpose are:

- The first instrument is a brief **questionnaire**, designed to gather quantitative and qualitative data about participants' usage of mobile technology and their mobility habits. The first part of the questionnaire, regarding mobile technology requires as input the level of familiarity with various technology terms related to mobile technology (and in general to technology) nowadays (WiFi, smartphone, tablet, GPS, e-

mail, Facebook, etc.). The answer is in the form of multiple choices. Each of this terms corresponds to an aspect of T&Tnet and the familiarity level of the user informs us about the barriers that the user would possibly face using a navigation application: knowing how to connect to WiFi network is important, because WiFi can push location-related notifications to users or can be used to acquire map information; familiarity with Facebook could be an indication that a social platform in T&Tnet will be accepted by the users; similarly, familiarity with other technology artifacts lowers the cognitive barriers for T&Tnet.

The second part of the questionnaire regarding the mobility habits gives us a first mobility profile of the participants. It informs us about means of transportation participants use, navigation tools and their route planning for unknown routes. The questionnaire is filled in in the beginning of the focus group and can be found in Annex D: Questionnaire

- **Focus group** is a widely used method for collection of user requirements that involves discussions and often brainstormings or other methods, all fermented in the group interaction. In our setup, the focus group session is moderated by one researcher and observed by one or two researchers and the number of participants ranges between countries from six to sixteen. The focus group includes a discussion, a brainstorming phase and a brief evaluation of ideas generated by the T&Tnet Consortium and during the brainstorming phase. The setup is explained in section 5.2 and Annex A: Focus group manual
- In addition to the focus groups optional **user observations** will be applied. The user observation is a process that addresses the task in its actual context and in this case it will be performed with the help of Google Maps application. The context of navigation can be often very demanding and require from the user to constantly shift his attention from the environment around him to the device and vice versa. Moreover, external conditions (e.g. noise, light, weather, traffic etc.) can be distracting and cause frustration and errors. The user observation technique contributes to the understanding of user's problem solving methods and the influence of the environment on her/his interaction with the device. Moreover, it serves as a brief evaluation session with one of the most well-known navigation applications. In our case, the user

observation takes place on the road, while a primary target user performs a brief navigation task with Google Maps and thinks aloud about it. One or two observers accompany the participant to ensure her safety and encourage her to talk about the interaction with the application. The User Observation Manual can be found in Annex B: User observation manual.

4.2 Secondary and tertiary target users

With the goal to gather meaningful insights and feedback from different view angles, seniors' leisure organizations as secondary users are approached. The role of these organizations is to foster the well-being of their members, by organizing group activities and trips, tailored to seniors' needs. As a result, they possess all the necessary information and experience regarding seniors' mobility and navigation needs. Moreover, since they have years of experience dealing with seniors, they know their consuming behaviors and could have useful insights on the pricing strategy and on how T&Tnet should be introduced. Therefore, their involvement in the project is twofold - as they hold information both about seniors' mobility and navigation and about their consuming behavior - and it is addressed with a number of semi-structured interviews, described in detail in Annex E.

The role of the tertiary organizations, described in section 3.1.3, in the development of T&Tnet can be divided in three parts:

- First, they hold information regarding transportation, accessibility, sightseeing, weather, etc. Before moving on with the development of T&Tnet, it is necessary to define the types of information that will be included, the format into which this information will become available as well as the commercial aspects of it. In the course of time, once a final decision about the types of information is made, the negotiations with the respective organizations will follow.
- Second, tertiary organization can provide the framework in which T&Tnet business case will be developed. The framework depends on the pricing of the above-mentioned information and the possibilities of collaboration for the distribution of the application.
- Third, they can contribute in the dissemination of T&Tnet in their area of influence.

Therefore, soon after the user needs analysis is communicated to partners and the design of the application is initiated, meetings with tertiary users in the form of open discussions and negotiations will take place. The final outcome of the collaboration with tertiary organizations will be included in following deliverables.

5 Procedure

The following section gives an overview of the procedure applied in questionnaires, focus groups,user observations and interviews with secondary users. A detailed description can be found in the annex section (Annex D: Questionnaire, Annex A: Focus group manual, Annex B: User observation manual, Annex E: Interview Guide for interviews with secondary users).

5.1 Questionnaire

The questionnaire was filled in by focus group participants in all four countries, ES, AT, NO, FR. The moderators handed the questionnaire in the beginning of the focus group session. The questionnaire is focused on **mobile technology** and **mobility** aspects, contains multiple choice questions and questions that require short text for an answer. Filling in the questionnaire lasts approximately 10 minutes. Participants were free to ask questions to the moderators throughout the questionnaire.

The questionnaire main topics, mobile technology usage and mobility habits, are also addressed by the focus group thematic discussions (see section 5.2 and Annex A: Focus group manualHaving information on the same topics from various sources ensures the validity of the gathered insights and allows participants to express themselves in the way that is more suitable for them.

5.2 Focus groups

Table 2 provides the schedule of the focus group session with an estimation of the time planned for each activity.

After the questionnaire is filled in by the participants, the focus group starts with a discussion on all four thematic categories sequentially **(mobile technology**, **mobility**, **navigation technology** and **user system interaction**). The discussion is accompanied by a demonstration of the Google Maps application and of mobile platforms (Figure 3). During the discussion phase, the participants have the chance to talk about their usage and knowledge on mobile technology, describe their mobility habits and motivation and comment on the mobile platforms. The discussion aims to provide background information and

reveal possible issues of the participant's experience with mobile technology (and their interaction with it), mobility and navigation. The session continues with a **brainstorming** where participants have to come up with **ideas** and narrate their **use of an ideal mobile navigation system**. The moderator classifies their ideas into functionality and information points and she presents the Consortium ideas regarding possible functionality and information of T&Tnet. Participants are asked to comment and vote on both their and the Consortium generated ideas (Figure 4). The brainstorming part directly serves the research goal that refers to T&Tnet **content**; the participants' ideas fermented in group discussions and prioritized through the voting process will be valuable input while designing T&Tnet system. The detailed focus group manual can be found in Annex A.

Table 2. The focus group schedule

Time (in min)	Activity
0-5	Welcome
5-15	Informed consent
15-25	T&Tnet introduction
25-35	Mobile technology and mobility questionnaire
35-60	Discussion
60-70	Break
70-115	Interactive brainstorming
115-120	Conclusions, thanks, goodbye!

5.3 User observations

Following the focus groups, 2-3 participants will be invited to perform a short real-world navigation task. The T&Tnet user observations were decided to take place in Austria and France. The number of participants who took part in this study was 4 for Austria and 1 for France. No user observations were performed in Norway and Spain.

The procedure starts with a route planning assignment performed with the participant and a researcher in the lab and is followed by participant's attempt to find the way to the destination while expressing her thoughts on the task (Figure 15). A detailed user observation manual can be found in Annex B.

Figure 3. The moderator demonstrates route planning with Google Maps to focus group participants (Austria).

Figure 4. Participants vote for their preferred ideas after brainstorming (Austria).

Figure 5. Focus group participants (France).

Figure 6. The moderator demonstrates route planning with Google Maps to focus group participants (France).

5.4 Interviews with secondary users

As described also in section 4.2, the secondary users selected for the interviews were organizations involved in organizing touristic trips and leisure activities for seniors. Interviews with representatives of such organizations took place in ES, AT and NO. The representatives were contacted through phone for the interviews and received no compensation. The questions were concerned with

- seniors' mobility and navigation needs as perceived by the travel organizers
- how do they currently support seniors while they participate in the planned activities/trips and how do they ensure their safety and comfort (staff, material, medicine, information provided, hotels)
- what is representatives' outlook on the pricing strategy and the business case for T&Tnet.

Regarding the business view angle, the representatives were introduced to the core idea of T&Tnet and were asked to imagine how they would use such a service to facilitate the mobility of their members and for their own (commercial or other) interests. A detailed description of the interview can be found in Annex E: Interview Guide for interviews with secondary users

6 Timing

Table 3 shows an overview and the timing of all activities to perform within the requirements analysis of T&Tnet.

Table 3. Schedule of the User Needs Analysis.

Week	Activity
Week 37	Literature and end-user groups specification
Week 38	End-user groups specification
Week 39	Iteration with partners on end-user groups
Week 40	Literature and focus group manual
Week 41	Focus group manual
Week 42	Iteration with partners on focus group manual
Week 43	User needs analysis Deliverable Draft (D1.1)
Week 44	Iteration with partners on user needs analysis
Week 45	Recruitment and final instructions
Week 46	Focus groups and user observations
Week 47	Focus groups and user observations
Week 48	Analysis of results
Week 49	Analysis of results
Week 50	Analysis of results/D1.1, interviews Secondary Users
Week 51	Analysis of results/D1.1, interviews Secondary Users
Week 1	Analysis of results/D1.1
Week 2	Analysis of results/D1.1
Week 3	Pre-final D1.1 for internal review
Week 4	Internal review/final revision D1.1
Week 5	Final D1.1

7 Results

7.1 Questionnaire

The questionnaire can be found in Annex D of the present document. It should be noted here that in all countries, there were participants who forgot or did not want to answer some questions. In this case, the results occurred from the answers available.

7.1.1 Demographics

Spain

In Spain, the questionnaire was filled in by 16 focus group participants (11 male, 5 female). The average age of the participants is 68. All participants have cell phones and two have smartphones but without mobile internet contract for financial reasons. However, they do not know how to configure WiFi on the device so they do not use it for navigation purposes. None of them has a tablet.

Austria

The questionnaire was filled in by all 11 participants (6 male, 5 female) present in the focus group. The participants' average age is 71. Four of them possess a smartphone and the rest a regular cell phone. None of them has a tablet.

France

In France, the focus group included 6 participants (1 male, 5 female). The average age of all participants is 76. Two participants have a smartphone and the rest possess a regular cell phone with the cost being the main barrier to their access to advanced mobile technology (e.g. smartphone tablet).

Norway

In Norway, 16 participants (9 male and 7 female) with average age 70 completed the questionnaire. Two thirds of the participants possess smartphones.

7.1.2 Mobile technology

Spain

Question 1

In Spain, most focus group participants have experience only with e-mail; one third have used WiFi technology and only one of them uses GPS devices in the car (Figure 7). None of them use internet with a mobile device.

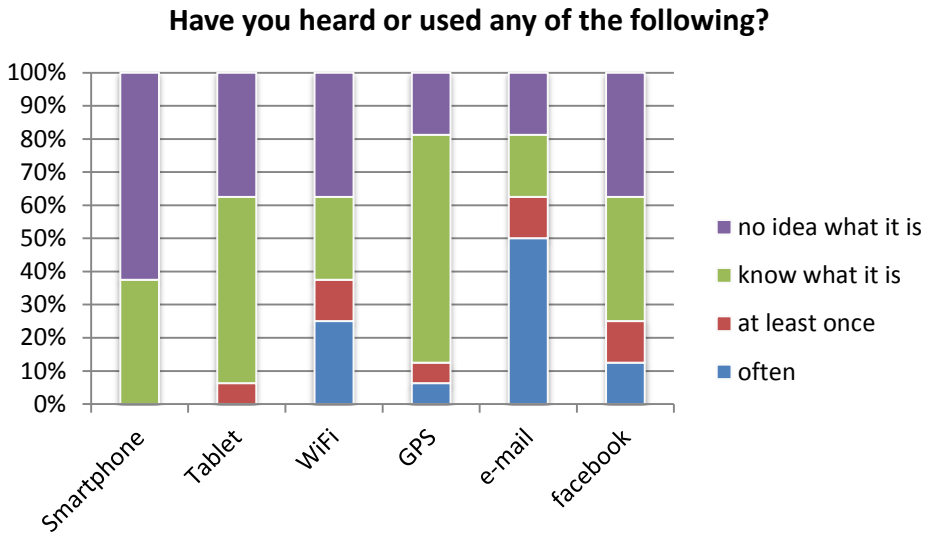

Figure 7. Questionnaire results regarding knowledge and usage of mobile technology of spanish participants.

Question 2

The vast majority of participants have only an e-mail account with the exception of 2 (out of 16) participants who mentioned online banking and other applications.

Austria

The results are summarized in the diagram below (Figure 8). In a nutshell, most participants are frequent users of e-mail service and have used at least once a smartphone and a GPS navigation system. Moreover, they are somewhat familiar with WiFi and have heard about Facebook and tablet.

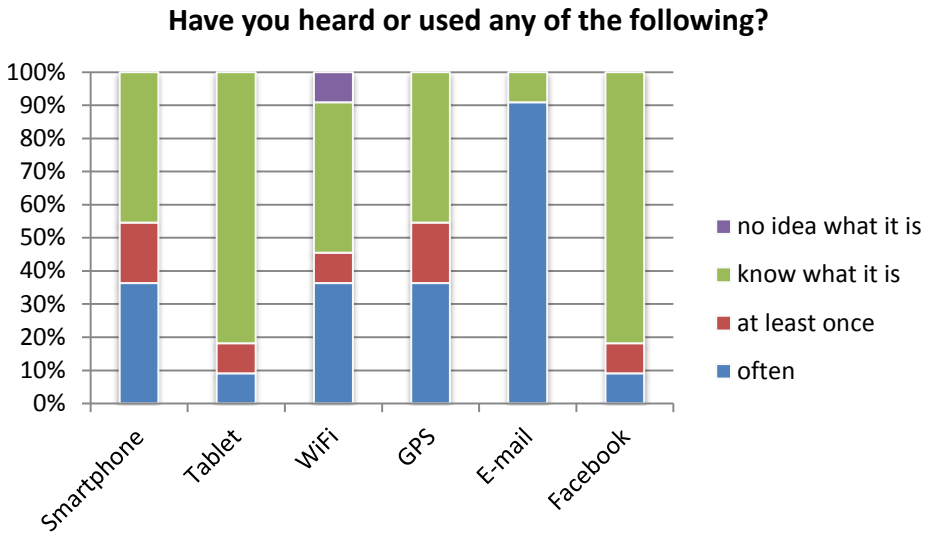

Figure 8. Questionnaire results regarding knowledge and usage of mobile technology of austrian participants.

Question 2

The participants reported that they do not have accounts in other applications.

France

Question 1

The French participants also have experience with e-mail, are less familiar with GPS and most of them have some information about tablets, smartphones and Facebook (Figure 9). About one third of participants use WiFi often. Two of the participants are owners of a smartphone.

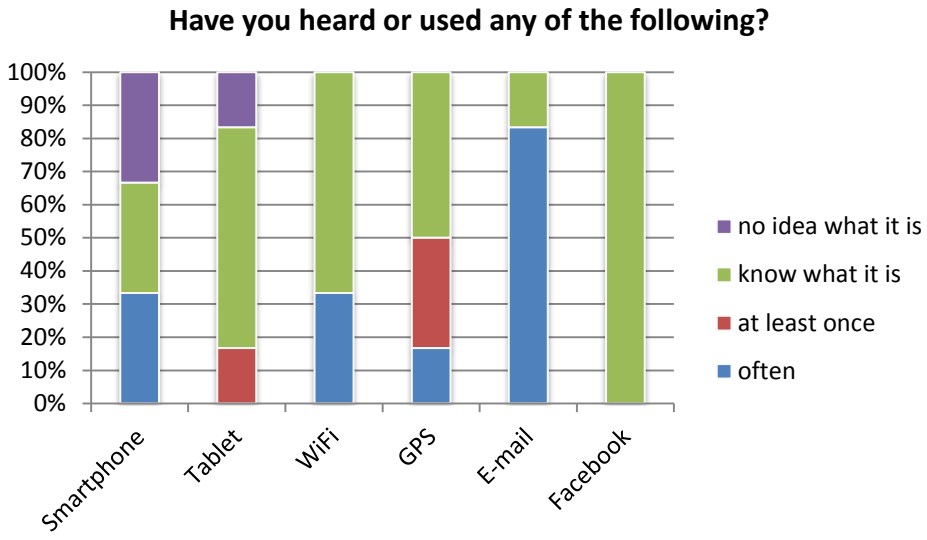

Figure 9. Questionnaire results regarding knowledge and usage of mobile technology of french participants.

Question 2

Participants reported that they do not have any website accounts.

Norway

Question 1

All participants use e-mail, two thirds own a smartphone and are experienced with WiFi (Figure 10). The majority are familiar with GPS and Facebook, despite the fact that they do not find the latter interesting. One third of participants have some experience with tablets. The use of mobile technology among focus groups participants is highest in Norway.

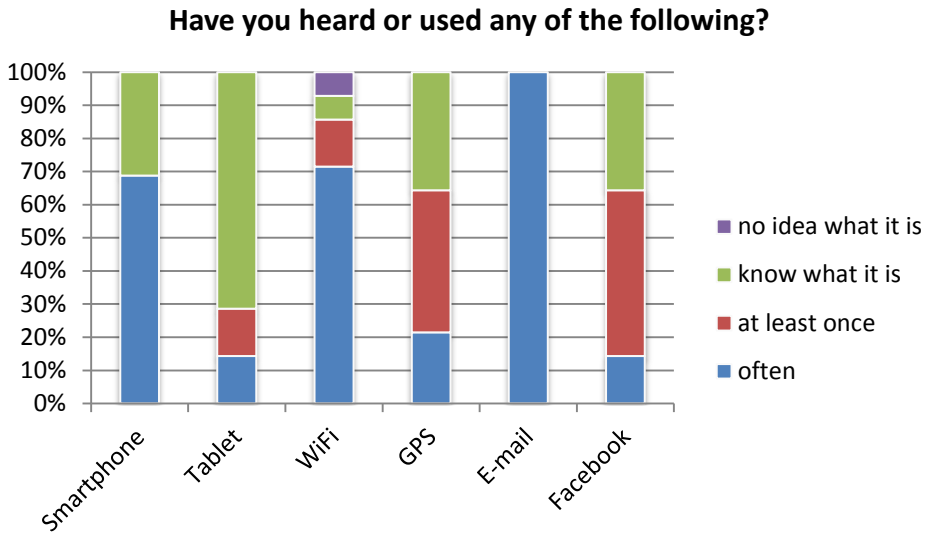

Figure 10. Questionnaire results regarding knowledge and usage of mobile technology of norwegian participants.

Question 2

Most participants reported to have accounts for online banking, buying cinema/theater tickets, buying software etc.

7.1.3 Mobility habits

Spain

Question 3

Spanish participants walk every day and take the bus frequently; private cars are also used often. Overall, participants rely on both public as well as in private vehicles for their transportation (Figure 11).

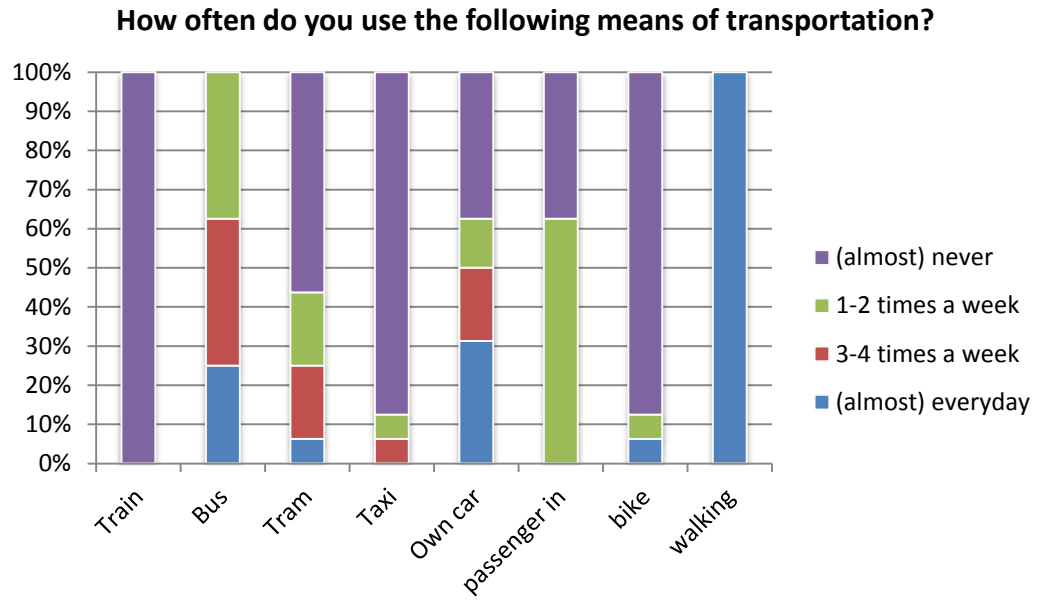

Figure 11. Questionnaire results regarding usage of transportation means (Spain).

Question 4

When using public means of transportation, most participants miss an information display about the bus timetables and they also complain about the lack of commitment of buses to their timetables. Another problem mentioned by a participant is that there is insufficient information about transportation facilities for disabled people.

Question 5

Zaragoza is well-known to them and small so they rarely have the need to navigate. However, they sometimes check the website of transport operator at home. When they are planning a longer trip some of them use internet. 4 out of 16 said they used Google Maps to print maps of the route and most of them to search information about the city, monuments, etc.

When they travel within Spain, they rely on map prints from the internet (4 out of 16), they book organized trips and they contact tourism offices and travel agencies for information. In the rare case when they travel abroad, they are usually with family..

Austria

Question 3

Participants mostly go on foot, use public means of transportation (metro, train, tram, bus) and are less dependent on private vehicles (taxi, own car, passenger in other cars) (Figure 12).

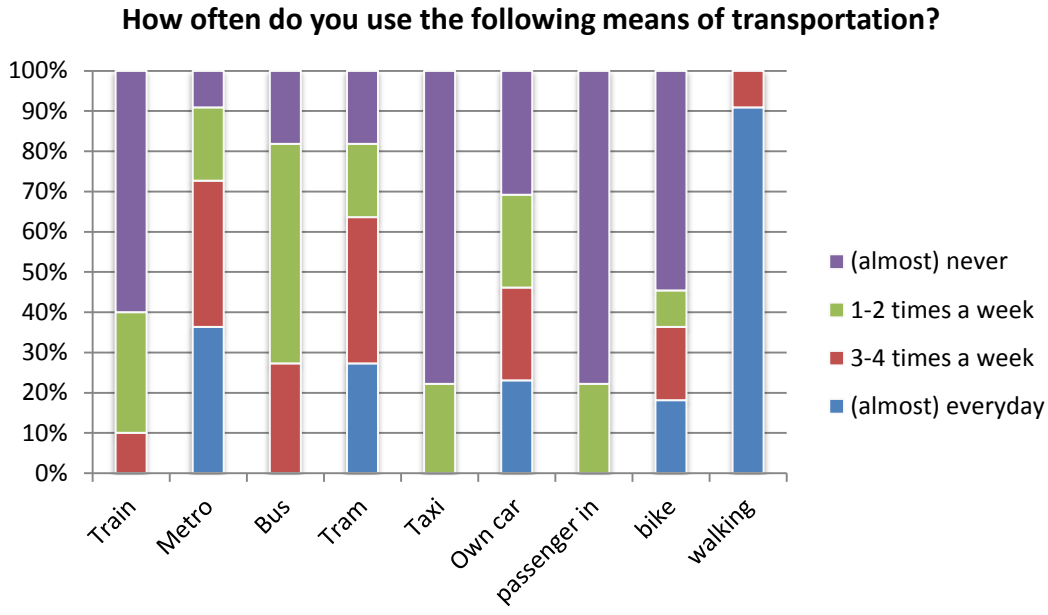

Figure 12. Questionnaire results regarding usage of transportation means (Austria).

Question 4

From the means of transportation presented to them, the majority prefers metro because it is fast, convenient and there are many connections. Tram is also appreciated by some participants because *'you can see outside of the windows'*; car and going on foot follow in preference.

The participants quote as least preferred means of transportation tram and bus, because they are slow (in comparison to metro), the steps are too high, *'you can be robbed inside'*, not so many connections as with metro.

Question 5

In the situation where the participants have to navigate in a foreign country, rely both on technology (GPS, internet planners such as Google maps) and on conventional means for their navigation, such as road- and city maps and travel guides. The preferred transport would be there also with public means of transportation. About half of the participants mentioned that they would inform a family member for their trip, and the rest of participants would not inform anybody.

In the situation where the participants have an appointment with the doctor, they follow similar approach; road-/city maps, internet planners and navigation systems were mentioned for both the way-finding and the route planning process. Almost all participants would take some public means of transportation and only three out of eleven would inform somebody (in all cases a family member) for this route.

France

Question 3

In Paris, the preferred means of transportation between the participants is bus and walking; metro, train and car follow in the preference. From the diagram (Figure 13), it can be observed that public means of transportation are overall preferred from private vehicles.

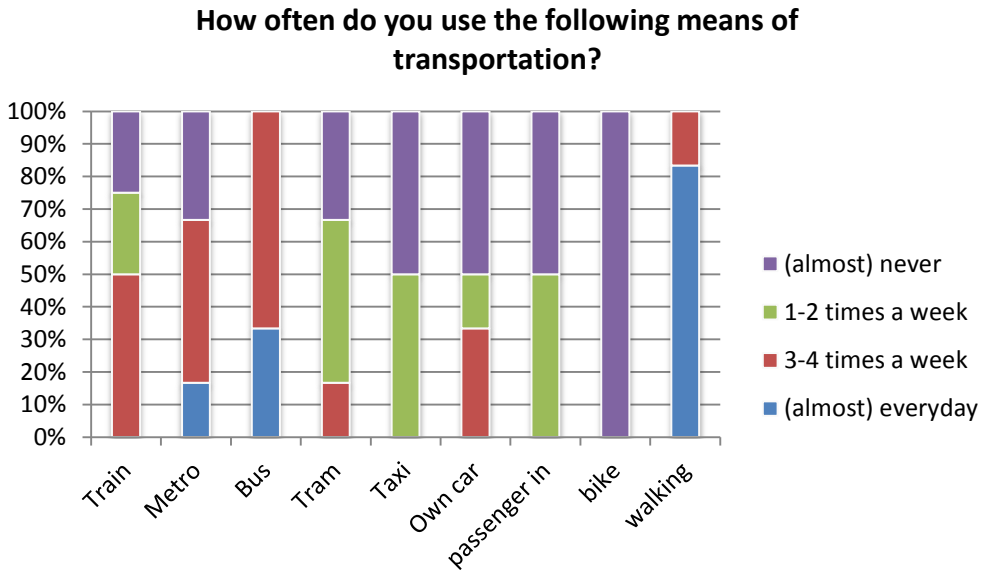

Figure 13. Questionnaire results regarding usage of transportation means (France).

Question 4

The majority of participants reported to prefer bus because it is *'easy to use'*, fast, *'friendly' 'even if stairs are too high'*. The participants commented on metro (second in preference) that it is easy and fast and they feel *'confident because there are fewer possibilities to lose the way'*. Participants also complained about metro that it is often crowded, there are too many stairs to climb and that the routes of buses are often not clear to them (as in the metro).

The reason for the confidence that people experience in metro – similar comments were also mentioned in other countries too - is possibly that there is always a metro map inside the wagons and usually it is found above the doors. Even if such a map is available inside a bus, its position is not standardized and the passengers cannot move much inside the wagon to access the map.

Question 5

When abroad, the participants rely mainly on maps, internet and travel agencies staff for navigation. They mentioned travel plans, health documents, GPS navigation systems and cell phones or smartphones as objects that they carry with them in the trip. Most participants would contact a family member to inform about the trip.

In case they have an appointment with a doctor in an unknown area of the city, participants mentioned that they would rely on internet to plan the route. They would use bus, metro or taxi to get to the destination and they would take with them prints from the plan they created online. They would not inform anybody for this route.

Norway

Question 3

In Oslo, the focus group participants prefer walking and car for transportation. They use public means of transportation once or twice a week. As it can be seen also in the diagram (Figure 14), Norwegian participants depend more on private vehicles than on public means of transportation, unlike participants from AT, FR, ES.

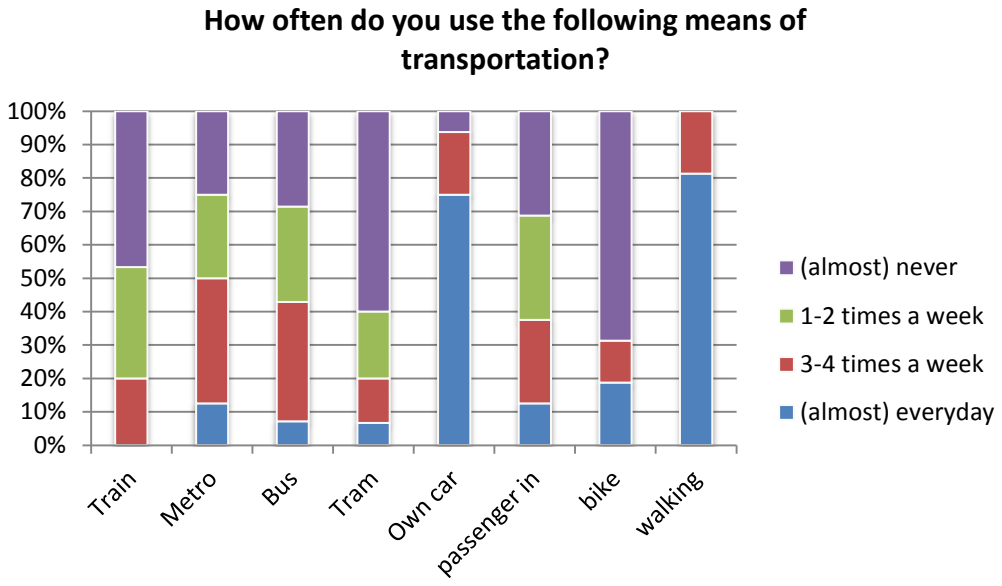

Figure 14. Questionnaire results regarding usage of transportation means (Norway).

Question 4

The majority of participants consider the process of buying tickets for public means of transportation cumbersome; *'it takes time to buy tickets and it is stressful when there is a line'.* Other problems mentioned are delays, accessibility *('escalators not working sometimes'*), mistaking the bus direction and lack of information about a bus route.

Question 5

The Norwegian participants plan their routes online, when they visit a foreign country. Some mentioned that they would plan their trip with the help of travel agencies, get advice from travel books and by asking people. Their preferred means of transportation are mainly airplane, train and car and at the destination, public means of transportation. They carry mostly travel books, smartphones and prints from the internet. All participants would inform family members for their trip.

In case of an appointment with a doctor, the participants would plan their route online and prefer taxi, public means of transportation or their car to reach their destination. They would take with them smartphone, GPS navigation system or map and inform family members for their route.

7.2 Focus groups

7.2.1 Discussion about mobile technology, mobility, navigation and interaction techniques

Spain

In Spain, the culture of travelling is not as widespread as in other European countries. Spanish seniors travel occasionally inside the country and rarely abroad. When they do, organized trips are their first option (IMSERSO[7]) and they request information in tourist offices or in the hotels they stay.

Internet use is widespread among seniors (mainly e-mail, digital newspapers and searching information), but not the use of smartphones. The main reasons are cost-related; mobile devices (smartphone, tablet) and mobile Internet is expensive (Spanish rate plans are one the more expensive in Europe). Moreover, use of such devices would require additional training for most seniors. The main motivation for using mobile technology is communication with family - some participants also use their phones to take pictures.

The lifestyle is centralized in cities and journeys are made within them, so seniors are familiar with the environment and they do not have any needs for route planning. If they need to find a particular location, they usually ask people or plan the route on the internet.

Mobile technology.

The main point of the discussion in Spain on this subject was about whether they preferred tablet or mobile phone. About half of them preferred the smartphone and the other half preferred the tablet, but in fact, they are not quite familiar with either device. Some of them preferred a bigger device to be able to see clearly visualizations on the screen and others would appreciate more a lightweight device.

The participants know how to use the cell phone to talk, and some of them can send/receive SMS and take pictures with it. They would like to have a smartphone but they are not skilled users. Their main motivation to use a smartphone is because they would like to communicate and to use free SMS applications to read the news, books and email. How-

[7] http://www.imserso.es/imserso_01/index.htm

ever, they would use such technology occasionally and only when it is necessary; they mentioned that do not want to be like the young people that are always attached to the device. Table 4 contains the summary of participants' comments regarding mobile technology.

Table 4. Opinions expressed on mobile technology by spanish participants.

Mobile technology		
	Pros	**Cons**
Smartphones	• portable and lightweight • comfortable to carry	• all participants are not educated and skilled users (only 2 of them have a smartphone) • none of them have use internet on the mobile • small display → difficult to read /see • they do not hear very well when they are talking on the phone
Tablets	• bigger screen • more practical	• none of them has or use a tablet • not so comfortable to carry
GPS	• one participant thinks that it is very useful	• only one participant uses GPS in car • it has to be continuously updated
WiFi	• they know what it is • few of them (4/16) have used it at home with a laptop	• the rest do not know how to configure it
E-mail	• most of the participants are users	

Mobility

All participants of the study have similar mobility patterns. They go out several times a day (in the morning and in the evening). The reasons for their routes are: go for a walk, daily shopping, see family and meet friends.

The preferred means of transportation for the participants are the bus followed by the tram and their own car. Most of them walk when the distance to the destination is short. Participants make use of the routes of public transportation, mainly bus, because in Zaragoza, apart from the bus, there is only one tram line and metro is not available. They do not have difficulties to combine more than one bus line or tram.

The main problems that they face are:

- low bus frequencies and delays
- bus stops without bus shelter and screen display
- crowdedness in public transport
- road works in the routes and bus detours.

It was mentioned that for some of them who have family members with mobility impairments, the main difficulty is to solve accessibility problems (to find buses with bus ramps, adapted taxis, etc.).

Route planning is not very common. They rarely plan a route inside Zaragoza because the city is small and is well known. As it has been mentioned before, they are aware of the bus and tram routes and many of them have visited the website of transport operator at home. When they are planning a longer trip some of them use internet. 4 out of 16 said they used Google Maps to print maps of the route and most of them to search information about the city, monuments, etc. One participant knows how to use GPS in the car and he was very concerned about the updates.

When they travel, normally within Spain provinces, they usually book organized trips by asking information in travel agencies and hotels. When they travel by their own they usually contact tourist offices to get information in advance. The majority of them do not travel abroad. And if they do it, normally it is because they are travelling with the family so they do not care about route planning. In these cases, they do not have problems to take a flight or a long distance train service.

The cell phone is the primary tool for communication with family and friends. They have no objection to tell their family/friends their destinations but they like the idea of being able to choose which routes should be reported. Their usual behaviour would be to inform about extraordinary journeys but not for the usual routes. Table 5 contains a summary of participants' comments regarding their mobility.

Table 5. Mobility habits of spanish participants.

Mobility habits	
Physical limitations, barriers	• bus stations without shelter • lack of information panel about bus frequencies • to find adapted buses, taxis, etc. for family members with disabilities • crowdedness • road works
Use of public transportation	• bus is the main mean of transportation • walking is also preferred. • majority of participants also use tram and very rarely train (2-3 times a year)
Communication with secondary users	• necessary for extraordinary routes and not for everyday chores • with cell phone
Route planning	
How do they plan a route?	• travel agencies • tourist offices (they ask in advance and they receive the information) • on internet, mainly to find information about the place they are going to visit. Some of them print maps of relevant areas or routes. • they travel with family
Wayfinding	
How do they find their way?	• the city is small, so they rarely need to navigate to an unknown space inside Zaragoza abroad: • they often travel with family members • asking in the hotel to know which mean of transport they have to use • asking people • maps of the city or map prints • they do not use GPS or mobile phones for navigation

Navigation technology

Most of the participants are familiar with applications like Google Maps, although only some of them use it to print maps. They like the choices that Google Maps offer (to travel by car, by public means of transport and walking). They do not know how to use these tools with mobile devices. They are more confident with paper maps and normally they ask for one when arriving to a new city in the hotel or tourist offices. They do not rely on smartphones or GPS (only one knows how to use it). Table 6 includes the summary of participants' comments on navigation tools.

Table 6. Navigation tools of spanish participants.

Navigation gadgets and tools	
In-car GPS	• majority of participants do not know how to use it • concern about updates
Paper map	• it is the most common tool and it is appreciated
Smartphone maps	• they would like to use it but theywould need some training. • none of them currently use this kind of technologies

Interaction techniques

The preferred interaction technique is by voice. They would like a high-pitched voice which would report where they have to get off (final stop) and not all the intermediate ones. They also think that the interaction technique by vibration is interesting. They are not used to tablets or mobile phones with touch display; so they will face difficulties with interaction techniques such as: pan, pinch, drag and tap. Only half participants know how to put their phone in silent mode. Table 7 indicates interaction techniques that participants consider suitable (or unsuitable) for a navigation application.

Table 7. Interaction techniques preferences of spanish participants.

Interaction techniques		
	Suitable	**Not suitable**
Notification sounds		not preferred
Voice instructions	high-pitched voice an-nouncing the final stop	
Vibration	interesting	
Pan, pinch, drag, tap		they are not used to such techniques

Austria

Mobile technology

All participants use a mobile phone on daily basis; some try though to limit its use (solely when outdoors or indoors), as they don't want to be *'disturbed'* and available at all

times. They are also concerned about their data privacy. When they were asked explicitly about smartphones, they commented on the simplicity of the touchscreen but also on it being *'too sensitive'* (easy to mistype) and reflective under strong sun. The focus group was rather unfamiliar with tablets, but when asked if and how they would use them, they identified use cases, such as reading books and sharing photos, that would be interesting for them (Table 8).

Table 8. Opinions expressed on mobile technology by austrian participants.

Mobile technology		
	Pros	**Cons**
Mobile phones (comments for all mobile phones, both smartphones and older phones)	• mobile phone is cheaper that a landline • important means of communication • touchscreen is simple	• privacy/security concerns • reflection problems with the screen • high error rate when pressing buttons. • Limited usage -either at home or outside – they don't always want to be available/disturbed.
Tablets	• preferred for usage at home • for reading books, for photos and files, internet access. • useful due to dimension and weight	• paper books are comfortable – how can you note something down on a digital book? • copyright issues?

Mobility

The majority of participants use public means of transportation within the city due to many connections, speed and convenience (e.g. no parking difficulties). For rural areas, car is preferred. In order to plan their routes, participants mostly use internet planners for car and for public transport; sometimes also city- or road- maps. While on the road, they find their way with GPS navigation systems (when driving) and by asking questions to passengers. When they were asked on mobility barriers, they commented on the lack of information regarding situation of the roads (Table 9).

Table 9. Mobility habits of austrian participants.

Mobility habits

Physical limitations, barriers	• majority uses public means of transportation due to parking problems and thanks to the quality of the transportation system • lack of information regarding road situation
Use of public transportation	• choice depends on route and task • fond of the well developed metro system • metro is preferred inside the city, while car in the rural regions and the outskirts of the city
Communication with secondary users	• not necessary
Route planning	
How do they plan a route?	• internet planners, • maps, • GPS systems for car • to look onto road situation, they look at wien.gv.at website.
Wayfinding	
How do they find their way?	• they use GPS systems or internet planners (öamtc[8], wienerlinien[9], etc) • they ask for directions

Navigation technology

When the focus group moderator presented a route with the Google Maps application to the focus group, the general opinion formed was that on one hand, they wish for additional information, on the other hand, the information is sufficient and even more than enough. Nevertheless, participants noticed lack of choice between alternative routes and mentioned that information about the situation of the route path would be appreciated (Table 10).

Table 10. Navigation tools of austrian participants.

Navigation gadgets and tools	
GPS	• few own one and they are satisfied with it
Paper map	• useful, common tool for navigation, even inside Vienna
Google maps	• Google Maps is satisfying for some participants. • information about traffic jams, tolls, POIs, gas consumption, drug stores, road works, alternative routes would be appreciated by some. • they would like to have choice between alternative routes • at the same time, they do not want to be overwhelmed by information

[8] http://www.oeamtc.at/
[9] http://www.wienerlinien.at/eportal/

Interaction techniques

Participants consider sounds such as notification sound and vibration insufficient, as they have no informative value. They opted mostly for voice instructions because they have used it successfully with their satellite navigation systems. Moreover, participants considered interaction with the touchscreen partially problematic, as pressing wrong controls is easy, particularly for people with medical limitations, e.g. tremor. The font size was found acceptable and a zoom function for it would be much appreciated (Table 11).

Table 11. Interaction techniques preferences of austrian participants.

Interaction techniques		
	Pros	**Cons**
Notification sounds		not preferred, because no informative value, just signaling is not enough
Voice instructions	• useful in case of visual impairment	
Pan, pinch, drag, tap	• some use the zoom function	• difficulties tapping text • difficulties due to medical problems (e.g. tremor)
Text	• font size usually acceptable, if zoom in function is also available just in case	

France

Mobile technology

All participants use a cell phone and find it useful in case of emergency. Everyone agreed with the usefulness of functionalities brought by cell phones (e.g. agenda, birthday reminders). However, some of them prefer to have support from multiple sources for the important information (i.e., using both, the agenda and the cell phone to register events), because they find that: *'the technology sometimes is capricious'*. Two participants reported that they did not know all of functionalities of their own device and some of them explained that they were using a cell phone because a relative asked them to have one.

Only two participants, a man and a woman, use a smartphone. The male smartphone owner said: *'Once you've used one, you'll never want to go without one again'*. They de-

scribed different functionalities and services that they found particularly useful (e-mail, Google, Wikipedia, GPS, agenda, telephone, etc.). The female owner considered smartphone useful but not necessary, more like a 'hobby'. She said she does not know all the functionalities. She added that she had to ask for help in the apple stores, because the battery was frequently flat, and they gave her the solutions. For her appointments, she prefers to use two diaries in addition to her smartphone. Moreover, when she travels, she uses the GPS but always takes a printed plan with her, *'because sometimes it (GPS) says nonsense and guides me toward a wrong way'*. A participant pinpointed that the technology is always changing, *'if you buy something today, tomorrow is outdated, so you don't have all the options, for that is necessary to buy another one'*.

Regarding the possibility to buy a smartphone, a tablet or a GPS, the participants would agree to use these devices, but the current cost remains the main barrier. They do not consider a smartphone really necessary. A participant described herself as not capable to learn how to use this kind of technology. She prefers internet at home and *'a simple cell phone'*.

Concerning tablets, a participant said *'if you have a smartphone and PC, why should it be necessary to own a tablet? Well, maybe if you are not able to walk… you could take the tablet on your legs, the PC is too heavy'*. Another participant said to be tempted to buy one, even if she thinks it is a too expensive and not so useful gadget. Table 12 includes a summary of participants' comments regarding mobile technology.

Table 12. Opinions expressed on mobile technology by french participants.

Mobile technology		
	Pros	**Cons**
Smartphones	• many functionalities	• not necessary • too expensive
Tablets	• many functionalities • light compared to PC	• do not see the difference with the smartphone.
GPS	• useful at night and in remoted areas	• sometimes is not reliable

Mobility

All participants said to take part in various cultural, social and personal activities. The motivation for everyday mobility is medical visits, social encounters, cultural activities and going for a walk on their district.

Barriers to mobility found by the participants were:

- using the stairs to reach the metro
- too high steps to get on the bus
- the lack of information about buses (schedule, strike, handicap access);
- reading the signs (because are rarely big enough),
- not knowing when they will arrive and how long will run the strikes blocking the way.

Most of participants plan their journey/route with the help of Google Maps or other applications and use the printed plan as main tool of way finding. Nevertheless, they said they do not need it often, because they mostly go to already well known places. When they were asked if, for any reason, they needed to go in the suburbs, they answer strongly *'there is nothing in suburbs, it is preferable not to go there'*. But if it was necessary to go, the option mentioned was to buy a plan of the suburb or to print one.

Regarding the communication of their mobility to their family members, all participants thought that it is not necessary to mention all their intents of move. In fact, they keep informed their relatives only when they go out for an extraordinary reason (i.e., appointment with a doctor, a journey). They think the details about moving are pertinent to communicate when the relative lives with them (partner). But for the majority, who are living alone, it is enough to tell to their daughter/sons general information, without details (i.e., *'This weekend I'm going to Alsace, I'm going with a friend and we'll stay in her home. I'll go back Sunday'*). For the mundane chores (i.e., groceries or newspaper) they do not consider necessary to inform anyone. Table 13 contains a summary of participants' comments regarding their mobility.

Table 13. Mobility habits of french participants.

Mobility habits	
Physical limitations, barriers	• accessibility: using the stairs to reach the metro, too high steps to get on the bus • the lack of information about buses (schedule, strikes, handicap accessibility); • the small fonts of the signs • time management/handling delays
Use of public trans-portation	• bus is the most frequently used public transportation • metro is avoided because the stairs and frequently crowded
Communication with secondary users	• only for the exceptional trips or appointments and without details
Route planning	
How do they plan a route?	• Mappy[10] or other websites. • printed map • smartphone – RATP[11] app (Transport service in Paris)
Wayfinding	
How do they find their way?	• printed map (4 participants) • smartphone (1 participants) • asking people

Navigation technology

The participants stated to use the printed map from the computer or a map book. A participant sometimes orients herself using global reference points, such as the cardinal directions (north, south, east, west) or the position of the sun in the sky. Others prefer to be early at the appointment, so as to search in their plan or ask to someone on the street. Another participant said he was using the compass, but exclusively when he walks on the forest.

All participants know what the GPS is, but they more frequently use a plan. Only one participant mentioned that she regularly uses the GPS, as she considers it useful, even if, she said: *'sometimes it shows me a longer way than the one I usually take'* (Table 14).

[10] http://en.mappy.com/
[11] http://www.ratp.fr/

Table 14. Navigation tools of french participants.

Navigation gadgets and tools	
In-car GPS	• it is really smart • only one participant uses it frequently
Paper map	• maps or map books are frequently used • map prints from web applications are used too.
Compass	• only when walking in forest

Interaction techniques

Four demos were shown to the participants; a) using the website of Google Maps, video projected; b) projecting a YouTube video showing the use of Google Maps application on a tablet[12] c) moderator used Siri[13] option asking the device to show how to go from the hospital to home, and d) with a tablet or a smartphone to be handled by the participants themselves. In the latest demo, each person handled the device with the supervision of the moderator. The participants, using the Google Maps had to find the pathway to go from their home to another point of their choice. Then, we asked them to tap, drag and scroll - left/right on screen using the fingers. Because of some WiFi connection issues, tablets did not works correctly during all experience.

During demos, the participants found the smartphone option more interesting, because it is easier to keep in the bag. A participant who owns a smartphone proposed to use a device with an intermediate size, bigger than smartphone, with a stylus so as to make writing easier. Everyone seems agree.

After demonstration with a smartphone, all participants except for one, found the interaction easy to learn and interesting. At the beginning, they believed that it would be difficult to write using the keypad, but the finally found the device easy to use when it is in a horizontal position. They concluded that utilization would become easier with experience and they would agree to use such devices.

[12] http://www.youtube.com/watch?v=eKQ_w0C0ww8
[13] http://www.apple.com/ios/siri/

An interesting situation was observed: initially, a female participant was strongly opposed to use a smartphone or tablet. After the demo with the smartphone, she found especially interesting the 3D visualization of the map. Indeed, she has some orientation problems and she thought a smartphone or a tablet could be helpful. Nevertheless, even if she found it useful and not as difficult as she thought, she prefers using her PC, printed maps and a classic cell phone, because the smartphone *'is too expensive, and requires much time to learn'*. A summary of participants' comments regarding interaction techniques is included in Table 15.

Table 15. Interaction techniques preferences of french participants.

Interaction techniques		
	Pros	**Cons**
Notification sounds	• reliable • you can choose the sound	• it could be disturbing if everyone uses this.
Voice instructions	• it is not necessary to use the keypad	• none
Vibration	• discrete sound	• sometimes it cannot be heard/seen
Pan, pinch, drag, tap	• very useful	• persons with big fingers could have difficulties
Text	• none	• in smartphones (in vertical position) small keypad

Norway

Mobile technology

In Norway, the majority of participants were very positive towards smartphones. In combination with WiFi, e-mail and access to the internet, smartphone is considered a very useful tool. The use of navigation applications in smartphones is only interesting when a particular need to find a location occurs. More than half of the participants use this feature, when needed. The participants are not particularly interested in tablets, twitter and blogs, and consider Facebook also to be of little interest. On the other hand, all participants regularly use e-mail.

The main motivation for using mobile technology is to buy/order tickets for travel, cinema, theatre, concerts, etc. Online banking is also a much appreciated service, as is searching for information on particular areas of interest. Some participants mentioned communication with family and friends as their main motivation to use mobile technology. A summary of participants' comments on mobile technology can be found in Table 16.

Table 16. Opinions expressed on mobile technology by norwegian participants.

Mobile technology		
	Pros	**Cons**
Smartphones	• majority of participants are educated and skilled users	• 1/3 of participants has never used a smartphone
Tablets		• not very much in use by participants
WiFi	• a very useful technology used by the majority of participants.	
GPS	• useful when needed.	• not so often needed
E-mail	• all participant are users	
Facebook	• some use it to stay in touch with family and friends	• not commonly in use • scepticism about privacy of information
Twitter		• not interesting
Blog		• not interesting

Mobility

The primary means of transportation for the participants are their own car or walking, when it is convenient. However, most of them also use train, bus, metro and/or tram at least monthly, some even weekly.

When using public transportation, the participants are faced with various challenges:

- buying and validating tickets; they often find it stressful to stand in line and it is very complicated to use the automatic ticket system.
- inoperable escalators is also an issue and which tram/train line to take and on which side to pick it up.
- lack of information while traveling is making it difficult to know when to get off.

The smartphone/cell phone is the primary tool for communication with secondary users, normally the closest family. Also the smartphone seems to be the preferred tool when in need of rout guidance. They may inform travel agencies, hotels, the City Hall, but first and foremost, the closest family.

The majority of the participants use the internet when planning a longer trip. In addition some of them contact a travel agency. For shorter trips some may use a GPS navigation system. On longer trips airplanes will be the primary means of transportation in combination with a taxi, bus or train. One participant mentioned that it is *'impossible'* to figure out corresponding trains when travelling in Europe. On shorter trips the participants prefer their own car or the normal public transportation system bus, train, tram, taxi.

When traveling abroad, the participants bring with them small travelers guides, maps and other written tourist material. However, several participants rely solely on their smartphone. On shorter distances maps and the smartphone are the preferred tools. Table 17 includes the summary of participants' comments on their mobility habits.

Table 17. Mobility habits of norwegian participants.

Mobility habits	
Physical limitations, barriers	• escalators not working. • ticket-, and ticket refill machines not easy to use with difficult messages. • lack of information about stations, departure times and arival times.
Use of public transportation	• main means of transportation are own car and walking • majority of participants use train, bus, metro and tram weekly.
Communication with secondary users	• smartphone • smartphone/ cell phone
Route planning	
How do they plan a route?	• on Internet. • contacting travel agencies • using smartphones (GPS, map)
Wayfinding	
How do they find their way?	• using maps, often from different internet services • using smartphone (GPS, map) • they contact closest family

Navigation technology

The participants mentioned that maps in navigation applications are not accurate enough and do not show exactly the correct point of interest. They are also confused with zooming in; they want to be able to zoom in and out and still have correct information. Lack of standardization of text, icons, etc. makes maps difficult for them to read. Furthermore, when they type an address, they find it confusing to pick the correct one when multiple choices are shown. It is also complicated to find the best route on existing maps and impossible to find corresponding routes on the map. In addition, the marking of a location at Google Maps (symbolized with upside down drop with a letter inside) is confusing when there are more results for one address input. In a nutshell, they consider maps in mobile navigation applications somewhat confusing (Table 18).

Table 18. Navigation tools of norwegian participants.

Navigation gadgets and tools	
In-car GPS	• not updated at all times. • lack of information about local situations, blocked roads, detours.
Paper map	• printouts are appreciated
Smartphone maps	• not accurate enough, the marking of the location of the user is not correct, creates confusion. • lack of map standards, makes different map-based services difficult to read. • lack of information about blocked routes, detours • lack of information about facilities, for example available bus sheds, rain and protection from. • difficult to find corresponding routes.

Interaction techniques

A special task to compare route planning on tablet and mobile was not performed due to the fact that most of the participants are very skilled on smartphones and not very familiar with the tablet. However, a lot of ideas and suggestions regarding improving existing services and creating new ones were discussed and documented (see section 7.2.2 about brainstorming).

7.2.2 Brainstorming: information and functionality needs

Spain

In this exercise, Spanish participants express their ideas about the application. In a nutshell, they consider very important that the application will be easy to use and they would like to have information about changing between means of transportation, delays and roadworks, traffic when travelling by car, and so on. After the brainstorming, the participants voted for the 4 information and 4 functionality ideas they preferred. The results are presented in Table 19 and Table 20.

Table 19. Information points – Spain.

Participants/consortium	Topic	Information Points	Votes
Consortium	Public means of transportation	routes and timetables	***
Consortium	Public means of transportation	tickets information	**
Consortium	Public means of transportation	crowdedness information	**
Consortium	Accessibility	accessible paths (with elevators and escalators) information for metro and train	***
Consortium	Accessibility	urban accessibility information (elevators, escalators, stairs, architectural barriers, roadworks, steep paths)	**
Consortium	Culture/ sightseeing	public/social/cultural events information	*
Consortium	Personalization	suggested routes according to user´s interests (tourism, accessibility, weather)	***

Table 20. Functionality points – Spain.

Participants/consortium	Topic	Functionality Points	Votes
Consortium	Public means of transportation	notification for stepping out of public means of transportation.	***
Consortium	Public means of transportation	buy tickets through T&Tnet app	***

Consortium	Public means of transporta-tion	information about your current position and orientation	**
Consortium	Social network	send a route to another user	**
Consortium	Social network	automatically notify a user when your location is outside of a particular area.	*
Consortium	Personalization	save locations you visited or you want to visit, and be reminded when you walk nearby.	*
Consortium	Personalization	choose a different modality for different notifications	*

Austria

During the brainstorming phase of the focus group, participants were asked to provide their input for information and functionality they would appreciate in a navigation system.

They were also asked to comment on the Consortium generated ideas. The participants performed this exercise on their own and they accompanied most of their ideas with comments and explanations.

The participants came up with a considerable amount of ideas; the ideas were written in post-it and each participant, in his turn, was bringing them on the board and explained them. The researchers started to group the ideas into several categories already during the brainstorming in order to facilitate the voting process. Some ideas appeared twice or three times on the board and the votes were counted collectively for them. Upon the completion of the focus group, the researchers updated the clustering. From the perspective of information requirements, the main categories that emerged from the clustering are: public means of transportation ideas, actual position requirements, culture/sightseeing ideas, ideas related to cars, necessities/emergencies ideas and actual position requirements. From the functionality point of view, the clusters are public means of transportation, social network, personalization and usability requirements.

Specifically, the most highly regarded ideas in total were to buy tickets through T&Tnet, routes and timetables of public means of transportation, being offered alternative routes and ideas related to health emergencies (hospitals, doctors, pharmacies available). Following in the preference of the participants are ideas regarding usability, taxi stands information, route recommendations, toilet, opening hours, highway tolls, etc. The votes on

the actual position information were rather unexpected, since this is the basic function of a navigation system. However, the emphasis on this idea is supported also by the user observations; when using a navigation system, users first try to find out their actual position and their destination and this information is not always very clear for them in current navigation applications.

Table 21. Information points –Austria.

Participants/consortium	Topic	Information Points	Votes
Consortium	Public means of transportation	routes and timetables	***
Participants	Public means of transportation	alternative routes/ which different means of transportation can I use to arrive at my destination?	***
Participants	Public means of transportation	road works/delays of public means of transportation	**
Participants	Public means of transportation	taxi stands	**
Consortium	Necessities/ emergencies	hospitals, doctors opening hours, location, telephone information	***
Participants	Necessities/emergencies	opening hours	**
Consortium	Necessities/ emergencies	public toilets information	*
Consortium	Necessities/ emergencies	police stations information	*
Consortium	Culture/ sightseeing	monuments location and history information	**
Consortium	Culture/ sightseeing	public/social/cultural events information	**
Participants	Actual position	actual position	**
Participants	car	gas stations	***
Participants	car	highway tolls	**

Table 22. Functionality points – Austria.

Participants/consortium	Topic	Functionality Points	Votes
Consortium	Public means of transportation	buy tickets through T&Tnet app	***
Consortium	Public means of transportation	notification for stepping out of public means of transportation.	*

Consortium	Personalization	save locations you visited or you want to visit, and be reminded when you walk nearby.	**
Consortium	Personalization	get route recommendations, e.g. 'would you like to take a walk today in the park?'	**
Consortium	Personalization	get statistics and an automatic journal of the routes you made over a long time	*
Participants	Usability	big buttons, readable display, pleasant voice	**

France

Only one out of six focus group participants uses regularly Google Maps on his smartphone. The other participants had difficulties imagining what kind of information or services they could expect from a mobile application. After the demonstrations of Google Maps during the discussion, they could get a better grasp of the map and how the information is displayed on it.

In this phase the group was divided in two parts. In each subgroup there was one senior with smartphone experience. The moderator gave the materials (printed plans of Paris, including the bus, metro and places of interest, and one tablet) and the scenario for each group (Group A. Go to the doctor from your home; and Group B. Take your time to walk in a place in your town that you do not know well).

After 15 minutes each group presented its ideas and the moderator wrote them on a board (Table 23, Table 24). Then, the moderator gave to each participant a list of options proposed by T&Tnet (information and services). Both, moderator and seniors selected and erased the repeated options and added their comments some of the options proposed by T&Tnet (underlined in yellow on the table below). Then, the participants voted individually their 4 more important information points and their 4 preferred services.

Table 23. Information points – France.

Participants/consortium	**Topic**	**Information Points**	**Votes**
Consortium	Public means of transportation	routes and timetables , also for disabled people (some buses are adapted, and there are available only for some bus routes)	***
Participants	Public means of transporta-	travel times (duration)	*

	tion		
Consortium	Accessibility	accessible paths (with elevators and escalators) information for metro and train	***
Consortium	Accessibility	urban accessibility information (elevators, escalators, stairs, architectural barriers, roadworks, steep paths)	**

Table 24. Functionality points – France.

Participants/consortium	Topic	Functionality Points	Votes
Consortium	Public means of transportation	notification for stepping out of public means of transportation.	**
Consortium	Public means of transportation	buy tickets through T&Tnet app	*
Consortium	Personalization	apply different filters on the map according to the purpose of your route (e.g. touristic, practical) and or other parameters (e.g. weather)	***
Consortium	Personalization	choose a different modality for different notifications	**
Consortium	Personalization	get route recommendations, e.g. 'would you like to take a walk today in the park?'	**
Participants	Other category	get information about your current position and orientation	***

Norway

The participants came up with various ideas which were later classified into categories. All the ideas produced during the brainstorming, even the ones that are not directly relevant with the scope of T&Tnet are presented below in categories. The most important ideas are marked with *,**, ***.

1. **The T&Tnet system should be extremely easy to use ("simple"). *****
    a. The hierarchy of functions or choices should be kept low, so that the user sees few choices at a time.
    b. The user must 'dare' to use the system.
2. **The social part of the T&Tnet system should be separate from the main T&Tnet system for travel assistance:**
    a. The social platform could be used for
        i. informal planning and reporting of experiences to other persons, such as sharing photos and restaurant reviews
        ii. sharing accessibility information.
        iii. sharing travel plans and travel tips
    b. Use of the social platform

   i. must not be a prerequisite for the use of the main T&Tnet system.
   ii. must not require difficult usernames and passwords.

c. '*Wouldn't ordinary e-mail be good enough for chatting before the trip? This is what we already do…*'
d. Facebook could create engagement.
e. It would be nice if you could create a code in Facebook, and when you type this code on the smartphone, the route pops up.
f. Everybody should find their way to the starting point of a journey on their own, before they start socializing on the social platform.**

3. Seamless ICT platform:

a. PC or tablet for planning at home, and seamless synchronisation with the smartphone for travel. *
b. Large device (tablet) must be available. *

4. The cost of use should be kept low

a. Use of free networks or home network should be switched on automatically.
b. Challenge: price on use abroad (data-traffic).
c. It should be priced as the GPS –free to use once you have paid the subscription, any-where you are 24/7.
d. It should show what it costs to use the T&Tnet system abroad. **

5. Important planning parameters as to accessibility are: **

a. Weather (much rain or slippery roads must be avoided). These should be marked with a symbol.
b. Quality of roads, streets and paths: uneven surface, or much up/down-hill (for persons with wheel-chair or walker, or motor impairment).
c. The nearest handicap toilet / elevator.
d. The nearest rest areas and benches should be marked.
e. Doors (when narrow) and thresholds (when high) that are difficult.

6. Opportunity to easy parking:

a. Mark parking houses (some will avoid them).
b. Also mark what is private and what are communal parking places and means to pay (credit card, only cash, when entering, etc.).
c. How much will the parking cost?
d. Remember: Persons may drive to the starting point of the trip and continue with public transportation.

7. **Time management:**
    a. Distance in m/km and duration (the system should know how fast a particular person walks) and take into account bus/tram/metro/ train timing). **
    b. Required time when only walking compared to walking plus other means of transport.
    c. Provide time when I will arrive. Do I have plenty of time, or do I have to hurry? **
    d. when I have to visit several places (not only go from A to B), the system should be able to propose the best (less time consuming) order in which to reach them.
    e. Provide the option to choose between the fastest, the cheapest or the most interesting route (for tourists). **
8. **Support to changes in route or transportation medium when travelling:**
    a. Provide a message when plane gates, or when train tracks are changed. ***
    b. Provide a message if entering wrong bus / tram / metro / train / gate.
9. **Safety-information must be available: ***
    a. The system should be designed with "safety feeling for the user" in mind.
    b. Paper print-out if everything should go wrong with technology.
    c. Information about changes along the route or during the transportation. ***
    d. Possibilities to get advice from someone you trust – a real person. *
10. **Detailed information should be available about local conditions: ****
    a. Roads that are blocked – detours.
    b. How is the bus-stop equipped for rain?
11. **Navigation indoors, such as airports and train stations: *****
    a. Where the information desk is.
    b. Train tracks and terminals/gates. **
    c. How to get from one train to another or from one gate to the other. **
    d. Availability of assistance to carry luggage within the area / to a place outside (bus, taxi, train). (For some seniors, it is a big challenge to carry their own luggage.)
    e. Within airports: Reminder about liquid in hand luggage.
    f. Give a notice if you go wrong way.
12. **Information about payment-based services:**
    a. Where and how to buy tickets for transportation?
    b. In a foreign city: What kind of discounted tickets are available for transportation / museums, etc., and where can you buy them? Guided tours.
    c. Alternative ways to get from one place to the other with a price tag attached to each alternative. **

d. Use of T&Tnet system directly for payment.
e. The tickets for transport should be available on the smartphone and ready to be scanned on the bus, train, etc. (It takes a long time to look for and buy tickets, especially during the rush hours). Provide a "multi-travel-ticket"; the smartphone must be able to keep track on all tickets and payments. ***
f. How the ticket automates work? I can look at this at home before I travel.

13. Alarm button.

a. Possibility to push button sending signal to predefined destination.

14. Location information relative to where the person is.

a. Nearest police station.
b. Guide me home / to my hotel / to where I left my car.
c. Way to closest bus / tram / metro stop.
d. Guide me to given place from where I am.
e. To where my car is when it is stolen.
f. Give message if a taxi is available around my location.
g. Give message if I walk in the wrong direction. **
h. Way to closest ATM.
i. Closest hotel, restaurant and other points of interest.
j. Information about the history of buildings, churches, etc. The user can choose topics in advance.

15. Information about interesting places passed.

a. Information – in mother tongue – about places you pass when being transported through a foreign city.
b. Possibility to mark such places to return later to them.

16. Touristic information.

a. On site audio-guides for touristic places.
b. Information about cafes/restaurants.
c. Information about currency in different countries.
d. Provide "footprints" from earlier trips.

17. Maps

a. Provide an easy-to-read map rather than a textual description about how to go from one place to another.
b. Possibility to point on map, not only write an address.
c. Possibility to mark the geographic area roughly first, and then give more exact details.

d. Eliminate irrelevant duplicate/triplicate choices for "From" and "To".
e. The map has to show exactly where I am – zoom in – and still be exactly correct. Often, the Google Maps are wrong – not much but enough to create confusion. (Example: When the travel planners say "Lysaker", the bus stop is not at "Lysaker" station (which would be the correct thing to say for travellers), but in real life it is close to the "CC shopping mall" in the area "Lysaker".) It has to tell me exactly where I am when the street signs are missing. ***

18. **An alternative to my smartphone should be provided for navigation.**
    a. *'If the battery is discharged or I forgot my smartphone at the hotel or elsewhere, I want an alternative'*. Some other automate or information kiosk nearby?
19. **Language adaptation for user – simple text (e.g. no English idioms).**
    a. Voice operation.
    b. Voice recognition as a security means. (If it is not my own voice the system will not act accordingly but send out a signal).
    c. Translator from one language to another.
    d. Use of the camera for translation.
20. **No commercials/ads in the system.**
21. **During public transportation:**
    a. Notification in good time before my stop/destination. *
    b. Notification if I enter wrong bus/train. *
22. **Personalisation. ***
    a. Alternative transportation means suitable for me.
    b. Alternatives for audio/visual help.
    c. Something that makes me hear well when I need it. It could be combined with my hearing aid.
23. **It should be possible to make a planning-list before the trip.**
24. **Tracking / 'Find T&Tnet':** When traveling with a group or others, the T&Tnet system should be able to track the other people in the group – show where they are.
25. **All relevant information above should be available in the T&Tnet-system, in terms of links, media, text, maps, symbols, etc. without surfing from one travel/tourist site to another. All in one!** Connect automatically to the relevant and best databases. **

The ideas that received the most votes are presented in the Table 25 and Table 26 below.

Table 25. Information points – Norway.

Partici-pants/consortium	Topic	Information Points	Votes
Consorti-um	Public means of transporta-tion	routes and timetables	***
Consorti-um	Public means of transporta-tion	tickets information	***
Partici-pants	Public means of transporta-tion	information about facilities, for example available buss sheds with protection for rain and cold.	***
Partici-pants	Public means of transporta-tion	information about stops on the route (Included in Route infor-mation?)	***
Partici-pants	Public means of transporta-tion	information about time of arrival	***
Consorti-um	Accessibility	accessible paths (with elevators and escalators) information for metro and train	**
Consorti-um	Accessibility	urban accessibility information (elevators, escalators, stairs, archi-tectural barriers, roadwork, steep paths)	**
Consorti-um	Accessibility	well-lit areas at night	**
Partici-pants	Accessibility	weather conditions. (Much rain or slippery conditions recommend not to be used today. Should be marked).	**
Partici-pants	Accessibility	information about where to find nearest handicap toilet and rest area.	**
Partici-pants	Accessibility	information about special hindrances like narrow doors, high thresholds.	***
Partici-pants	Accessibility	indoor navigation and support. Where can I find information desk, the gates? How do I get from one gate to the other? Availability of assistance	***
Consorti-um	Necessities/ emergencies	public toilets information	**
Consorti-um	Necessities/ emergencies	hospitals, doctors opening hours, location, telephone information	**
Partici-pants	Necessities/ emergencies	information about changes (gates, and train tracks)	***
Partici-pants	Necessities/ emergencies	information about payment based services (where and how)	**

Table 26. Functionality points – Norway.

Partici-pants/consortium	Topic	Functionality Points	Votes
Participants	Public means of transporta-tion	tickets should be available on smartphone and cover the entire journey (Multi-travel ticket).	***
Participants	Usability	the system must be easy to use. Only a few choices shown. Hier-archy of choices should be kept low.	***
Participants	Usability	seamless ICT platform. PC or tablet for planning. Smartphone when travelling.	*
Participants	Other category	time management facility	**

7.3 User observations

Austria

In Vienna, the user observation sessions were scheduled right after the completion of the focus group sessions and took place in the area around CURE facilities. For the observation sessions, four focus groups participants who possess a smartphone were chosen. Two iPhones, one android phone and one tablet were given to the participants for the observation. The devices were chosen according to availability and not for comparison purposes (as there were not enough participants to allow us to support the comparison with sufficient data). On all devices, the Google Maps application was installed and configured appropriately. Recognition of the actual user position and orientation was possible on all devices except from iPad.

Each participant, accompanied by an observer, had to arrive to a specific destination (different for each participant); the destinations were chosen so that no means of transportation was required to perform the route and the estimated duration on foot from the departure point was less than 30 minutes according to Google Maps. The assignment started with route planning that took place in the CURE facilities. The participants were encouraged to express their thoughts and decision mechanisms during the routes (according to the think aloud protocol). The observers-escorts were instructed to intervene only if the participant asks for help and to ask open questions to the participants, when they do not follow the

think aloud process.

The observers' notes and participants' comments of all four observations were accumulated, coded into small information chunks -each containing one statement- and clustered to categories. The categories on which the results are organized were not predefined but occurred during the clustering. In general, the results mainly concentrate around the map perception and usability, input and output modalities, physical interaction with the application during the task and desired functionality/information suggested by the participants.

Map perception and usability

Once the route planning was completed, three out of four users were noticed to have some problem with actually perceiving the route as it was depicted on the map. For the participant with the iPhone, it was not clear right away which are his destination and his departure point (both are depicted with a dot in different colour). Similar problem was noted also by the participant with the android phone; the white arrow indicating direction of the route was considered unclear and confusing and it took him sometime to find out the departure and the destination point as well. The participant with the other iPhone had problem with creating a route; input field and the keyboard were not clear for her.

Moreover, the lack or presence of orientation indication was commented by three out of four participants (orientation indication is usually attached on the actual position of the user and indicates the direction of the user). The participants referred to it as a 'compass'. Users noted that they highly appreciate this feature on their smartphones. The participant with the android phone confused the orientation indication (blue arrow) with a compass; he expected it to show the North. A participant with an iPhone tried to understand which way to go by turning the map (and the phone) around so that her walking direction and the orientation indication match and used this practice more than once.

Finally, three out of four participants commented on the street names that were missing from the map when it is zoomed out and tried to bring up a more detailed view with all the street names. However, zooming in also created some issues to the participants like:

accidentally pressing a wrong button and erasing the route, unsuccessful zoom in gesture, a lot of effort to see the names of the streets and losing the overview of the route.

Input and output modalities

Two participants commented that speech output would be much appreciated, although one of them had hearing problems (*'when I listen to music for more than twenty minutes, something clings in my ear'*).

Regarding touch modality, two participants were not fully familiar with gestures needed to manipulate the map, but once the gesture was shown, they could immediately adopt it, but without completely avoiding errors, such as accidental button press (participants with iPhone).

Physical interaction with the application and the device

Two participants commented on their interaction with the device: the user with the iPad commented that *'iPad was too big and heavy to carry longer than 5 min'*. The same participant stated that he used iPad as a paper map; e.g. when arriving to a crossing he shortly checked street signs and the iPad map. Another participant (with an iPhone) commented that it is important for her to look at the ground and not at her phone, because she has broken her leg and she has to be careful. Moreover, she noted that she feels embarrassed walking around with the device and she would like to be hands free *'when you have a bag or a child with you'*. The observers also noted that she had difficulty to put her coat while holding the iPhone and her bag at the same time.

'save to favourites', 'download maps' functions and 'time left'

Two out of four participants (both with iPhone) were reported to accidentally lose the route data by pressing a wrong button or because they tried to do a task, landed in a wrong page and then initiating the application again, after pressing the home button. One of the two participants expressed the need for a 'lock' or a 'save to favourites' function when she is doing something else. She also stated that she misses the information of time or kilometres left to arrive at the destination. Another function mentioned by another participant was

'download maps' as he does not have any data contract.

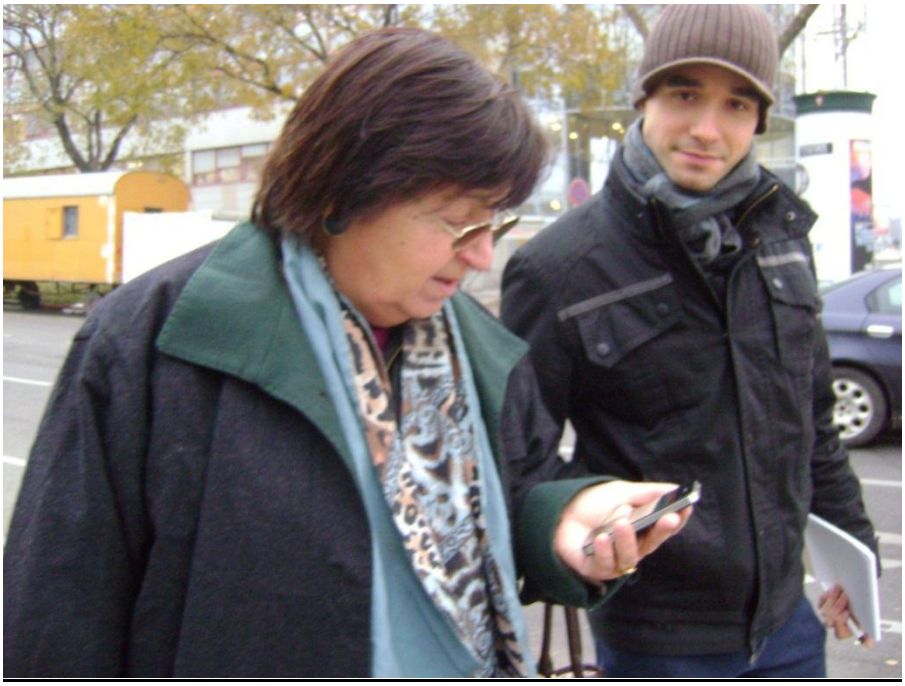

Figure 15. User observation in Vienna (AT).

France

In France, one user observation with one male participant was conducted. The participant is 86 years old and currently owns a smartphone (Galaxy Note-Samsung), but he had never used the Google Maps application. Nevertheless he explained us that he had often used a GPS with his car.

The observation was audio-recorded and conducted between the Broca Hospital to the Collegiale Hospital (preparing stroll: 5 minutes, stroll: 15 minutes). During observation the participant had to think aloud. For this experience he used a smartphone (Samsung Nexus), which he had never used before. The evaluator takes part of discussion and guides the participant only when it was necessary.

Three main issues were identified during observation; a) Ergonomic issues; b) Experience and training with device and c) Environmental and safety issues.

Ergonomic issues

Participant's comments were frequently focused on ergonomics aspects. One of the first difficulties the participant faced was the font size. Indeed, the first plan showed had not the option to zoom. This option was activated only after tapping on icon 'My position'. In this phase streets name on the plan were pretty small for the participant (Figure 16).

A second issue was to understand how and where he should begin to write the address of destination (see on Figure 17: the box to write are the same colour of screen back, the participant thought that to write it is necessary a blinking cursor). The icons at the bottom of the screen are probably less detected than icons at the top.

Experience and training concerns

The participant did not know how to begin the navigation: after setting on the application the starting point and the arrival point, it was displayed a map with the written instructions and a vocal guide. Nevertheless, the participant did not understand which direction he should take: left or right. It seemed no clear at all for him. He knew the name of the street on which we were, but not the direction of the map. The observer showed him the right direction to continue and the next steps were easier for him.

Several times during the itinerary, the participant said that the experience would be easier if we had used his smartphone, even if he never have used before the Google Maps application. It is necessary to underline here that the interface of Google Maps is different depending on the smartphone model/brand.

Environmental and safety issues

The participant made some comments about the relation between the application and the context. For example, street names on the real situation are not always at the beginning of street. It is evident that we could not modify this kind of issue, but it could be interesting to keep it in mind during T&Tnet design.

A second and relevant aspect is security and safety for the seniors. During assessment, a warning message was appearing on the screen, suggesting to the person to pay attention on the road. This message was welcomed by the participant as *'many accidents*

happen because people look their phone and not the route'. Nevertheless, during the observation the participants mainly used the visual information on the screen to find the way. The voice messages were not clearly heard (he choose not to use the earphones and the message was propagated from the speaker of the device), and he could not find the option in the app to listen to the message again.

The positive and negative aspects of application

The participant considered the vocal instructions interesting, because it would be safer to cross the streets than to see the screen during navigation.

He has found the application useful because he has never took the same route before. He said that this kind of application could be more useful to go in the suburbs, because there is not enough signboard. Nevertheless he though this application is not necessary for him, because he never goes in the unfamiliar locations.

In the beginning the participants faced various issues with the application, but in the course of time, he was able to use the application more fluently.

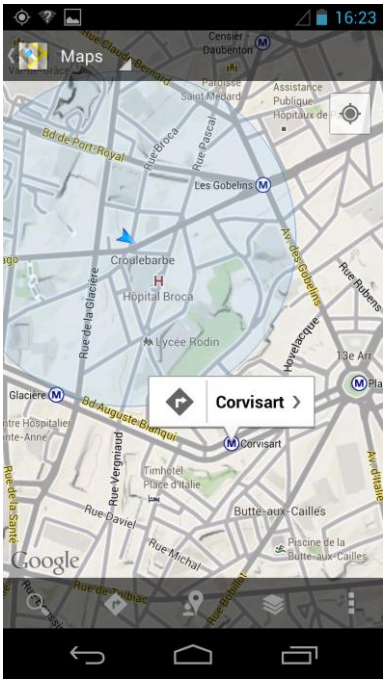

Figure 16. Google Maps application screenshot showing the localisation of participant (France).

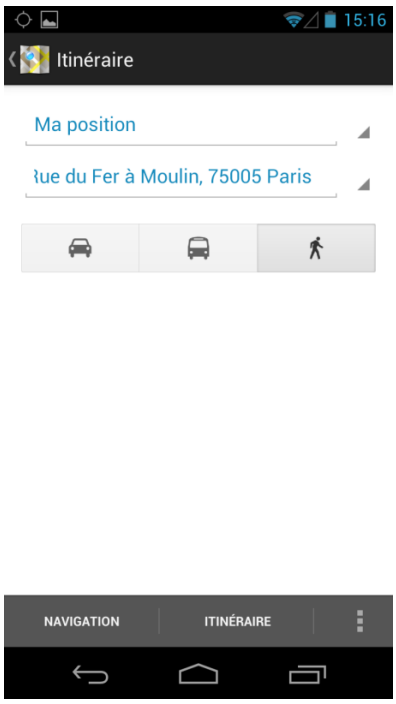

Figure 17. User needs to type her address –Google Maps screenshot (France).

7.4 Interviews with secondary users

Interviews with secondary users (representatives from seniors' organizations) were conducted in Spain, Austria and Norway. The transcribed interviews are included in ANNEX G: Interviews with secondary users.

Spain

In Spain, a representative from Zaragoza Tourism Office[14] was interviewed. The office organizes indoor and outdoor activities and trips abroad both for younger and older individuals.

T&Tnet mobility and navigation needs

[14] http://www.zaragoza.es/ciudad/turismo/default_en.htm

The age of their older members (they have both young and old members) range from 50 to 80. Seniors often prefer to join in group trip instead of booking a trip on their own. They bring leaflets, prints with advice they found on internet and guides with them to Zaragoza, while younger people rely more on their mobile phones. They often ask for a place to rest, have a drink and access to toilets. Accessible infrastructures, big letter fonts and clear explanations are very important to them. Zaragoza is a small city, so seniors do not face particular problems with navigation – in case it is needed, a staff member can pick them up from a specific location. They show interest in history monuments and traditions more than younger people.

Design input

The representative thinks that updating the application frequently so that it corresponds with what is going on in the city (opening hours, timetables and routes, etc.) will be highly appreciated, because seniors get annoyed when their expectations do not match what they encounter in the city. She also added that the application should be easy-to-use and feature big letter font.

She believes that T&Tnet would add value to seniors experience in the city, as they are pleased when they received additional attention and services from the tourism staff. Zaragoza Tourism Office would be interested in communicating information about trips (e.g. accessible monuments, nice restaurants, recommended routes, events etc.) to its members via T&Tnet and would also agree to provide age, preference and requirement surveys to T&Tnet consortium. The suggested pricing strategy would be to offer the application for free or very cheap, because that would ensure that more seniors would use it.

Austria

In Austria two organizations representing secondary users were interviewed, EURAG Austria[15] and GEFAS Styria[16]. Both organisations organize information and adult education events for seniors (e.g. on health or technology related topics) or are involved in the organisation of leisure trips for seniors (e.g. guided or hiking tours). Therefore they are familiar

[15] http://www.eurag.at
[16] http://www.generationen.at

with the mobility needs of the T&Tnet primary target group as well as their requirements regarding the use of assistive solutions for route planning and navigation. Further the interviews also set out the possibilities to use a solution like T&Tnet as platform for organizing and promoting events and leisure trips for seniors.

T&Tnet mobility and navigation needs

The members of the interviewed organisations are seniors being in good health, most of them at the age of 60-85 and to a high proportion living independently in their own homes. Their members mainly live in urban or sub-urban areas (in Vienna and Graz) and therefore, to a high extent, rely on the possibilities of public transport in order to travel to the events organized by EURAG and GEFAS; the car plays a minor role as means of transportation in this target group.

Current navigation solutions are used by the seniors in rare occasions and mainly for navigation while driving a car. The same applies for online timetables for the public transport. Most seniors do not own a smartphone and therefore also do not use current app-based navigation solutions. While they are outdoors, seniors rely strongly on maps in metro, tram and bus stations, particularly surrounding maps that show the right exit, elevators etc.

The main differences between organizing travels for seniors and younger people are:

- For seniors, the accessibility is an important prerequisite when selecting the event venue. Many seniors face problems when having to walk longer distances due to joint or cardiovascular problems; some have to take a short break after only climbing 5-10 stairs. Some visitors ask specifically about the accessibility of the building when making their route plans. “Do I have to climb stairs?” is the most frequently asked question. In addition to the accessibility of the building (e.g. the availability of lifts), a good connection to the public transport is the second important prerequisite when selecting the event venue.

- Especially in winter, it is important not to start the events too late in the evening. If an event continues after 20.00, people start leaving because they feel less secure if they have to go home late in the evening (darkness, bad weather in the evening, etc.). For that reason EURAG schedules its events not later than at 18.00 in the evening.
- When planning their trip to the events, seniors rely a lot on the personal support by organizers. Seniors have higher information needs than younger people when it comes to plan a trip. Even if this information was provided together with the invitation, many visitors call the organizer the day before the event to get more detailed information on how to get to the venue or how to find the specific room. Further, the seniors also require personal support when being on the way to the event. For this reason, a phone number is provided together with the invitation. In general, seniors interact and rely more on the trip organizers than on family members, when planning a trip.
- Since most visitors of the events organized by EURAG and GEFAS know their cities for about 60 years, they rather need the 'right keywords' instead of a detailed route description.

An interesting observation mentioned in the interviews is that there seems to be a clear change in the activity of seniors at about the age of 80. Before that age they regularly visit to the events organized by EURAG and GEFAS, after this age seniors stop visiting the events. The main reason for this seems to be that at this age, many seniors face mobility-related health problems that prevent them to come to the events independently. On the other hand, many seniors stop coming to the events when they move to an old people's home, mainly because of other leisure events that are provided in their new living environment.

Design input

Nowadays, the communication between event organizers and seniors is mainly handled via classical media such as telephone, mail, but also via e-mail (newsletters). Attempts to use e-mail as single means of communication at EURAG were unsuccessful due to many

members that are not connected to the internet, read their mail only occasionally or do not pay the same attention to announcements when communicated via email.

They came up with the following features that would support their objectives:

- The T&Tnet solution has to support the specific interaction requirements of senior users. Many seniors e.g. are facing vision loss and therefore have problems if fonts are not big enough or if there are reflections on the screen.
- Touch-based devices seem to have high acceptance rates among seniors. The preferred size of the device is between a smartphone and a tablet.
- The interviewees are sceptical regarding the use of voice interaction, because it could lead to a feeling of stigmatization *('seniors don't want to attract the attention of others when being on the street'*).
- Carrying a smartphone/tablet device when being on the move could lead to a higher probability of falls or even theft, because using an expensive device on the street might attract attention. Ways to overcome this problem could be to use a watch as platform or to provide haptic feedback.
- Asked about the creation of personalised routes based on user profile, the interviewees agreed that this is a good idea, but it should not prevent the users from getting the information on a specific event/route. The senior should decide on his own which route is possible for her or not.
- Regarding the information to be provided via the T&Tnet solution, interviewees underlined the importance of accessibility information; *'having to walk 200 extra meters makes a big difference for many seniors'*. For example, the location of elevators should be included to the planning of the routes etc. Further, the location of public toilets is also very important information for seniors.

The interviewees from EURAG and GEFAS welcomed the idea of using T&Tnet to provide event announcements combined with personalized route information to their members. They hope that in this way, the need for personal support could be reduced but not

eliminated; *'Many people just want to talk to me, even if they know the way to the event venue'*.

On the other hand, EURAG and GEFAS do not intend to get involved as possible service providers of a new route planning and navigation solution. However, they are willing to recommend the solution to their members. Regarding the pricing of the solution, the most reasonable strategy seems to be to provide the application via an application store under a fixed fee. An important factor for seniors is not to buy a big in a poke – it should be possible to try the solution before buying it.

Norway

Representatives from three organizations, Sande Pensjonsistforening[17], Brandtsgård Minibuss[18] and Sande Seniornett[19] were interviewed in Norway. Two of the organizations work with seniors on a non-profit basis and one is a professional travelling agency which organizes leisure trips for seniors and younger adults.

T&Tnet mobility and navigation needs

The age group of their members range from 60 to 100 years old. The trips can last from one day to two weeks and they are mostly performed with a combination of bus, ferry and airplane. In order to participate in a trip, they should be independent for their daily chores (shower, toilet, etc.), otherwise they must be accompanied by a dedicated nurse.

In general, seniors rely a lot on support from the organizers and they feel insecure if they cannot maintain close contact with the organizer during the trip. Seniors often have difficulties walking for a long time or finding their way, especially when the environment is too crowded or noisy. Moreover, they can forget the time and location of the group meeting. For this reason, some of the organizers are always on duty to tackle with such problems.

The main differences between organizing travels for seniors and younger people are:

[17] http://www.pensjonistforbundet.no/lokallag/7/7023
[18] http://www.bramini.net/
[19] http://www.seniornett.no/

- Seniors believe that the journey is part of the experience, unlike younger adults who want to get to the destination as early as possible. Moreover, seniors enjoy guided tours, need frequent stops during bus trips and are more interested in quality food and good restaurants. Seniors also need to visit a toilet/washroom often.
- The organizer has to plan a seniors' trip in every detail. 'Accessible' hotels with rooms, toilets and facilities to accommodate seniors that have problems with walking must be found. In addition, detailed knowledge of facilities in stops is needed. Often seniors follow specific diets for medical reasons, so their meals need to be planned accordingly. Organizers must take into account the needs of people that do not hear or see properly and should be informed about special equipment that seniors might carry with them. Moreover, they should ensure the availability of doctors and medical facilities during the trip.
- Seniors want to have all the relevant information about the trip and have usually a lot of questions. Some days beforehand, detailed plans are made and distributed to the travellers. The plans include photos and contact numbers of other travellers and of the organizers, photos of destination, a checklist about what they need to bring with them and accommodation information.

Design input

The organizers think that the application must be easy to use with big fonts and buttons. Combination of audio and text and a simple, minimal menu (not all choices shown at once) should also be key features of the interface. From their point of view, there should be two different sections in the application: one for planning and one for supporting the seniors when they are on their own (they have independent time during the trip). T&Tnet could be used then to help organizers plan the trip but also to allow communication with the members before and during the trip, including also members with hearing and vision impairments.

They came up with the following features that would support their objectives:

- Collecting basic information about the participants, thus building a simple user profile.
- A checklist according to user profiles to help both the seniors and the organizers not to forget important things they need to do or take with them on the trip.
- The organizer should be able to build a trip plan online in an interactive way and distribute it automatically to members. Members should be able to interact with the plan (pose their questions, etc.) in order to understand the trip requirements.
- A tool to follow progress. Have users completed their duties? Are they ready to travel?
- The location of each member of the group, when they have independent time, should appear on organizer's screen.
- Reminders for plan details and personal issues like taking medicine, etc.
- Navigation to the meeting points (e.g. parked bus, restaurant) with the possibility to be updated by the organizers, if needed.
- Games for entertainment (e.g. quizzes, a popular game among seniors)
- Integration with hearing aids
- Sharing of photos between travellers
- An alarm feature that would inform the organizer in case of emergency.

They also stated that once there is a working prototype of T&Tnet, they would be willing to suggest to their members to participate in evaluation studies. Regarding the business side, the organizers said that elderly are not usually willing to buy applications. However, they would be very interested to buy and distribute it themselves as a travelling tool that would help both organizers and seniors and also create a strategic advantage for the organization.

8 Summary

This section includes the summary of the results according to the main thematic categories defined in the Research questions (see section 2.2): Mobile technology, mobility habits, navigation technology, interaction techniques. Moreover, in section 8.5, the information and functionality ideas that collected the most votes in all countries are presented. In order to highlight the differences that emerged during the studies, a summary of the results per country is presented in section 8.7.

8.1 Mobile technology

In total, all of participants have a cell phone with 37% of them owning a smartphone. The highest percentage of smartphone owners appears in Norway (about 2/3 of users). On the contrary, no participant declared to own a tablet device. Most participants do not consider them necessary but they would be willing to use them for communication, reading books, sharing photos and browsing the internet. In Norway, France and Austria, participants consider tablet unsuitable for navigation while travelling due to its weight and stated that they would prefer the smartphone for this purpose. In Spain, participants were split between those who preferred to have a bigger screen and those who preferred a lightweight device.

An interesting observation is that participants from Austria, France and Spain emphasize on using mobile technology *'only when it is necessary'*. In general, the word *'necessary'* appears often in the comments of participants, mainly referring to their motivation to use mobile technology. They do not wish to be connected and interact with their phones constantly as the young people often do; the cell phone serves primarily their communication purposes. Moreover, they do express their concerns regarding mobile technology; privacy issues (monitoring location, copyright of work in the internet), difficulties in using a touchscreen and that time-consuming training would be needed to learn to use the devices.

From all the technological means presented to the participants (smartphone, tablet, WiFi, GPS, email, Facebook), the e-mail scored the highest with almost all participants reporting to use it daily. Facebook on the contrary scored rather low; Norwegians quoted it

along with other social platforms (twitter, blogs) as not interesting, and Austrian, French and Spanish participants seem to have very low participation in it. Regarding other applications, while Spanish, Austrian and French participants state that they use internet merely to communicate and to search for information, Norwegians use it to fulfil functional goals: the majority reported to have accounts for online banking and for purchasing tickets and goods.

With the exception of Norway, participants show little familiarity with WiFi technology. In Spain, 4 out of 16 participants stated to have used it at home with their laptops and the rest do not know how to configure it. In Spain, Austria and France, although most participants use internet daily (at least for their email), their answers regarding use and knowledge of WiFi range between 'knowing what it is' and 'have used it at least once'. Knowledge and use of GPS navigation systems seem to follow the same patterns as WiFi; participants are somewhat familiar or have heard about it, but few (particularly in Austria and Norway) are experienced in using it.

8.2 Mobility habits

Social encounters, going for a walk, groceries and other mundane tasks are the main motivation behind seniors' mobility, according to French and Spanish participants. Their need for route planning is very limited, as they visit already known to them places. Inside their city, public means of transportation are preferred over private vehicles (taxi, relative's vehicle, own car) in Spain, Austria, France; the use of private cars is on average limited to 1-2 times per week. On the contrary, in Norway, possibly due to climate, landscape and urban infrastructure, transportation with own car seems to be the norm, scoring the highest use ('almost every day') between other means; metro, bus, tram and transportation with relative's vehicle follow in preference with frequency of use around 1-2 times per week. Nevertheless, in all four countries, walking is considered one of the most common means of transportation ('almost every day' in all four countries).

In general, participants do not inform their family members or friends for their everyday routes but only for longer trips and without many details (Spain, Austria, France) except from Norway, where participants stated that they inform their family members for most of their routes.

When on the road, participants stated to have considerable difficulties with bus routes and timetables (Spain, Austria, France, and Norway). Bus stops without information display and without shelter were considered by Spanish and Norwegian participants an important hindrance to their mobility. Lack of routes and timetables information can lead to problems such as taking the wrong bus or not knowing where to get off (Norway).

Accessibility was also an issue discussed by participants in all four countries. Spanish participants lack information (and infrastructure) for suitable transportation for people with disabilities (adapted taxis, bus ramps, accessible paths). The stairs in public means of transportation are often too high for some of the participants (Austria, France), there are too many stairs in order to take the metro (France) and escalators sometimes do not work properly (Norway). Moreover, crowdedness is yet another problem with public means of transportation mentioned by participants in Spain, Austria and France. In such situations, it is possible that seniors feel unsafe or uncomfortable ('*I dislike the bus, because I have been robbed once*', Austrian participant). Finally, the majority of participants in Norway refer to the ticketing system as cumbersome and complicated and comment that it is stressful to stand in the line waiting to buy or validate a ticket.

The route planning in all countries takes place with the help of online route planners and with paper city- and roadmaps. Prints from websites (usually websites that enable users to create routes with local public means of transportation) and paper maps are carried during the route to help them with navigation. In Spain and France, participants reported to perform little or no route planning, because they mostly visit places they are familiar with. When they travel abroad, most participants contact travel agencies and tourist offices to plan the trip along with collecting useful information also from the internet.

While on the road, participants find their way with printed maps they created for their route online, or city- and roadmaps. Participants with smartphones use them for navigation (in Spain, France and Norway). Participants also opt for asking people, when they have trouble finding their way (Spain, Austria, Norway).

8.3 Navigation technology

Most participants in Austria, Spain and France use paper maps and prints from online route planners. GPS navigation systems are also appreciated, although only few participants have access (Spain, France and Austria). The majority of Norwegian participants own smartphones and have identified a number of problems with their navigation applications: they miss information about blocked routes, road works and urban barriers, information about bus sheds and facilities to protect them from cold and rain and they consider them 'not too accurate' and source of confusion. Commenting on Google Maps, the Austrian participants said that although they might wish for more information, they do not want to be overwhelmed by it.

During user observations, a lot of insights were collected regarding seniors' interaction with navigation technology. In Austria and France, participants found that it was not clear right away the marking of their position and of the destination. Moreover participants emphasized on the orientation indication or 'compass' as it was commonly referred to by the participants; they stated that they highly appreciate this feature. Street names also play an important role in their navigation task, as they serve as confirmation that they are on the right way. Participants found zooming in and out frustrating, as it creates some instant loss of information (when zooming out, street names are lost, when zooming in the overview).

8.4 Interaction techniques

In Spain, Austria and France, participants express concerns regarding the use of the touchscreen and mostly agree that a voice interface would be useful for the purpose of navigation. In all countries, participants consider interaction with the smartphone touchscreen problematic because it is difficult to type or give input correctly (big fingers-small buttons, tremor, reflective screen, small keypad etc.). However, they think that part of the problem lies on their lack of training with such devices (France, Spain). In Austria and Norway, most participants recognize the smartphone as the most appropriate platform for navigation when traveling due to the fact that it is portable.

Valuable feedback was collected during the observations regarding the interaction techniques. Half participants consider speech interface to be useful along with the graphical

one, despite the fact that some seniors might have hearing problems. Seniors do not prefer to hold the device while walking and they mentioned various reasons; they do not want to attract attention, they are afraid of falling or being robbed, their hands are often occupied. Participants seem to be able to handle the touchscreen by themselves (or after a short demonstration of a gesture) but without avoiding errors such as mistyping and having to start the application over or accidentally pressing keys, while zooming in/out (for this purpose, a 'save' function was proposed so that there is no need to start over creating the route).

8.5 Information and functionality needs

Through the brainstorming part of the user studies, participants had the opportunity to express which information and functionality they want to have available with them while navigating.

In Spain, the highly voted features included information regarding public means of transportation (6 out of 10 features), accessibility (2 out of 10) and route recommendations (2 out of 10).

In Austria, both from information and functionality point of view, public means of transportation and necessities concentrated 9 out of 17 features; the rest of them are concerned with culture, personalization of the application, usability, actual position and car driving.

In France, public means of transportation, accessibility, personalization of the application and actual position are the topics of the 8 highly regarded features.

In Norway, out of 19 highly voted features, accessibility is the most populated topic (7 features); public means of transportation (6 features), necessities (4 features), usability (1 feature) and time management (1 feature) follow.

It becomes obvious from the comparison between the results that all participants need more information regarding public means of transportation. Accessibility information is also highly appreciated by Spain, France and especially in Norway. Table 27 contains a summary of all features (information and functionality), classified in meaningful clusters.

Table 27. Information and functionality points voted in the four countries.

Topic	Countries	Features	Votes
Public means of transportation	ES, AT, FR, NO	Routes and timetables	12
	AT, NO, ES	• Ticket information, • whole-journey tickets, • buy tickets	14
	NO, FR, AT	Time of arrival, duration, travel times, delays, route time management	8
	ES, FR	Notification for stepping out of public means of transportation	5
	NO	Information about stops on the route	3
	NO	Information about changes (gates, tracks, etc.)	3
	AT	Alternative routes/ which different means of transportation can I use to arrive at my destination?	3
	NO	Information about facilities, for example available buss sheds with protection for rain and cold.	3
	AT	Taxi stands	2
	ES	Crowdedness	2
Accessibility	ES, FR, NO	Urban accessibility information (road works, steep baths, architectural barriers, special hindrances like high thresholds)	9
	ES, FR, NO	Accessible paths for public means of transportation (with elevators and escalators)	8
	NO	Indoor navigation and support. . Where can I find information desk, the gates? How do I get from one gate to the other? Availability of assistance	3
	NO	Well-lit areas at night	2
	NO	Weather conditions (rain or ice)	2
	NO	Nearest handicap toilet and rest area	2
Necessities	AT, NO	Hospitals, doctors, pharmacies (opening hours, location)	5
	AT	Shops and offices opening hours	2
	NO	Public toilet information	2
	NO	Information about payment based services (where and how)	2
Usability	AT, FR, NO	• Big buttons, readable display, pleasant voice. • possibility of choosing different modality for different notifications. • Easy to use. Few choices shown, low hierarchy of choices	7

Actual position	ES, AT, FR	Information about actual position and orientation	7
Personalization	ES, AT, FR	Get route recommendations, according to filters of interest (touristic, weather, accessibility) or generated by system e.g. 'would you like to take a walk today in the park?'	10
	AT	Save locations you visited or you want to visit, and be reminded when you walk nearby.	2
Culture	AT	Monuments location and history information	**2**
	AT	Public/social/cultural events information	**2**
Social Network	ES	Send a route to another user	**2**

8.6 Summary of interviews with secondary users

Five interviews with representatives of seniors' organizations were conducted in Spain, Austria and Norway. The organizations were chosen as they deal with similar issues as T&Tnet: seniors' requirements while they are travelling. The representatives talked about seniors' mobility and navigation needs, their requirements from the organizers as well as features and functionality which would make T&Tnet a useful tool for them. The results, particularly from Austria and Norway, overlap to a great extent, however data saturation was not reached.

The organizers provide seniors days before the trip with a detailed plan containing photos and telephone numbers of the organizers and other members, accommodation, stops, schedule, etc. A simpler plan is also distributed for events. The one-day events should be organized early in the afternoon or evening because seniors prefer to travel during the day. For the long trips, the organizers have to take care of the meals, to find accessible hotels, consider members' specific limitations, to ensure availability of doctors and medical facilities during the trip and schedule many stops with access to the toilets.

Both in Austria and Norway, organizers stated that seniors have many questions on the plans. They call them to ask how to get to the place of meeting, if they will have to climb stairs or walk for long time, etc. Organizers think that an application specifically targeted towards seniors reduce their need for asking questions to personnel, but not eliminate it, because seniors highly value personal contact.

Norwegian representatives suggested that the application should be designed so that the organizers can collect information about the participants, plan the trip, distribute the plan to the trip participants and receive their questions on it online. Additionally, it should provide support to seniors when they are travelling on their own and when they have independent time during a trip. Moreover, it should provide participants with a checklist of what they should bring with them on the trip, medicine and other personal reminders. The organizer should be able to see the locations of the trip participants on the application and receive an alert in case of an emergency.

Austrian representatives also mentioned that they would like to provide events information combined with personalized routes for every member. Currently though, the majority of their members do not own smartphones and thus, they rarely use navigation applications and only when travelling with the car. Furthermore, Austrian representatives expressed their concerns regarding use of smartphone: carrying a smartphone and interacting with it could lead to a higher probability of falls, theft and attract unwanted attention. The Spanish representative highlighted the importance of updating the application so that the information matches what seniors encounter in the city (timetables, opening hours, etc.).

It was generally agreed that the application should be provided for free or under a very small fee in order to reach seniors, as they are not used to buy mobile applications. All organizations stated that they would be interested in serving as a testbed for T&Tnet.

8.7 Summary of the results per country

8.7.1 Results – Spain

In Zaragoza, 60% of the participants use e-mail and 40% WiFi once or more times while familiarity with tablets, smartphones and GPS devices is rather low. Internet is used

for information browsing and communication purposes, not so much for functional goals (e.g. online banking). They dislike being attached to their phone *'as young people do'*.

In Zaragoza, the need for planning a trip is limited due to the fact that the city is relatively small and seniors do not travel often without companion. They are familiar with web map applications, but only few of them use it to actually print maps. They do not usually inform their relatives about their trips. Seniors use bus (the most common public means of transportation in their city) and face problems with it; the most important of them are the low bus frequencies, delays and road works, lack of informative and comfortable bus shelters and accessibility.

Their preferred means of interaction with the smartphone is high-pitched voice, but they are in general open to other interaction techniques. They are not familiar with touch interaction and they would need some training before using it. Their desired information and functionality points for T&Tnet focus on: public means of transportation and ticket information, accessibility, actual position, route recommendations and communicating routes to other users.

8.7.2 Results – Austria

The Austrian participants reported high and frequent usage of email (90%) while about half of them have used at least once GPS navigation system, WiFi and smartphone (about 30% are smartphone owners). They have no interest in social networks and they mainly use internet for browsing information and not to fulfil functional goals. They make limited use of their mobile phone, as they do not wish to be available at all times.

Seniors use mostly public means of transportation inside the city and car in the outskirts. They are pleased with metro but they mention various problems with trams and buses: infrequent connections, accessibility and crowdedness. They are quite familiar with internet planners and they use city maps to navigate.

Austrian participants, during both the focus group and the user observations opted for smartphone as a suitable platform for a navigation application as it is lighter and easier to hold. Moreover, they have used successfully voice interaction with their car navigation sys-

tems and they are positive to it. As Spanish participants, they also have concerns about touch interaction, as pressing wrong controls is easy. The most highly voted ideas were concerned with public means of transportation routes and timetables, possibility of choosing between alternative routes, ticket purchasing and medical information (available doctors, hospitals, pharmacies, etc.).

8.7.3 Results – France

The French participants are also frequent users of e-mail (90%), have used GPS at least one or more times (50%) and one third of them have used one or more times WiFi. Two out of the six participants own a smartphone which they consider useful but not necessary; other participants have a simple cell phone to communicate with their relatives.

The main mobility barriers mentioned were accessibility (high steps in the bus, escalators on the metro), lack of information about buses (schedule, strike, handicap access) and reading the signs (small fonts). Navigation is seldom needed because participants visit mostly areas known to them. When they visit an unknown place, they use the printed map from the computer or a map book to navigate. They would not inform their relatives for every day trips and only briefly for unusual ones.

Participants agreed that the ideal navigation application platform would be a bit bigger than the smartphone along with a stylus for easier text input. They also lack experience with touch interaction but they think that it would become easier with practice. Their most voted ideas focused on routes and timetables of public means of transportation, alternative routes according to parameters (weather, accessibility, touristic, etc.), accessibility information and actual location information.

8.7.4 Results - Norway

As expected, Norwegian participants were the most experienced users of technology, with 70% of them owning a smartphone, 70% having used WiFi one or more times, 60% GPS one or more times and 100% using email frequently. The Norwegian participants not only browse for information as their Spanish, Austrian and French counterparts, but they also buy tickets, plan their routes and handle their bank accounts online.

More than half of the participants use navigation application on their mobile phones and they find them somewhat frustrating. They think that Google Maps is not very precise and they consider reading maps, zooming in and text input to be rather confusing sometimes. They state to have no interest in tablets, Facebook and blogging and social platforms.

The preferred means of transportation is the car, followed by public means of transportation. The main problem the participants face when they use public means, is the ticketing system which they consider cumbersome. Moreover, accessibility and lack of information when travelling can be sources of frustration and stress.

Norwegian participants, already experienced users of smartphones, require low hierarchy, easy-to-use menus and prefer smartphone as an application platform for the time they are on their way and pc or tablet for planning the route at home. Perhaps due to their computer literacy, Norwegian participants came up with many ideas-features for T&Tnet with the most important ones concerning routes and timetables information, ticket purchase, accessibility information, time management function, indoor navigation, etc.

9 Conclusions

The studies described in this document, covered all the important aspects relevant to T&Tnet scope: mobile technology, mobility, navigation, interaction techniques. The methods followed for this purpose were questionnaires, focus groups, user observations and secondary user interviews. The main objective of this exploratory approach is to map the experiences, opinions and observations collected into actual design guidelines for T&Tnet. In this section, there will be an attempt to draw conclusions and guidelines based on the initially set research goals, described in section 2.1.

User-system interaction

Throughout the studies, participants - even those who own a smartphone - showed little or no interest for tablets and specifically choose smartphone over tablet for on-site navigation in two countries (Austria and Norway). The main reason they gave is the weight of the device. The dilemma, as expressed by Spanish participants is choosing between seeing more clearly the screen (tablet is better) and carrying the device (smartphone is better). However, based on the clear preferences of participants in Austria and Spain, a smartphone application would be the most reasonable choice for on-site navigation, without of course excluding tablet from the prospective T&Tnet platforms.

When walking, participants are not in favour of holding a smartphone on their hand for long time. Their reasons are that they do not want to attract unwanted attention, they fear of being robbed or falling, they want to pay attention on the environment (streets, signs, etc.) and often have occupied hands (Austria, France).

When participants prepare a route, they usually bring with them, paper maps and prints from online maps (almost all participants reported this). Therefore, emphasis should be given not only to the user interface of the planning application (that will be designed for both web and mobile), but also to the output of this planning, the print. The printed map should also be designed according to the guidelines developed for the interface (destination and point of departure should be clear, the names of the streets should be readable etc.).

Seniors' limitations with technology are imposed not only by their lack of experience, but also by their physical impairments. Participants mention as desirable features big buttons, pleasant high-pitched voice, possibility of choosing different modality for different notifications, few menu choices, low hierarchy of choices. In a study by Osman, Maguire and Tarkiainen [7], usability and ergonomics features, such as easy menus, big fonts, portability, large buttons, are the most appreciated features among older users' requirements from mobile phones. Their goal, also explained in *User's mental model*, is to use their mobile device only '*when it is necessary'.* From this comment, frequently mentioned by many participants, it can be understood that it is unlikely that seniors will spend time to learn how to use the application. Therefore, the design should focus on making the interface self-explicable, non-invasive and simple, perhaps in expense of adding extra useful functionality.

The content

During the brainstorming but also from the questionnaire results, it was shown that participants are not particularly interested in social networks. A very small percentage of participants in all countries are actively involved with Facebook (about one person or less per country). Moreover, ideas concerning interaction with other users were produced in a lower rate than ideas concerning accessibility and other aspects and most of them were not so highly valued during the voting. In particular in brainstorming (section 7.2.2), 'send a route to another user' was the only idea that received sufficient votes in Spain. Moreover, participants do not inform their family members for mundane routes and only briefly for leisure trips or not so usual routes, e.g. visits to the doctor.

Users are in general in favour of having the choice between alternative routes that match their route intents (e.g. tourism), or the context (e.g. weather) or their accessibility preferences. In a user needs study for location aware services, Kaasinen comes to the same conclusion but underlines also the fact that although users would benefit from personalized service, they might not be willing to 'work' for it, namely define a profile with preferences and other details [8].

From these observations and from literature, a lightweight profiling of the user and social network can be suggested for T&Tnet. The profile could enable users to store their preferences, send routes to other users and save locations important to them, as it was also discussed during user observations (see section 7.3). In user evaluations by Kaasinen 98[8], users said that they would use a location-based application when found in unfamiliar environment or in an emergency situation (which agrees with our participants response that they use their cell phones *'when necessary'*) and thus, he suggests that the service and the most important functionality should be easily available when needed spontaneously but should also support pre-trip planning. This can be translated that the user shall not need to log in in order to navigate, but in order to look up the address of the restaurant saved some days ago.

The information needs of participants are mostly concentrated around public means of transportation. Participants use public means of transportation on a daily basis with the exception of Norway where private vehicle is the most common means of transportation. Nevertheless, in all countries, information about routes and timetables along with information and possibility to buy tickets via the application would be highly appreciated. Delays, road works and changes in the routes and timetables are a source of frustration for seniors and thus, are also included between the most highly voted information points.

Several problems seem to occur with the use of buses: Spanish participants report the lack of commitment of buses to their routes and timetables, French have reasons to feel more confident inside metro than bus, *'because there are fewer possibilities to lose the way' and* Austrians, Spanish and French complain about the *'steps being too high'* in the buses' entrance. The buses are of course subject to changes in the landscape of the city, road works, infrastructure and traffic, therefore, it is much more likely to deviate from their planned routes and timetables. Accessibility also varies between buses in the same city. Buses are by definition less accessible because they have limited space and the user is bound to his chair until the destination. For all these reasons, it would be perhaps inappropriate to apply the same information design approach for all means of transportation. For example, the bus is much more likely to deviate in route and timetable and accessibility ergonomics than the metro. On the other hand, taking the bus at night instead of metro might be safer in some area of the city.

This conclusion is supported by the fact that the idea of 'getting route recommendations, according to filters of interest (touristic, weather, accessibility) or generated by system e.g. 'would you like to take a walk today in the park?' is highly voted in Spain, Austria and France and the idea of 'Alternative routes/ which different means of transportation can I use to arrive at my destination?' is highly voted in Austria. Different means of transportation are appropriate for different purposes or under different conditions and each means has its own peculiarities.

User's mental model

Participants from Austria, France and Spain often refer to their usage of mobile technology as an activity that is performed '*only when it is necessary*'. Participants explicitly state that they do not wish to be constantly connected as young people do; main reasons behind this behaviour are privacy issues and the time needed to learn to use complex mobile devices. Additionally, they need to 'save' their sensory and cognitive resources for other things that require attention while on the way. As a participant mentioned during the user observations: *'I don't want to look at it (the device) all the time, I prefer to look at the ground, because I recently fell and hurt my left ankle'*. That means that T&Tnet should be designed with the goal in mind to allocate as little cognitive and sensory resources (especially vision) as possible. This is also supported by Holzinger, Searle and Nischelwitzer (2007) who place cognitive complexity among the most important barriers of elderly in their usage of mobile technology [5]. Moreover, Ziefle and Bay (2005) showed that seniors' navigation performance met the younger users' performance when they used mobile applications of lower complexity [10].

During the user observations, participants had difficulties recognizing their position and destination while they often used the orientation indication when it was available to ensure that they are on the right track. This remark along with the fact that users voted as one of the most important features the 'information about actual position and orientation' show that seniors do not take for granted these basic features and they want to make sure that this information will be available and in a comprehensible format.

Finding your desired destination can be also difficult; Norwegian participants find confusing the multiple choices that Google Maps returns when they type for an address. Church, Neumann, Cherubini and Oliver categorised the queries in a location-based application in general queries (e.g. 'supermarket', 'chemist'), location explicit queries (e.g. 'here', 'nearest'), address/direction queries where the location is specific, and location implicit queries (e.g. 'where can I get ski equipment?') [9]. They conclude that users should be able to specify fuzzy or vague locations and ambiguous queries on mobile location-based applications. Of course, there is no way to optimize user queries and the responses they might receive. But for example, it would be appreciated that the system can learn over time what the user means when he types 'centre' and not show her all the results that include the word centre inside all the times.

Furthermore, a balance between overview and details of the location of the user has to be achieved in the T&Tnet design. It became apparent during the user observations that street names of adjacent streets follow in importance after the information of actual position and orientation. Participants used the street names as a way of confirming their location. The overview of the route gives also important information to the user; it informs him first of all about the shape of the route and about the general area of the city he is in (this information could be also used as a way of confirmation that the user in on the right track). In overview though, street names are illegible, especially for elderly and that makes changing between views necessary. However, zooming in and out seems to be frustrating because it creates the question to the participants *'where has the information gone?'* In case of zooming out, street names become invisible and in case of zooming in, the user loses the overview or sees details of a 'wrong' location due to lack of precision in zooming.

The results have shown that a small number of seniors are familiar with GPS and many of them would not know how to connect to a WiFi network. In Spain, half of the participants would have difficulties to set their phone into silent mode. These results inform us about the barriers set by lack of experience. It can be assumed that knowing how to operate a GPS helps to understand the functions of a mobile navigation application (although it is not necessary). An experienced user for example knows that GPS is not always precise, so when the system shows a wrong location for some time while it updates, she will not get

frustrated. The solution for these type of problems will be addressed through giving comprehensible feedback to the user in order to make her understand how the system works, when it updates or it does not receive signal, thus informing her expectations about how the system works. Nevertheless, attention to the design of feedback messages and warning dialogues should be paid because they can be confusing for the user [6]. Similarly, users must be able to benefit from an open WiFi network in proximity. Therefore, it should be a design goal to adapt the WiFi notification in a user-friendly and comprehensible way for seniors.

Seniors leisure organizations input and involvement

In a nutshell, the representatives of seniors' leisure organizations agree that seniors need a detailed plan many days in advance, when they decide to participate in a group trip. The plan should include information and phone numbers of the staff and other trip participants, schedule, accommodation, sightseeing, etc. The organizers plan the trip taking into account all possible restrictions, such as special diets that seniors might follow, accessible hotels, medical staff availability, many stops with access to toilet in the way. Seniors always have questions on the plan and ask to contact the crew personally. For this reason, the organizers believe that an application such as T&Tnet could not fully replace the need for personal guidance and contact but it could complement it. Norwegian representatives would be very interested in being able to plan the route on an interactive platform that would allow seniors to set their questions on the plan. It would be also very useful for the organizers if they could monitor the location of all trip participants and receive alarms in case of an emergency. Moreover, they propose a personalized checklist to remind seniors of what to take with them on the trip. Austrian representatives proposed similar solutions but added also their concern that seniors are not used to smartphones and that using one would result in higher probability of fall and theft.

Table 28. The T&Tnet user-system interaction guidelines.

T&Tnet user-system interaction guidelines			
device	ID.1	The appropriate platform for T&Tnet application is **smartphone for on-site navigation** and **web browser for planning the route at home**.	7.1.1,
	Idea	Although tablets seemed to be not very appealing to seniors, designing a tablet application should not be rejected as an option.	7.2.1

map print	ID.2	**The map print** from the planning T&Tnet app is a tool that seniors frequently used for navigation and should be designed according to their limitations.	7.1.3
	Idea	The map print can be available in Braille, or in mp3 format for people with severe vision impairments.	
'I don't want to attract attention'	ID.3	The interaction with the user should be **unobtrusive, subtle.**	7.3
	ID.4	User should spend **the least possible time looking at the device** to understand where he should go.	7.2.1
	Idea I	The time user spends looking on the interface could also be a metric to measure the success of the interface.	
	Idea II	Tactile feedback or some extra component to provide subtle directions to the user should be considered.	
usability requirements	ID.5	The interface should be **easy to use**. There should be **few choices** shown and the hierarchy of choices must be kept low.	7.2.2
touch	ID.6	The application must provide **feedback** about the user's action on the screen.	7.3
	ID.7	The application should feature **big touch spots/buttons** and **a comfortable font.**	7.2.2
voice	ID.8	Users will be able to get directions using **only speech-based interaction or in combination with other modalities**. Users prefer **a female voice**.	7.2.1
	Idea I	The speech based interaction doesn't have to be continuous, but instead, it can be initiated by the user, when he needs directions. For example, when a user gets to a crossing, she presses a button and the system then recognizes her position and gives them voice instructions.	
	Idea II	Sound or music based interaction can also be considered. For example, a user can wear earphones, and hear a notification sound from the left ear when he as to turn left.	

The representatives of seniors' leisure organizations have years of experience organizing trips and events for seniors, thus their input is particularly valuable. Some of their suggestions though might be difficult to include in T&Tnet, because they would add complexity or because they might not fit directly in the scope of T&Tnet. For example, building a platform that could be used from organizers to plan a trip abroad and interact with trip participants requires a completely different task-set and interface from building a platform

that would provide accessibility and navigation information to seniors inside their city. In the next stages, the consortium will take into account the feedback and take the final decision concerning the focus in the development of T&Tnet.

Table 29. The guidelines related to the T&Tnet content needs

T&Tnet Content			
Social Network	C.1	It should not be necessary to login in order for the user to plan a route and navigate.	7.1.2
	C.2	The social network, if included as a component, should be minimal.	7.2.2
	Idea	Seniors' leisure organizations mentioned that they need a planning tool, on which they can design a travel plan, distribute it, send personalized information and even monitor the location of each trip member. In that case, the social network component would be an important part of T&Tnet, as a user would have to make a profile in order to register for a trip.	7.4
Public means of transportation	C.3	The specific characteristics and parameters of each means of transportation should be taken into account when designing the application. E.g. Not all buses are accessible and their timetable is subject to traffic, road works, etc. while metro is usually accessible and reliable but not so safe at night.	7.2.1
Routes	C.4	Between a departure and a destination point, should be more than one routes available. Each route should be optimized for a parameter.	7.2.2
Timetables	C.5	The user must be informed about delays in public means of transportation.	7.2.1, 7.2.2
	Idea	This information could be transmitted to users through RFID tags placed on the bus stops.	

Table 30.The guidelines related to user's mental model.

User's mental model			
'I use it only when it is necessary'	M.1	Users do not want to spend time learning the interface. The use of wizards and pop-up windows which explain the interface should be eliminated. The interface should be self-explanatory (also see ID.4)	7.2.1, 7.3
Actual position and orientation	M.2	The user should be able to understand without any prior knowledge/explanation his location and orientation on the map.	7.3, 7.2.1
	M.3	The same applies also for his destination.	7.3
zoom in/out	M.4	The user should be able to understand how to switch between the overview (usually a map with the route drawn and markings of current position and destination) and the detailed view (street names) around his position.	7.3
'I lost my plan! How can I go back?'	M.5	If the user lands on a wrong view (e.g. by tapping imprecisely), she should be able to go back to her created view.	7.3
	M.6	The user should have access to her created route plan during the journey. Accidental wrong tapping shall not cancel/delete/undo the route plan.	7.3
	Idea	Undo/Redo function available, adjusted to the map context. Saving route plans and being able to refer to them.	7.3
Ignorance about **GPS**	M.7	Precision, updates, orientation with GPS, signal issues have to be subtly explained.	7.1.2
Ignorance about **WiFi**	M.8	The user should be able to benefit from a free WiFi in their proximity.	7.1.2
Need for personal contact	M.9	The user should have at his disposal a number she can call for help or instructions or questions wherever she is.	7.4
	Idea	Whenever a user enters a particular area (e.g. airport, metro station, or a city district), he should have the phone number of a person available to answer questions or help (e.g. the information point of an airport, a police office of a district, etc.)	

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Annex A: Focus group manual

General recommendations

This section provides an overview on general recommendations for moderating focus groups.

- First, ask broad open-ended questions. Then ask more specific questions.
- Do not give your opinion to respondents. Do not judge answers. Stay neutral.
- Form your questions in a neutral way, so that they do not impose any positive or negative attitude towards the product/application. For example, it is better instead of asking: 'do you think this application is useful?' to ask: 'what do you think about the application's functionality?'
- If the respondents ask about your opinion, turn the question back to them: e.g. 'I don't know. What do you think?'
- Dig below top-of-the-mind answers. Find out 'why' and 'how'.
- Cover your primary topics. Keep track of time. Stay on track.
- Look respondent in their eyes and listen to their answers. Show understanding and empathy. Nod your head.
- Challenge in a friendly way. Keep the tone upbeat and positive. Do not argue.
- If a question confuses a respondent rephrase it. If the question still does not work, skip to the next question.
- Manage the respondents so that every respondent gets equal talk time. In some focus groups, dominant respondents show up.
- Give summaries at the end of a discussion session and ask if you have understood everything correct.

Preparation checklist

Tasks	Check
3 DAYS BEFORE	
Translate the FG presentation, the informed consent the questionnaire and the manual questions and topics.	
Book the focus group facility.	

Ask one (or two if possible) of your colleagues to be the observer and inform him/her about his/her role.	
Arrange refreshments for participants.	
Recruit participants.	
Prepare and send instructions for the participants how to find the facility.	
Remind participants.	
Print n Informed Consent forms (n: number of participants; consider some extra copies as give-away for the participants).	
Print focus group manual.	
Arrange a projector.	
Arrange camera and operator (possibly one of the observers can take pictures).	
Arrange audio/video recording of focus group (devices and operators).	
Arrange at least one smartphone and one tablet with Google Maps installed in both devices.	
Arrange materials: o Markers and pens o Post-it o Plain dot stickers (two colors) o Blank paper o A whiteboard behind the demonstrator o A presentation document (.ppt) on a USB stick o Tangibles printed	
Print n mobile technology and mobility questionnaires.	
Print the information and functionality list for the moderator and for the observers.	
Arrange n incentives for participants.	
5 HOURS BEFORE	
Delegate the tasks between the observer(s) and the moderator. Decide: o Who is taking pictures/audio/video recordings? o How will the participants sit? o Will the observer(s) support the moderator in any other task other than taking notes?	
Check audio/video recorder, camera and projector.	
Place all the materials on the table (questionnaires, markers and pens, post-it, plain dot stickers, blank paper, presentation document (.ppt) on a USB stick, focus group manual, tangibles printed).	
Create a list of participants and nametags for them.	
Make a rehearsal of your speech (description of the project, the questions you'll	

ask etc.)	

Focus group procedure

The focus group session will take 120 minutes and will have the following structure (see table below).

Time (in min)	Activity
0-5	Welcome
5-15	Informed Consent
15-25	T&Tnet introduction
25-35	Mobile technology and mobility questionnaire
35-60	Discussion
60-70	Break
70-115	Interactive Brainstorming
115-120	Conclusions, Thanks, Goodbye!

Welcome (0-5 min)

The moderators welcome the participants, introduce themselves and offer them refreshments and snacks. The participants sequentially introduce themselves to the rest of the focus group and place their nametags in a visible place in front of them.

Informed consent (5-15 min)

Before starting the discussions, each participant must be informed about the following topics:

- The project
- The focus group study and its goals
- The procedure
- Which data is recorded
- How the recorded data will be used

The participants receive an Informed Consent (IC) that must be read and signed by them in order to participate (Annex C: Informed consent. To ease the procedure and shorten

the time, you can go through the document together with the participants and explain the information in the IC form step by step.

T&Tnet introduction (15-25 min)

The introduction to the T&Tnet project can have the following format:

"We are participating in a large-scale European project called T&Tnet that aims to develop a navigation application targeted especially towards senior citizens. Therefore we are organizing this study in order to find out more about your route planning and way finding challenges and wishes. The study has three parts: in the first, you will fill in a short questionnaire about mobile technology and navigation, in the second, we will discuss about navigation issues and in the third part we will try to synthesize an ideal navigation system from your experience and wishes regarding navigation. The data we collect out of this study, will remain anonymous and will only be used to design the navigation system. You are welcome at any time to ask questions regarding the process, the data and the project."

Discussion: Usage and knowledge of mobile technology (25-35 min)

- **Aim**: to get insights into
  - Smartphone - pros and cons
  - Tablet - pros and cons
  - Motivation to use mobile technology
- **Procedure**: The moderator passes a functional (working) smartphone and a tablet to the participants and asks them*: 'How many of you have a mobile phone? A smartphone? A tablet?' The moderator waits to see hands, or nodding or gestures. 'Those of you who have one of the above, how does it help you? And how does it hinder you? Those who don't, would you be interested in getting one? How would you use it?'* The moderator gets brief input from each participant.
- **Expected output:**
  - brief evaluation of participants' experience with mobile technology
  - insights on their motivation to use mobile technology
  - comparison between different mobile solutions.

Discussion: Mobility related habits (35-45 min)

- **Aim**: to get insights into
  - Physical barriers, accessibility
  - Use of public transportation (frequency, routes, time tables etc.)
  - Interaction with secondary users
  - **route planning**
    - How do they plan a route?
    - challenges
  - **way finding**
    - How do they find their way when they visit a place for the first time?
    - Challenges
- **Procedure**: *'How often do you go out of your house? For which purpose? Do you face any difficulties on the way? How do you plan your daily trips? What do you do in case you have to go to some place that you don't know very well? Is it sometimes difficult to plan a route? If yes, why? Do the members of your family know about your routes? When do you inform them? Why?'*
- **Expected output:**
  - mobility motivation
  - evaluation of their experience with mobility and possible barriers
  - communication with family regarding their mobility
  - insights on their route planning and way finding habits

Discussion: Navigation technology (45-55 min)

- **Aim**: to discuss about
  - Navigation gadgets and tools (GPS in cars, Google Maps, compasses, maps, etc).
  - Short demonstration of a task with Google Maps.

- **Procedure**: *'Which tools do you use to find your way? Analogue, like paper maps and compasses or digital? What is your experience with the navigation tools you used?' The moderator can demonstrate with a beamer a task with Google Maps, for example how to go from the Airport to the town hall (the task should refer to the city of the focus group, so that the participants have references). The result is a blue line connecting the two locations and some additional information on the side. The moderator can then ask the participants: 'What information do you get from this map? Do you miss any information? Do you know where to find the information that is missing? How would you plan this route?'*
- **Expected output:**
    - evaluation of their experience with navigation tools
    - evaluation of Google Maps
    - first insights of what information they need

Discussion: Interaction techniques demonstration and preferences (55-65 min)

- **Aim:** to demonstrate and discuss about
    - notification sounds
    - voice instructions
    - vibration
    - pan, pinch to zoom, drag, tap.
    - text
    - graphics and color palette.
- **Procedure**: Participants then try the Google Maps application on a tablet and a smartphone. The moderator asks them which one they would take with them on the way and why. Moreover, the moderator demonstrates different interaction techniques and participants comment on them.
- **Expected output:**
    - comparison of tablet and smartphone for navigation application.
    - interaction techniques preferences
    - Insights on suitability of interaction techniques for navigation.

Break (65-80 min)

Participants can have a short break. The moderators are there with them in the room to help them if they need something.

Brainstorming: Information and functionality needs (80-115 min)

- **Aim:**
    - to bring up ideas, wishes and expectations regarding mobile navigation technology
    - to through narration, to reveal cognitive processes taking place while navigating
    - to evaluate the Consortium generated ideas for information and functionality of T&Tnet.
- **Procedure:**

  Participants are given:
    - some map prints to choose from. The maps are maps of their city, with a dot representing their house and a dot representing their destination.
    - markers
    - post-it,
    - tangibles (see section 'Tangibles')

  They are also given two scenarios:
    - They have an appointment with the doctor.
    - They take a walk in a part of the city they don't know and they take their time.

To half of the groups formed (1-4 persons each), the first scenario is given, to the other half the second. They are asked to think and discuss which information they would like to have on an ideal mobile navigation application, from the moment they plan the route and while they are on the go. They can add their ideas with a post-it or draw it on their map print. On the table, there are also at least one real smartphone and a real tablet for reference.

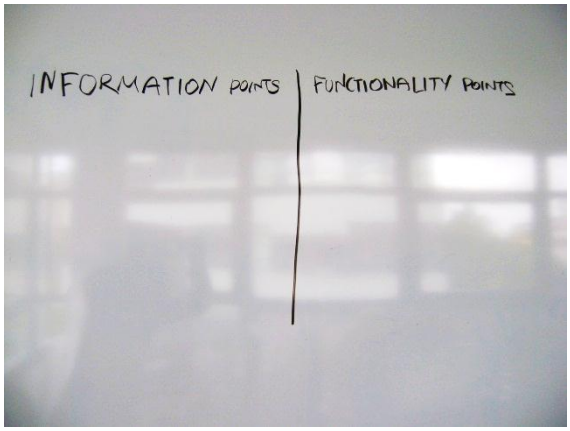
The moderator can describe the process as follows: *'Now it is time to use the pictures, the maps, the smartphone and the tablet that are in front of you as inspiration to think about a navigation system, that you would like to carry with you to assist you with your everyday activities, but also when you want to discover places in your city or abroad. Think about how could a mobile navigation application help you solve the problems you face and make your trips pleasant in order to enable you to be as autonomous and comfortable as possible, when travelling. I will let you about 15 minutes to think. At the end of this time, I want each one or each team of you, to pick a device which they would like their ideal navigation application to be and present us an example, how they would use this ideal application in a navigation context'.*

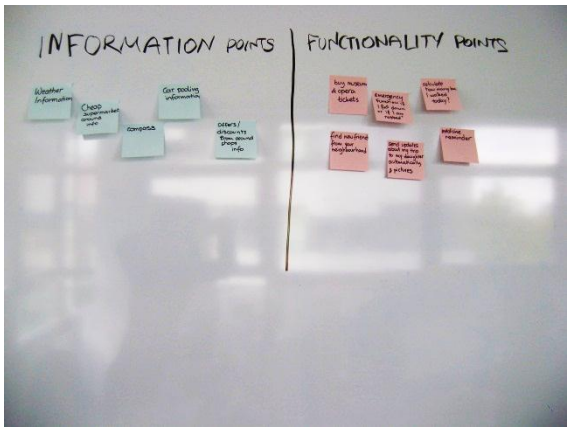
After 15 minutes, the users present their ideas in the form of a narration. The members of each group are asked to describe in detail how he would use the ideal mobile navigation app and the rest of the group can ask questions in the meantime. For example, the participant starts*: 'I am at home (at this dot) and I want to go to my doctor. First thing I do is to check the weather on my phone and dress accordingly. Then I want to see the bus timetables…'*. The moderator writes on a post-it every new idea she/he heard and puts it on the whiteboard (figures 1, 2). The observers try to keep all the information of the narrations.

After these narrations are finished, it's the time to introduce T&Tnet generated ideas about information and functionality and have the participants to evaluate them. So, the moderator and the observer(s) check from a list of information and a list of functionality points (the list is presented below but here we need the input and the imagination of all partners as it is about the core of the T&Tnet application) which ones were mentioned and which not. All the information and functionality points, both the ones generated by the participants and the ones generated by T&Tnet consortium, are introduced to the participants and are also placed with post-it on the whiteboard.

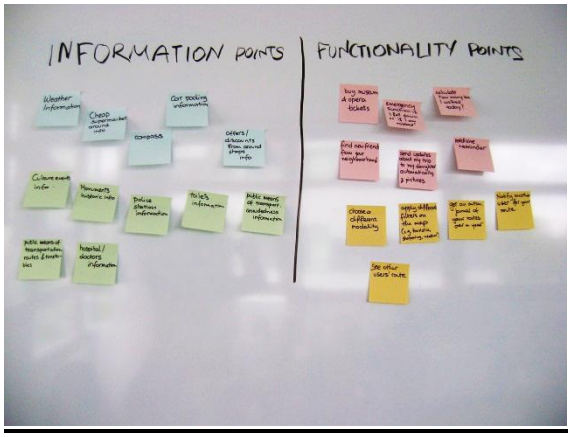
In a second step, participants are given 4 green and 4 blue dot stickers and are asked to vote the 4 most useful information points with the green and the 4 most useful function-

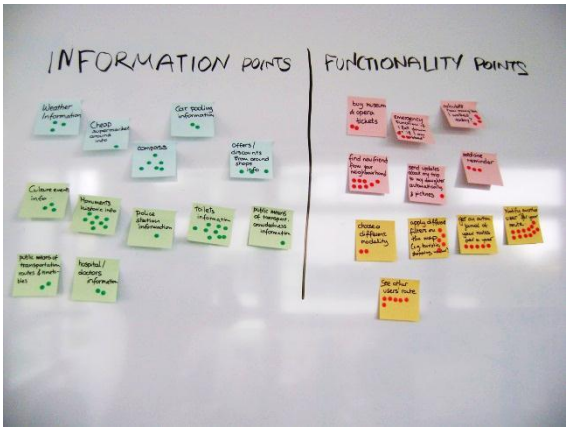
ality points with the blue (figures 3, 4). After the voting process is over, users are commenting on their choices.





Figures 1,2: On the left, the whiteboard with the two lists 'Information Points' and 'Functionality Points' and on the right, the whiteboard with the first ideas of participants posted.





Figures 3, 4: The moderator adds the information and functionality points of the T&Tnet consortium in green and yellow correspondingly (left) and participants vote with stickers for their four preferred information and functionality points (right).

Information list

1. Metro, bus, tram and other **public means of transportation routes and timetables**
2. Metro, bus, tram and other **public means of transportation tickets** information
3. Metro, bus, tram and other **public means of transportation crowdedness** information
4. **Accessible paths** (with elevators and escalators) information for metro and train

5. **Urban accessibility** information (elevators, escalators, stairs, architectural barriers, roadworks, steep paths)
6. **Public toilets** information
7. **Restaurants and café** information
8. **Monuments location and historic** information
9. **Public/Social/Culture events** information
10. **Suggested routes according to interest or situation:** touristic, accessibility, weather, etc.
11. **Police stations** information
12. **Well-lit areas at night** information
13. **Hospitals, doctors** opening hours and location information
14. **Other users' profiles,** planned routes, etc.

Functionality list

1. Notification for **stepping out of the metro** or other public means of transportation.
2. **Buy** public means of transportation **tickets** through T&Tnet
3. Get information about your **current position and orientation**
4. **Send a route** to another user
5. **See other user's route** (if he grants access to you)
6. **Automatically notify** him when your location is outside of a particular area.
7. **Add users** to your social circle
8. **Get route recommendations**, e.g. 'would you like to take a walk today in the park?'
9. **Save locations** you visited or you want to visit, and be reminded when you walk nearby.
10. **Get statistics** and an automatic journal of the routes you made over a long time.
11. **Apply different filters on the map** according to the purpose of your route (e.g. touristic, practical) and or other parameters (e.g. weather)
12. **Choose a different modality** for different notifications

- **Expected output**

- Participants' wishes and needs regarding navigation
- Participants' vocabulary and mental model of navigation tasks
- Participants' evaluation of the ideas already created by the T&Tnet Consortium

Conclusions, thanks, goodbye! (115-120 min)

Moderators thank the participants, hand them the gifts and inform them about the following T&Tnet studies in which they are invited to participate.

Annex B: User observation manual

The participant is welcomed and briefed regarding T&Tnet and the assignment: *"We are participating in a large-scale European project called T&Tnet that aims to develop a navigation application targeted especially towards senior citizens. Therefore we are organizing this study in order to find out more about your route planning and way finding challenges and wishes. In this assignment, I will give you an address that is not far from here, and you are asked to plan a route with Google Maps application. You are free to use any way and any means of transportation you like to arrive to the destination - we are not interested in efficiency and it is not important for us if it is the shortest route or not. After you spend some time planning this route, you will be asked to go there and I will accompany you. You can carry the smartphone/tablet with you along the way and look at the application as much as you want. I would like to ask you to think out loud how you think in order to find your way during the task. Feel free to comment on anything on the application or in the environment that could help you or hinder you in your way finding. Please keep in mind that we are not judging you, your skills or your efficiency, but the application.'*

The moderator will hand to the participant a smartphone or tablet. If both devices are available and functional, the participant is free to choose, if not, the moderator hands the device which is available to the participant and he notes it down. The destination must not be further than 30 minutes on foot from the facilities and it should be relatively unknown (like a small street), so that the participant will have to demonstrate his way finding skills.

When the participant has completed the route planning, the moderator accompanies him in the route, trying to remain completely neutral. The moderator has a sound recording device to keep the speech of the participant and if possible he writes down notes from his observations at the same time.

- **Troubleshooting:**
    - The participant has difficulties talking aloud? The moderator tries to encourage him to talk with open questions

- The participant asks questions? The moderator encourages her/him to find an answer on his own.
- The participant took the wrong way? The moderator intervenes after 2 minutes.
- The participant seems confused and is not sure where to go? The moderator encourages her/him to find an answer on his own. If participant seems confused after 2 minutes, the moderator intervenes giving hints to the participant.
- The participant does not know how to use some Google Maps functionality? The moderator notes down the question and he helps out.
- The weather conditions become severe? The observation is resumed and the moderator returns the participant safely at the lab.
- The participant takes the metro or the bus? The moderator reminds her/him of the destination station, if necessary.

From the moment that the participant starts thinking about the route and using the application, the moderator starts observing and recording. The moderator focuses his observations into the following points:

- **Mobility:**
  - **route planning**: how; which means are preferred; landmarks s/he refers to; which map views s/he uses (street view or map).
  - **wayfinding**: how is her/his problem solving; does s/he refer to landmarks; does s/he knows her/his position on the map;
  - **possible obstacles/ barriers** s/he meets on the way and if they affect her/him
  - **other comments**
- **Interaction with the device:**
  - how does the participant hold the device; what is his posture; does he have to stop to look at it; how frequently does he look at it; comments about the size, the shape and the usability in general of the device.

- **Interaction with the application:**
    - how does the participant use the application; what is troubling/hindering him on the application (relevant questions and comments); what is helpful for him (relevant questions and comments); is there any functionality that s/he is looking for but it is not there; errors s/he makes.

The participant and the moderator return at the lab and the moderator shortly interviews the participant about his experience and he asks any question he might have had during the task (e.g. why the participant choose this way; what confused him on the crossroad, etc). The participant is debriefed, given his incentive and compensation for the tickets he bought and leaves the facilities. The moderator attempts to write all his observations down (also those who he couldn't write while on the way) and he tries to organize them into categories (e.g. the above categories, or others).

Preparation

a. The moderator should know how to go to the destination address before he accompanies the participant. It is recommended that the moderator performs the route with Google Maps the day before the cultural probe and notes down all the possible obstacles/difficult parts that might trouble the participant.

- smartphone and/or tablet should be available and with the Google maps application installed.
- a sound recording device and a small paper notebook should be arranged for the observations.

Annex C: Informed consent

T&Tnet: Travel & Transport solutions through emotional-social NETworking

INFORMED CONSENT

Title of the Project:	**T&Tnet** - Travel & Transport solutions through emotional-social NETworking
Website:	http://ttnet-aal.eu/
Coordinator:	**Víctor Sánchez**
	ISOIN, c/Astronomia 1, Torre 4 planta 3ª, 41015 Seville. Phone: +34 954 21 90 13, Mail: vsanchez@isoin.es
Leading Local Investigator:	Markus Garschall
Institution:	CURE – Center for Usability Research & Engineering
Financed by:	EC, BMVIT, FFG
Programme:	AAL Joint Programme (AAL JP) http://www.aal-europe.eu/
Call:	AAL – 4th call – ICT based solutions for Advancement of Older Persons' Mobility
Project Number:	AAL– 2011 – 4 – **032**
Project Type:	Cooperative Project
Project Duration:	30 Months
Project Start - End:	1 July 2012 – 31 December 2014

The study described in this document is part of the research project " *T&Tnet - Travel & Transport solutions through emotional-social NETworking* ". The European Union (EU) and the BMVIT on behalf of the FFG finance this project under the AAL Joint Programme (Project number: AAL-2011-4-**032**).

This informed consent document may include words that you may not understand. If that is the case, please ask the contact researcher or any other staff of the study to fully explain the meaning of the word or piece of information you do not understand. You may take a copy of this consent to think about it or talk to your family before making any decision. At all times, we assure the compliance of the current legislation.

I. INTRODUCTION

You have been invited to take part in a research study of the *T&Tnet* project. Before making a decision on whether you want to participate or not, please read this document carefully. Please ask all the questions you may have so you can be completely sure that you understand the scope and procedure of the study, including risks and benefits.

II. PURPOSE OF THE STUDY/PROJECT

The general objective of the *T&Tnet* project is to develop a navigation application targeted especially towards senior citizens. The T&Tnet application will offer navigation and accessibility information, social networking, emergency services etc. and will be customized in real time according to specific user preferences and needs.

The outmost goal of this project is to develop technology that will support seniors in living an independent and active life, thus improving their quality of life,

III. PARTICIPANTS IN THE STUDY AND POSSIBLE PARTICIPATION

We kindly request your voluntary participation in this research study. This informed consent includes information on the following research study. We would like to assure that you are perfectly informed about the purpose of the study and what your participation in it implies.

Please ask to clarify any section in this informed consent document you do not understand. Please, do not sign if you are not sure that you have understood all the aspects of the study and its objectives.

The participation in this study is totally voluntary. You can give up at any moment without being penalized.

The criteria for participating in this study are as following:

- **Age:** The participant is equal to or above 65 years old.
- **Mobility:** The participant is mobility independent and can arrive to the study facilities without assistance.
- **Experience with ICT:** Prior experience with computers is not necessary, but she/he should be at least motivated to use technology.
- **Sensory system:** She/he has no profound hearing or vision loss. Moreover, she/he has good haptic sense and they are able to tap on a smartphone screen with precision.
- **Literacy:** She/he is literate as she/he should be able to read and understand instructions.

At the end of the study you will receive a financial compensation for your contribution, depending mainly on the duration and nature of the study you participated.

IV. PROCEEDINGS:

Within the *T&Tnet* project users of the above defined target group will be invited to requirements, lab and field trial studies of the developed system prototypes. Within these studies users will have the chance to give information on requirements, needs and wishes in early project phases. In further project phases users have the chance to try the prototypes (lab trials, field trials) and give feedback concerning usability and user experience that will be used to refine and optimize the system. Participants will have to perform specific tasks related to the prototype as well as to answer questionnaires and interviews regarding user experience and usability aspects of the system. Lab studies will be audio and video recorded for backup and analysis reasons. Field trials will include diverse log-file recordings.

Place of the Study:

- Austria: CURE Experience Labs

- Norway: KARDE and SeniorNett
- France: AP-HP
- Spain: ITA and Zaragoza City Council

Duration of the Study:

- Focus Groups / Requirements Phase: ~ 2 hours
- Lab Trials / Usability Evaluation: ~ 1,5 hours

V. RISKS OR INCONVENIENT

No risks are foreseen. You are only requested to be available to participate in the study.

VI. BENEFITS

The benefit from participating in any study of the *T&Tnet* project is that you can make a substantial contribution to the development of future technologies focusing on the enhancement of the quality of life of older persons and supporting an independent life-style

VII. PRIVACY AND CONFIDENCIALITY

Your registered and/or recorded responses will not include any personal identification information. Hence, it will not be possible to identify you after your participation in any study. Recorded information will be processed during the phase of data analysis and will be included in project internal reports or later in scientific publications. It will not be possible to identify the source of the information, observing at all times:

Austria: The „Bundesgesetz über den Schutz personenbezogener Daten (Datenschutzgesetz 2000 - DSG 2000)"

> "According to the law aforementioned, we inform you that all provided personal data that will be scientifically analysed will be coded from CURE so that it will not be possible to identify your name or other personal information about you in the results of the scientific analysis. All provided personal data will be stored in a file store that can only be accessed by partners that are active involved in the *T&Tnet* project. None of the provided personal data will be handled out to third parties."

The results of this study may be published in scientific magazines, conference proceedings or books. Complete anonymity of personal data is guaranteed by the *T&Tnet* partners.

The authorization for the use and access to this information with study purposes is completely voluntary. This authorization is valid until the end of the study unless you decide to cancel it before. If you should decide to deny your consent, please contact the leading investigator and let her/him know of your intention of leaving the study.

You can contact the leading investigator at the following address:

Markus Garschall

CURE

Modecenterstraße 17

Objekt 2

1110 Vienna

Austria

+43.1.743 54 51.209

garschall@cure.at

From the moment you withdraw from the *T&Tnet* project, your data will not be used in any further phase of the project. However, documents that have already been published or are parts of the study that have been finished will not be able to be altered.

Your decision to whether or not give your authorization for the use and diffusion of the information provided by you is completely voluntary. However, if you do not provide us with your authorization now or if you cancel it in the future, you will not be able to participate in this study.

VIII. CONTACT PERSONS

For further information about your rights as a participant in the investigation, or if you are not satisfied with the way this study is being carried out, or if you have any question or complaint during the investigation, please contact the leading investigator:

Markus Garschall

CURE

Modecenterstraße 17

Objekt 2

1110 Vienna

Austria

+43.1.743 54 51.209

garschall@cure.at

IX. CONFIRMATION

Your participation in this study is only possible if you freely and independently sign this informed consent document to authorize us to use the data you provide. If you do not wish to do so, please do not subscribe and do not participate in this study.

I have read the information in this informed consent document or the information has been read to me in an adequate way. All of my questions about the study and my participation in it have been answered.

Mark one of the following with an X:

__I read all the information in this form.

__The information in this informed consent was read to me by: ……

All the questions that I had have been answered by: ……

I authorize the use and analysis of my answers to the entity aforementioned for the purposes above indicated. Signing this informed consent does not imply giving up to any legal rights. I accept in a voluntary way to participate in this investigation carried out by CURE and the rest of the partners of the *T&Tnet Project*. I understand that I have the right of having a copy of this informed consent. Therefore, a copy will be provided to me.

Name and surname of the participant:

……

Date:

……

Signature of the participant

……

Name and surname of the researcher

……

Date:

……

Signature of the researcher:

……

X. PHOTO, VIDEO AND AUDIO RECORDING

The study is led by:

Markus Garschall

CURE

Modecenterstraße 17

Objekt 2

1110 Vienna

Austria

+43.1.743 54 51.209

garschall@cure.at

As part of this research project, photograph, videotape and audiotape recordings during the participation in the study will be done.

I have received a thorough description of the purpose and procedures for any recordings and I give my consent to allow CURE use the recordings or parts of the recordings for analysis, related studies and project results, as well as for marketing and PR purposes of *T&Tnet*. I understand that all information will be kept confidential and will be reported in an anonymous way.

Name and surname of the participant:

……

Date:

……

Signature of the participant

……

Name and surname of the researcher

……

Date:

……

Signature of the researcher

……

Annex D: Questionnaire

First name: _____
Last name: _____
□ Male □ Female
Age: _____

Mobile technology Usage

1. Have you used/heard of one of the following?
   a. Smartphone?
      □ I often use a smartphone.
      □ I have used a smartphone at least once.
      □ I know what it is.
      □ I have no idea what it is.

   b. Tablet?
      □ I often use a tablet.
      □ I have used a tablet at least once.
      □ I know what it is.
      □ I have no idea what it is.

   c. WiFi?
      □ I often use WiFi.
      □ I have used WiFi at least once.
      □ I know what it is.
      □ I have no idea what it is.

   d. GPS?
      □ I often use GPS.
      □ I have used GPS at least once.
      □ I know what it is.
      □ I have no idea what it is.

   e. Email?
      □ I often use email.
      □ I have used email at least once.
      □ I know what it is.
      □ I have no idea what it is.

f. Facebook?
   - □ I often use Facebook.
   - □ I have used Facebook at least once.
   - □ I know what it is.
   - □ I have no idea what it is.

2. Do you have an account to other online applications? If yes, to which?

Mobility habits

3. How often do you use
   a. train?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday
   b. metro?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday
   c. bus?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday
   d. tram?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday
   e. taxi?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday
   f. own car?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday
   g. relative's car as a passenger?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday
   h. bike?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday
   i. walking?
      □ Never □ 1-2 times a week □ 3-4 times a week □ almost everyday

4. From the above-mentioned means of transportation (public and private):
a. Which is your most preferred? Why?

b. Which is your least preferred? Why?

5. In the following scenarios, describe briefly (i) how would you plan your routes (ii) which means of transportation would you use? (iii) which tools would you take with you on the way? (iv) would you contact anybody regarding your route?

   b. You go abroad, to a country you haven't visited before for sightseeing.

   c. You have to go to a doctor, who works in an area of the city you don't know well.

Annex E: Interview Guide for interviews with secondary users

According to AAL Joint Programme, there are three end-user categories directly or indirectly involved with ICT applications developed for AAL and they are explained at the section 3.1 of this deliverable. The three categories are briefly: primary users, the individuals who will actually use an AAL product; secondary users, individuals or institutions who are directly in contact with primary users; tertiary users, public or private institutions or organizations who are directly or indirectly involved in enabling, organizing or providing information to AAL projects.

During the requirement phase, an extensive user study was conducted with primary users, as the information and the insights they hold are the most critical for the design of T&Tnet functionality. T&Tnet primary users, as it was pointed out during the focus groups, do not rely on their family, doctors or caregivers, to plan a trip and to conduct mundane navigation tasks; thus, involvement of these secondary users during the requirement phase was considered of relatively low importance. This section describes the interview guidelines with another type of secondary users, the senior organizations that organize group outdoor and indoor activities for their members. These organizations deal with the core aspect of T&Tnet: mobility for seniors. Therefore they can provide T&Tnet Consortium with valuable twofold input: first, regarding the mobility needs and requirements of seniors; second, insights on how to develop the T&Tnet business case.

To address the above mentioned goals, the following set of questions is proposed.

Mobility and navigation needs

The first question (a) is a question to check whether the target group of the organization matches the T&Tnet primary user group. The rest of the questions are concerned with the mobility and navigation requirements of seniors, as perceived by the representative of the senior organization.

a. Could you describe in terms of age, health, independence the users who participate in the group outdoor activities you organize?

b. How does a group leisure trip for seniors differ from an group leisure trip for younger adults with regards to organization, staff (travel guides), hotels, etc?
c. Which are the mobility limitations seniors face in such a trip? Can they walk for a long time, do they feel tired soon, do they get easily lost, etc? And how do you tackle them?
d. What are their requirements from the trip organizer? What do they ask most often during the trip?
e. What is your experience regarding seniors ability to navigate on their own?

T&Tnet business case

First, a description of T&Tnet application is necessary. The interviewer can include it in his introduction and/or explaining the motivation behind the interview. Since many features are still under discussion at this phase, the description should be basic.

E.g. *'We want to develop an easy-to-use navigation application that will enable seniors to cope with their route planning and way finding tasks in the most convenient for them way. The application will contain all the information available in the current navigation apps, such as street map, clear indication about user's actual position, compass, duration of the route, major landmarks, etc. Moreover, we are considering additional features such as accessibility information, (accessible entrances in metros, escalators, elevators, roadworks, etc), sightseeing information, taxi stands, opening hours of shops, etc.'*

The application will be initially developed for some cities.

- How would you design such an application? What kind of features would be necessary in order for seniors to use it successfully?
- How could T&Tnet be useful to you and your members?
- Would you consider sharing information about trips (e.g. accessible monuments, nice restaurants, recommended routes, events etc.) with your members through such an application?
- Would you be interested in collaboration? How do you think you could contribute to T&Tnet project?

- Do you think that your members would be interested in buying such an application and if yes, under what terms?
- What would be a preferred pricing strategy? Would it be better to offer the application under a fee in the Apple or Android store or to offer the application for free but ask from the users to buy the data for each city they are visiting?
- How would you sell T&Tnet to your members?

ANNEX F : Personas

Spain

Giovana Rodriguez, 75, Zaragoza, Spain

About & Family

Mrs. Giovana lives together with her husband, her two children and their families in their big house on different floors. She and her husband are on the ground floor. They are a big family and she has many grandchildren. They have no financial problems.

Limitations/Difficulties in

- climbing up stairs

Health

She is both physically and cognitively healthy. She does not have any diseases except for a cataract detected recently on one of her eyes. She uses drugs to keep it under control. However, she can see and hear well. She is slightly overweight and has pain in her knees and other joints, which leads to difficulties in climbing up several flights of stairs.

Diseases

- cataract

Symptoms

- pain in back, knees, hips

Social

Mrs. Giovana is a very positive and communicative person. She is happy living with her whole family and especially with the grandchildren. She loves them and takes care of them whenever their parents are not at home.

Psychographics

- happy, positive,
- communicative, hopeful

Drugs yes

Hearing good

Eyesight glasses

Educational level basic

Risks overweight

Technology Usage

Mrs. Giovana likes watching TV and listening to the radio. The grandchildren are keen on playing with the computer and telling their grandmother about the new technologies, or showing her something that they found on the internet. She has a cell phone and a pc given to her by her daughter and she uses it to browse for information.

General attitude towards technology

- positive but not strongly motivated
- not sure what is WiFi or GPS

Devices in use

- TV and radio
- cell phone

Mobility & Navigation

She often uses the bus and she rarely visits areas in the city she doesn't know. She would like to know however about the bus timetables, especially when she has to change buses and she is **interested** in the new buses with the lower steps, as she cannot climb high steps in buses anymore. She travels to other cities in Spain and in provinces with her children.

Types of trips performed

- mostly trips to known places
- once a year travelling abroad

Means of transportation used

- public means of transportation
- passenger in family's car

Navigation tools

- asking people.

Austria

Roswitha Blumenthal , 65, Austria.

About & Family

Roswitha is a very active and socially engaged person who loves life. She studied at the university and worked as a social worker. Roswitha and her husband have two children who are living in the same city. They often meet up or at least talk on the phone a couple of times a week. She has a good pension and has enough money to live without worries about the future.

Limitations/Difficulties in

- no serious limitation/difficulty

Health

She has rheumatism and pain in her back, knees and joints. She takes drugs for joint support and for keeping her blood pressure under control, but she does not have any limitations in her daily life because of her diseases. She is normal weight and eats healthy.

Diseases

- arthitis/reumatism
- high blood pressure

Symptoms

- pain in joints

Social

Almost every week, she takes care of her grandson for a day. She loves playing with her grandson. She is an activist and does a lot of voluntary work in various organizations. She likes cultural events and going out with her husband and friends. Her schedule is always full and she needs to keep a calendar for all of the events and activities she attends. She goes swimming every week and takes long walks with her dog.

Psychographics

- happy, positive,
- satisfied with her life
- curious

Drugs yes

Hearing good

Eyesight glasses

Educational level high

Risks none

Technology Usage

She uses the computer and internet for e-mails. This way she keeps in touch with her friends who live abroad and receives information and newsletters. She is not interested in Facebook. She has a cell phone and she is using it only when it is necessary. She doesn't like being connected or available all the time. She is positive of upgrading to a smartphone but she is not so motivated '*unless it becomes quite cheap*'.

General attitude towards technology

- positive but not strongly motivated
- not sure what is WiFi
- she has seen her husband using GPS during a trip abroad.

Devices in use

- pc
- cell phone

Mobility & Navigation

Roswitha prefers for her transportation inside the city the public means of transportation and she is quite satisfied with them. The only problem is that sometimes understanding the bus routes is a bit confusing. Also, because of the arthritis, she doesn't like when she cannot find the elevator or the escalators in the metro stations and she has to go on foot.

She has visited the website of wiener linien (the public provider of transportation in Vienna) whenever she needed to plan a route to a place she hasn't been before or to check the timetables, but she thinks that the website is a bit confusing. She is very independent and wouldn't inform anybody for her everyday routes**.**

Types of trips performed

- mostly trips to known places inside Vienna
- sometime trip to an unknown place for a cultural event
- sometimes travelling abroad

Means of transportation used

- public means of transportation inside the city
- car when in the outskirts

Navigation tools

- printed maps from the internet, when needed

France

Jean Nicolas , 80, France

About & Family

Siegfried was a salesman and has enough savings for the rest of his life. He does not want to be alone but also does not want to leave his flat and live in a nursing home. He receives nursing care at home. Siegfried lost his wife recently. They had been together for almost 60 years. Since they didn't have children he is now alone without any living family.

Limitations/Difficulties in

- getting up from chair,
- lifting or carrying weights over five kilos,
- using a map in a strange place
- doing work around the house or garden

Health

He suffers from psychosomatic symptoms such as heart trouble, blackouts, dizziness, etc. He receives psychological treatment. He does not have much energy and feels physically weak. He uses glasses but his vision and hearing are not so good.

Diseases - Symptoms

heart trouble,
dizziness,
depression
sleeping problems,
breathlessness

Social

Siegfried thinks that he has gotten old and it is preventing him from acting freely. He is actually a satisfied and social person but feels sometimes depressed. However, he regularly visits the local seniors' club and meets friends there.

Psychographics

- introvert
- sentimental

Drugs yes

Hearing not so good

Eyesight not so good, glasses

Educational level medium

Risks heart

Technology Usage

He likes listening to music, on his old LP player. He logs into his computer to check the news and send and receive mails from friends. He owns a cell phone which he uses to communicate with his friends. He uses a cell phone developed for elderly with big font and he is satisfied with it.

General attitude towards technology

- interested but not sure if he can learn to use new devices
- he has used GPS once

Devices in use

- pc (light use)
- cell phone

Mobility & Navigation

He mostly uses the bus and the metro and once or tw week goes with the car of a friend to the local seniors' club. He likes when the buses or the metro get too crowded. In the metr feels more confident as there are fewer possibilities to step out w or lose the way. Sometimes, while he is on the way to some plac is not sure about his orientation.

Whenever he has to go to the suburbs, he gets confuse cause there are not so many signs there. If he had to go abroa would consider a travel agency.

Types of trips performed

- mostly inside the city
- rarely the suburbs

Means of transportation used

- metro, bus
- passenger in friend's vehicle

Navigation tools

- asking people
- map

Norway

Aud Gjerdrum Gjerdrum, Akershus

Retired housewife **The Skeptic**

Mobility: Technology: Economy: Social:

Age:	67
Family:	Married to Hans, children, grand-children.
Social:	Family and sewing club.
Economy:	She has enough money but does not spend much. She saves a lot so that her children and grand-children can inherit a nice sum of money.
Geography:	Lives on the countryside. She enjoys the nature around, and the calmness.
Technology use:	She has an old Nokia cell phone. She is starting to realize that a more modern phone might be convenient. Her grandchildren have given her an old PC that she uses for online banking and simple e-mails.

Limitations:

Cognitive:	Healthy. Cross-words for experts keep her memory sharp.
Sensory:	Good vision and good hearing.
Motor:	A bit slow walker; stiff legs.

Attitude:

"I think we need to travel a bit. To see around, just for our grandchildren's sake. They deserve grandparents who have seen something else, too, than the Gjerdrum village. We travel by bus or by train. It is practical, and very social as many other couples we know travel along. We do not fly. It is very expensive and not so safe. You can lose your luggage and they can cancel the flights. Hans agrees on this."

Touristic interests:

"Bus tours to European cities with other seniors are really interesting. We go to theatre and museums. Musicals are also very nice. I'm sure Hans agrees.
There is just one problem. We have a new tour leader and she makes the tour programmes on her PC and we should participate in this affaire somehow. The previous leader called us to discuss. Now it is all on PCs. I do not know anything about the next tour yet, and I notice that others do already."

Travel story:

"My husband drives me if I want to go somewhere special. I do have a driver's license but I haven't been driving since 30 years ago. And then I take the bus. It's practical and cheap. I call Ruter if I need to know the timetables. And then of course, we have the senior bus tours to all over Europe. We use to travel every fall and spring."

Accessibility story:

"I am not a risk-taker. I think that the ground should be stable and safe for elderly people. What would happen to Hans if I broke my leg and arrived at a hospital?
And another thing… I'm not a great fan of huge crowds of people either. I feel sort of trapped".

Technology story:

"I find all the new gadgets rather unnecessary and expensive.
All those silly things people do … I've seen grown-ups stare at their telephones on a bus, with ear-plugs and music that everybody around can hear! It's not even music, I say."

Christian Dahl Bærum, Norway

Early retirement **Techno-freak**





Age:	65	**Limitations:**	**Travel story:** *"I have two cars, and drive my Mercedes whenever I can. When I´m in France, I usually rent a boat, I really enjoy sailing. I often travel far by plan, and then economy class is not an option, I want comfort!"*
Family:	Wife (Lene Storm Dahl), ex-wife, children from previous marriage.	**Cognitive:**	Has experienced stress-related symptoms during the last years, some concentration problems.
Social:	Large social network. Plays golf, active in Rotary.	**Sensory:**	No problems at all.
Economy:	Very good. He can travel anywhere. Villa on Nesøya, summerhouse in France, ski-in-ski-out apartment on Kvitfjell.	**Motor:**	No problems, really well fit. Runs marathons.
Geography:	Christian has two cars. He uses rental cars when in France or other places. Travels a lot by plane.	**Attitude:** *"I really like trying out new things, I get bored rather easily. I am always online, that way I will not miss out on anything."*	**Accessibility story:** *"I have no physical problems with getting around. However, I always make detailed planning and lists, so that I´m always in full control."*
Technology use:	Christian is kind of a techno-nerd, and has double of everything: iPhone and Samsung-phone, iPad and galaxy Tab, PC and Mac. He enjoys trying out new things, and his friends often ask him for advice. Cost is not an issue.	**Touristic interests:** *"When travelling, I always make detailed plans before I go. I´m a very active person and I love sailing, diving and things like that. I´m a passionate art-collector, and buy art on auctions abroad. I also have to help my wife finding the places she wants to go to. She loves shopping!"*	**Technology story:** *"I´m really into all things technologically, and take my pride in always having the latest gadgets and apps. When travelling, I always make my reservations for hotels and tickets online."*

Hans Gjerdrum Gjerdrum, Akershus

Retired crafts teacher **"The (secretly) curious"**

Mobility: 

Technology: 

Economy: 

Social: 

Age:	71
Family:	Married to Aud. Children and grandchildren.
Social:	Fly-fishing enthusiast. The group of men has known each other for ages. They are really close buddies.
Economy:	Wishes he could spend more, but Aud controls the economy.
Geography:	Lives on the countryside and enjoys nature. His wife uses the bus to Oslo weekly. Hans feels there is no problem at all driving; some 35 km to Oslo is not that much, just half an hour.
Technology use:	Uses an old NOKIA smartphone as a safety tool when he is travelling. (The other guys have new smartphones and use the "fishing-app". This app doesn´t work on Hans' phone.) He thinks new smartphones look really interesting – all the iPhones.

Limitations:

Cognitive:	His mind is clear, and he feels very healthy.
Sensory:	Uses eye glasses and a hearing aid. Hans feels this is very normal and not any kind of "impairment" for a man in his age.
Motor:	Hans is healthy and vigorous. He has always been moving around a lot.

Attitude:

"Well, I am quite curious about all new technology. I find it exciting, but you know, I don't really dare to share these thoughts with Aud! She is so sceptical. I want the new gadgets, you know. It's all about the money… we have enough…
I'll buy the iPhone soon, no matter what! She might kill me, but what the heck!"

Touristic interests:

"I travel a lot with Aud to the bus trips across Europe. We are all retired people. We visit known cities, and there is always some cultural programme. Last time it was Copenhagen, and before that Krakow, I think. The museums are rather boring, I think, but Aud likes all that so much! Opera… to be honest, that's too much for me. Well, I enjoy the travelling, do not misunderstand. But I wish that I could travel abroad and do fly-fishing with the guys. That´s my dream! You know, to South-America, some rivers in Europe and so on. There are numbers of places that I have heard of! Our wives can travel to Milan in the meantime – by bus!"

Travel story:

"I always drive my car (a Volkswagen Caravelle). The 8 seats of 10 can be removed when we travel to the fishing trips. Actually, this is illegal, but we take the chance. A man must have a car!"
I never take the bus, except the bus trips to Europe with Aud, of course. She is simply too fond of buses!"

Accessibility story:

"I need large letters and sharp text. The modern way of making all kinds of special advertisements and all that… I can't really read it. And the mobile phone is totally hopeless. I mean, does anyone see the text?"

Technology story:

"I want to buy an iPhone, but Aud thinks it´s unnecessary and too expensive. After all, she is responsible for our economy… I want the "fishing-app" so badly, and I know that we could make some maps with the best fishing spots, yearly statistics (yet an app!) and so on. I am so jealous!"

ANNEX G: Interviews with secondary users

Spain

Transcribed minutes from meeting with Carmen Giménez, representative of Zaragoza Tourism.

a. *Could you describe in terms of age, health and independence your members – e.g the users who participate in the group outdoor and indoor activities you organize?*

   The age of the participants range from 50 to 80. Two modes of route can be selected: people participating individually of in group. Seniors usually prefer a group environment while younger people drop in tourism offices seeking routes in pairs or individually.

b. *How does a group leisure trip for seniors differ from a group leisure trip for younger adults with regards to organization, staff (travel guides), hotels etc.?*

   Almost everybody has a look to Zaragoza sightseeing before she/he asks for guiding routes. Visitors do it by reading leaflets, internet web sites and recommendations from their relatives and friends. When they arrive at Zaragoza Tourism Desk, they know what to visit, where to go and how to more around. Seniors do usually bring material with them. In occasions, prior to the arrival, tourism staff sends the material by post for free. Younger people have their mobile phone ready to use it just in case.

c. *Which are the mobility limitations seniors face in such a trip? Can they walk for a long time, do they feel tired soon, do they get easily lost etc.? And how do you tackle them?*

   They ask for place to have a rest, have a drink and toilets locations. It is not very common to see lost people and most of them find their way back. Typical situations are the search of lottery tickets, buy souvenirs, pictures, etc.

d. *What are their requirements from the trip organizer? What do they ask most often during the trip?*

In general, elderly people show interest in history, monuments and traditions whilst the younger ask where to go out, opening hours, etc. Everybody demand clear explication, clear letter size and accessible infrastructures. In churches, they like to have a bench to sit and rest. When strikes of punctual events occur in the city, trips are cancelled to avoid crowding zones.

e. *What is your experience regarding seniors' ability to navigate on their own? When you invite them to events, how do you help them to find to the meeting venue?*

Many people get on the tourism bus just at the hotel door or tourism staff pick them up in special locations. The size of city of Zaragoza allows people to move around easily and find out how to arrive at destinations.

f. *How would you design such an application? What kind of features would be necessary in order for seniors to use it successfully?*

Always up-to-date. People get annoyed when the things they expect to see do not match what they encounter in the city. Opening hours, daily services, big size of letter, easy to use, recommendations on how to get in and out of the city (how to get airport, train station) are also desirable features.

g. *How could T&Tnet be useful to you and your members?*

They would really appreciate if T&Tnet was a complement for their activities. Visitors are really happy with personal attention received by tourism staff.

h. *Would you consider sharing information about trips (e.g. accessible monuments, nice restaurants, recommended routes, events etc.) with your members through such an application?*

Yes, if they were complementary information.

i. *Would you be interested in collaboration? How do you think you could contribute to T&Tnet project?*

Yes, by providing surveys about age, preferences, how they move around, etc.

j. *Do you think that your members would be interested in buying such an application and if yes, under what terms?*

Yes, but it must be free or very cheap. Most organized trips are cheap to let people to book them. They ask for cheap trips and number of people decrease in expensive routes.

The *same* would happen when using smartphone apps.

k. What would be a preferred pricing strategy? Would it be better to offer the application under a fee in the Apple or Android store or to offer the application for free but ask from the users to buy the data for each city they are visiting?

Free download. Zaragoza apps are popular as long as you don't have to pay for them.

l. How would you sell T&Tnet to your members?

Very cheap or free.

Austria

Transcribed minutes from meeting with Eva Reithner, representative of organization EURAG Austria.

a. Could you describe in terms of age, health, independence the users who participate in the group outdoor activities you organize?

- EURAG regularly organizes information and adult education events for seniors (e.g. on health or technology related topics); previously they also organised guided/hiking tours
- EURAG is also connected to other senior groups such as the IBM seniors or the Kneipp seniors
- most EURAG members live in Vienna
- communication with seniors mainly via classical media such as telephone, classical mail, but also via email (newsletters); attempts to use email as single means of communication weren't successful due to many members that are not connected to the internet, read their mail only occasionally, …
- members of EURAG are seniors being in good health; (about 90 percent) living independently; most of them at the age of 70-85
- health related topics are very important for their members

- Eva mentions that she notices a clear change in the activity of their members at about the age of 80; before they come regularly to the events organized by EURAG, make journeys, etc.; seniors 80+ then stop coming regularly to EURAG events
- reasons: (1.) accessibility problems (e.g. not enough elevators in the Vienna city hall); (2.) time of events: e.g. am an event lasts longer than until 20:00 people start leaving because they feel less secure if having to go home late in the evening (darkness, bad weather in the evening, …), for that reason EURAG events don't start later than at 18:00
- most seniors terminate their membership when moving to an old people's home (because of other events that are provided in their new living environment, …)
- less interaction between seniors and relatives when planning trips (but seniors coming to events together with their relatives and friends)

b. How does a group leisure trip for seniors differ from an group leisure trip for younger adults with regards to organization, staff (travel guides), hotels, etc?

- main difference are the higher information needs (more signs at the meeting venue, information on accessibility – how many stairs, location of elevators, …)
- accessibility and good connection to public transport are most important factors when selecting venues for events, "99 percent" of visitors come with public transport, car less important

c. What are the mobility limitations seniors face in such a trip? Can they walk for a long time, do they feel tired soon, do they get easily lost, etc? And how do you tackle them?

- joint problems and cardiovascular diseases lead to problems when having to walk longer; some members e.g. have to take a short brake after climbing 5-10 stairs
- sometimes people get lost on the way to the events, but most of the time not due to age-related reasons (e.g. confusing the address of the venue); "things that could also happen to younger users"

d. What are their requirements from the trip organizer? What do they ask most often during the trip?

- personal support by meeting organizers is very important; many visitors call Eva the day before the event to get more detailed information on how to get to the venue

(the shortest and most efficient way), how to find the specific room etc.; most frequent question: "are their (many) stairs?"

e. What is your experience regarding seniors ability to navigate on their own?

- since most EURAG members are from Vienna and know their city very well they don't need a classical route description rather than the "right keywords"
- current navigation solutions are rarely used by the seniors, and if, mainly in the car (classical navigation systems); most seniors don't own a smartphone; important tools are the maps in metro, tram and bus stations (esp. the ones that show the right exit, elevators etc. in the metro stations)
- online timetables (for public transport) are little used by the seniors

a. How would you design such an application? What kind of features would be necessary in order for seniors to use it successfully?

- focus on accessibility: many seniors with vision loss, climbing stairs, "having to walk 200 extra meters makes a big difference for many seniors"
- problem that seniors fear being robbed when using an expensive device (such as a smartphone or a tablet) on the street
- Eva fears that carrying a smartphone/tablet when being on the move could lead to a higher probability of falls; ways to overcome this problem could be to use a watch as platform (green => you are on the right way; red => you left the rout, take a look at your smartphone)
- interaction: touch-based devices seem to show high acceptance rates among seniors; Eva is sceptical regarding the use of voice-interaction, because it could lead to a feeling of stigmatization ("seniors don't want to attract the attention of others when being on the street")
- stigmatization should be generally prevented (negative example: Euphoria phones)
- information needs: next public toilet!
- personalised routes based on a user profile? good idea, but shouldn't lead to preventing the users from getting the information on a specific event/route; the senior has to be the one to decide which route is possible for him/her or not

b. How could T&Tnet be useful to you and your members?

- event announcements via this platform are definitely a good idea

- combined with detailed and personalized route information
- Eva hopes that such a system could reduce the need for personal advice before the events, but is sceptical: "Many people just want to talk to me, even if they know the way to the event venue."

c. Would you consider sharing information about trips (e.g. accessible monuments, nice restaurants, recommended routes, events etc) with your members through such an application?

- yes (see above)
- particularly interesting for organisation of guided or hiking tours in order not just to provide the title and description of the event but also the route and difficulty information

d. Would you be interested in collaboration? How do you think you could contribute to T&Tnet project?

- interested in participating in tests (either directly as secondary user or by connecting us to potential users)
- interested to support us in dissemination: distributing flyers, mention the project in newsletters, presenting project results in their events

e. Do you think that your members would be interested in buying such an application and if yes, under what terms?

- "yes, if we recommend this solution"

f. What would be a preferred pricing strategy? Would it be better to offer the application under a fee in the Apple or Android store or to offer the application for free but ask from the users to buy the data for each city they are visiting?

- there should be a free basis version and fees for additional services; the possibility to try the solution before buying is very important for the seniors
- offering the solution via the app store is the best solution

g. How would you sell T&Tnet to your members?

- Eva don't likes the idea to see EURAG as service provider: "We can recommend such solutions to our members, but not sell them. They trust us because we are neutral."
-

Transcribed minutes from meeting with Regina Wallner, representative of organization GEFAS.

a. *Could you describe in terms of age, health, independence the users who participate in the group outdoor activities you organize?*

- GEFAS organizes information and adult education events for seniors as well as outdoor activities such as guided city tours on a specific topic
- GEFAS members are at the age of 58-80, living independently
- members of GEFAS are seniors being in good health, most of them not using any walking aids; just some of them need a walking stick when they have to walk long distances
- most members of GEFAS live in Graz or in suburban areas close to the city, therefore buses and trams are the most important means of transportation for them

b. *How does a group leisure trip for seniors differ from an group leisure trip for younger adults with regards to organization, staff (travel guides), hotels, etc?*

- For Regina the main difference when organizing events for seniors is the selection of the topic – especially health related (sports, care, nutrition etc.) and social topics (poverty, violence, public welfare etc.) are very important for their members. Further GEFAS also provides culture and adult education offers.
- More than younger visitors of regular events, older users seem to get used to a specific event venues. Therefore special attention has to be paid to changes in venues. In this case, additional information has to be provided together with the invitation.

c. *What are the mobility limitations seniors face in such a trip? Can they walk for a long time, do they feel tired soon, do they get easily lost, etc? And how do you tackle them?*

- Regina underlines that accessibility (e.g. availability of lifts) and good connection to public transport are most important factors when selecting venues for events.
- Events shouldn't be scheduled too late in the evening, especially during winter time. Seniors sometimes feel unsafe in badly illuminated streets.
- Most visitors of GEFAS events come by public transport. Reports related to problems when searching for a parking space are very rare.

d. What are their requirements from the trip organizer? What do they ask most often during the trip?

- Problems in finding the event venue are mostly related to the accessibility of the building – e.g. when visitors enter at the wrong entrance or do not find the right room number.
- In order to support visitors in such cases, a mobile phone number is provided together with the information, to allow them to contact the organizer. Additional information signs and notices are provided.

e. What is your experience regarding seniors ability to navigate on their own?

- Most visitors of GEFAS are from Graz and know their city very well they don't need a classical route description. A good route description includes a well-known reference point close to the venue together with a detailed description on how to master the "last 100 meters".
- A major problem when instructing seniors via telephone is that they cannot describe their current position. It would be very helpful to have an ICT solution, that allows to see where this person is currently located.

h. How would you design such an application? What kind of features would be necessary in order for seniors to use it successfully?

- From her experience with other project, Regina reports that using mobile devices underway is often a problem for seniors because of not seeing obstacles when looking on the device. Further it is also a problem to carry the device all the time, especially in situations, where the hands are needed for other purposes (e.g. when entering or holding on in the bus).
- Regina underlines that a good usability is very important for seniors. It has to be easy to find yourself on the map. Lack of contrast or reflections are also a major problem for seniors when using modern mobile devices.
- Instead of providing routing information when being already on their way, seniors could better be assisted before starting a journey. Regina likes the idea of a virtual environment that allows you to "preview" a route before actually starting it.

- Speech-based interaction could be a problem for seniors because many of them are facing hearing problems. Besides that also not hearing the environment (e.g. cars approaching) could pose a risk for seniors.
- Many seniors already use touch-based devices such as smartphones or tablet computers. Therefore this form of interaction seems to be suitable for seniors.
- Being a good compromise between device weight and size and space for information on the display, Regina would prefer a device that has a size between a smartphone and a tablet.
- Regina is sceptical about the idea of a user profile that is used to provide personalised routes. "Who inserts this profile? How much time does this take? How sincere are people with themselves? Do third parties have access to this profile?"

i. How could T&Tnet be useful to you and your members?

- Regina thinks that event announcements combined with detailed route information provided via such a platform are a good idea and could reduce the need for personal advice.

j. Would you consider sharing information about trips (e.g. accessible monuments, nice restaurants, recommended routes, events etc) with your members through such an application?

- City tours, theme routes or restaurant recommendations could be interesting for seniors.

k. Would you be interested in collaboration? How do you think you could contribute to T&Tnet project?

- Yes, for example as secondary user within the trial activities.

l. Do you think that your members would be interested in buying such an application and if yes, under what terms?

- In principle, yes but associated costs have to be low.

m. What would be a preferred pricing strategy? Would it be better to offer the application under a fee in the Apple or Android store or to offer the application for free but ask from the users to buy the data for each city they are visiting?

- The system should be provided as App directly on the mobile device for a low price or for free. Additional fees could be charged for additional information.

n. *How would you sell T&Tnet to your members?*

- GEFAS doesn't provide such solutions to their members. The service provider has to be someone else.
- GEFAS could recommend the solution to their members together with ways to learn how to use the system (e.g. courses or personal support).

Norway

Transcribed minutes from meeting with Jan Torbjørn Brandtsgård, representative of organization Brandtsgård Minibuss.

a. *Could you describe in terms of age, health and independence your members – e.g the users who participate in the group outdoor and indoor activities you organize?*
   We organize several trips for seniors. The type of trip can vary from a daytrip to a special event or location (museum, etc.), to trips to Europe lasting up to two weeks. The age of the participants differs from 70 to 95. Their health also varies, some are in a very good health others may be not so healthy. Some suffers from dementia. A lot think their health is better than it really is. When people book a scheduled trip there is no way of knowing their health status.

b. *How does a group leisure trip for seniors differ from a group leisure trip for younger adults with regards to organization, staff (travel guides), hotels etc.?*
   The main difference is that a Senior trip must be more of a social event than trips for younger people which often only need transportation to a special event. For the seniors much of the experience is in the travel, but the juniors want to get to their destination as quickly as possible. Seniors wants to spend a lot of time with several stops (at least every 2nd. hours), good food, etc. Seniors wants good information on the route, Guiding. Much more planning and preparation involved in arranging a trip for seniors.

c. *What are the mobility limitations seniors face in such a trip? Can they walk for a long time, do they feel tired soon, do they get easily lost etc.? And how do you tackle them?*

Some seniors can be left alone without problems, however, sometimes they may have difficulties finding back. .My experience is that most people find their way, but it can take a long time. Delays are often the result. Some people may be afraid of letting the bus out of sight. We tackle the problems by organizing small groups with one responsible person that we know have the skills and stamina to help others. When we have groups that rely on wheelchairs or other types of support to walk properly we have to organize special transportation or let people off and on as close to the location in question as possible.

d. What are their requirements from the trip organizer? What do they ask most often during the trip?

They require often stops to go to toilets, stretch their legs, etc. No rush they want to-take their time. They want good food. They want guiding

e. What is your experience regarding seniors ability to navigate on their own? When you invite them to events, how do you help them to find to the meeting venue?

Their ability to navigate varies. Some cope very well, others do not. Need some help

f. How would you design such an application? What kind of features would be necessary in order for seniors to use it successfully?

Must follow universal design standards, big enough letters, etc. Easy to use is the most important. See two main sections of solution, one to help organize and prepare a trip and one that support the seniors during the travel. Interactivity between participants and organizer as well as between participants is needed. Must support people with reduced hearing and eyesight.

g. How could T&Tnet be useful to you and your members?

A planning tool in combination with a user solution will be a useful and strategic marketing tool. GPS combined with location based information could improve guiding. Gaming could even be part of it. Also may be integrated with the facilities in a modern bus.

h. Would you consider sharing information about trips (e.g. accessible monuments, nice restaurants, recommended routes, events etc.) with your members through such an application?

Yes, we will and do share information, Photos on the big screen in the bus, on Facebook, etc.

i. *Would you be interested in collaboration? How do you think you could contribute to T&Tnet project?*
   Yes interested in testing.

j. *Do you think that your members would be interested in buying such an application and if yes, under what terms?*
   I would be interested in buying first and foremost a planning tool and then I could buy licenses for each seat in the bus(es). The travelling business is very price sensitive so cost must be kept low.

k. *What would be a preferred pricing strategy? Would it be better to offer the application under a fee in the Apple or Android store or to offer the application for free but ask from the users to buy the data for each city they are visiting?*
   Ref. above.

l. *How would you sell T&Tnet to your members?*
   Ref. above. I would like to test first.

Transcribed minutes from meeting with Solveig Gammelseter, representative of organization Sande Seniornett og Frivillighetssentralen.

a. *Could you describe in terms of age, health and independence your members – e.g the users who participate in the group outdoor and indoor activities you organize?*
   Average age 83. Yearly Europe with a group of 40 to 45.Participants must be able to cope with daily activities, toilet, change,. However if they cant cope on their own they can bring a person dedicated to help them. Group depending on very detailed logistics and help. (tett på) Only 5 out of the 45 is independent and can walk on their own.

b. *How does a group leisure trip for seniors differ from a group leisure trip for younger adults with regards to organization, staff (travel guides), hotels etc.?* Everything needs to be organized for them:

- Detailed printed material sent before travel, Photos of where, text describing in detail what they need to bring with them, what they can bring on board plain, etc
- List of participants with photo so that people recognize the other members of the group
- Must be shown lifts, room.
- Hotel room must be suitable, close to lift, bathroom with needed facilities, etc.
- Hearing and eyesight are not good. Special equipment needed aids.
- Time need to be set for meals, when to meet for outdoor activities, meetings, etc
- Special meals
- Medicine arrangements (remember to bring with them, take)

c. *What are the mobility limitations seniors face in such a trip? Can they walk for a long time, do they feel tired soon, do they get easily lost etc.? And how do you tackle them?*

Mobility varies, some can't go on their own, some 200 meters . 5 out of 45 can go on their own and can walk for å long time.Difficult to find their way. Easily lost especially if crowds. This is tackled by detailed organization. Printed material and people on duty that at all times have full control of each of the participants. Easy to see them when they are out, umbrella.

d. *What are their requirements from the trip organizer? What do they ask most often during the trip?*

Need to visit toilet often. Need to be in contact with travel organizer often. Need to feel the security of being looked after.

e. *What is your experience regarding seniors ability to navigate on their own? When you invite them to events, how do you help them to find to the meeting venue?*

Not good. They tend to forget when to meet and where. Also difficult to find location. (where is the bus parked)

f. *How would you design such an application? What kind of features would be necessary in order for seniors to use it successfully?*

Easy to use, big letters, Audio + text. Must not show all possibilities. Where am I and all the rest. Easy to use. Remember to… feature.

g. How could T&Tnet be useful to you and your members?

- Easier to communicate with people that has a hearing and/or seeing issue.
- Easier to be in control of where all member of the group are.
- Help group remember.
- Easy to contact

h. Would you consider sharing information about trips (e.g. accessible monuments, nice restaurants, recommended routes, events etc.) with your members through such an application?

Yes, we share with other organizations that work with the elderly. We do it in meetings and we produce documents that we present to the politicians

i. Would you be interested in collaboration? How do you think you could contribute to T&Tnet project?

Yes.

j. Do you think that your members would be interested in buying such an application and if yes, under what terms?

Not interested in buying. Next generation. A tool that can be distributed to the participants during planning and travel.

k. What would be a preferred pricing strategy? Would it be better to offer the application under a fee in the Apple or Android store or to offer the application for free but ask from the users to buy the data for each city they are visiting?

Very cheap.

l. How would you sell T&Tnet to your members?

First test and if good recommended by my organization. Must be recommended.by somebody

T&Tnet Minutes from meeting with Ellen Stampe, representative of organization Sande Pensjonsistforening

a. *Could you describe in terms of age, health and independence your members – e.g the users who participate in the group outdoor and indoor activities you organize?*
   The organization has 180 members. Age from 60 to 100. The people who participate has relatively good health and live at home. Independent life style. They travel without any form of help
b. *How does a group leisure trip for seniors differ from a group leisure trip for younger adults with regards to organization, staff (travel guides), hotels etc.?*
   Everything needs to be organized for them:
   - Hotel room must be suitable, close to lift, bathroom with needed facilities, etc. Hearing aids.
   - Time need to be set for meals, when to meet for outdoor activitees, meetings, etc
   - Special meals
   - Medicine arrangements (remember to bring with them, take)
   - Establish groups with members that can support each other
c. *What are the mobility limitations seniors face in such a trip? Can they walk for a long time, do they feel tired soon, do they get easily lost etc.? And how do you tackle them?*
   Mobility varies. Some can't be left alone. Others can go on their own and can walk for a long time. Can be difficult to find their way back. This is tackled by organizing small groups with people that can support each other. This may put restrictions on some.
d. *What are their requirements from the trip organizer? What do they ask most often during the trip?*
   Need to visit toilet often. Often stops. No stress and one thing at the time
e. *What is your experience regarding seniors ability to navigate on their own? When you invite them to events, how do you help them to find to the meeting venue?*

Often not good. They tend to forget when to meet and where. Also difficult to find location. (where is the bus parked).

f. How would you design such an application? What kind of features would be necessary in order for seniors to use it successfully?

Easy to use, big letters, Audio + text. Must not show all possibilities. Old people are skeptical. Security 1. Priority. Easy to use.

g. How could T&Tnet be useful to you and your members?

The people I organize for are too old. Next generation. Especially a feature to remind people of, where and when to meet. Take medicine. Help for bad hearing and eyesight.

h. Would you consider sharing information about trips (e.g. accessible monuments, nice restaurants, recommended routes, events etc.) with your members through such an application?

Yes, we share with other organizations that work with the elderly. We do it in meetings. Some with a particular interest share photos, etc. Not organized today

i. Would you be interested in collaboration? How do you think you could contribute to T&Tnet project?

Yes.

j. Do you think that your members would be interested in buying such an application and if yes, under what terms?

Not interested in buying. Next generation. Maybe a tool that can be distributed to the participants during planning and travel.

k. What would be a preferred pricing strategy? Would it be better to offer the application under a fee in the Apple or Android store or to offer the application for free but ask from the users to buy the data for each city they are visiting?

Very cheap.

l. How would you sell T&Tnet to your members?

First test and if good recommended by my organization. Must be recommended.