

# Developing the User Interface of Navigation Apps to Better Suit their Intended Target Group

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## Abstract

The objective of the EU project NavMem is to make older citizens more self-sufficient and confident specifically while traveling on foot. This could potentially lead to a more active and social life while decreasing the need of senior citizen care. With this objective in mind the NavMem consortium have up to this point created two separate beta-stage Android applications for navigating.

The objective of this thesis project has been to evaluate these applications as well as develop User Interface (UI) prototypes in order to improve the Usability and by extension the User Experience of the finalized product. Additionally the two applications will be merged into a single one. Development and evaluation has been carried out in collaboration with members from the Swedish Stroke Association as well as the NavMem project.

## Introduction

The elderly population of the European Union is continuously growing and will continue to do so for the foreseeable future. Meanwhile the funding towards welfare and more specifically senior citizen care is not - in fact, in many countries it is decreasing [1]. This situation is worrying and the obvious action would be to somehow provide more professional caretakers. However, there is another way of looking at it. Maybe we could provide

some sort of aid that would help elderly people become more self-sufficient? In this case self-sufficiency should not imply or amount to loneliness. This is of much importance. On the contrary the aid should encourage physical and social activities while insuring safety. The target group is people with age related memory decline, mild cognitive impairments and other cognitive impairments that occur with diseases such as stroke, brain injuries or early stages of dementia. All of the above have negative impact on the ability to navigate and orientate.

## Current applications

As of now, the NavMem project has resulted in two beta-stage applications. The *NavMem Explorer* that aims to fully satisfy the needs of the users with a broad variation of functions and navigation guidance and the *Home Compass* that solely aims to guide the user to their home by the use of a compass.



Figure 1 NavMem Explorer (left) and Home Compass (right)

More particularly the functions within the *NavMem Explorer* allows the users to

- Search for any destination and receive navigational guidance (Search)
- Save visited destinations thereby making them quickly available to select, and receive guidance to, next time (Destinations)
- Save and thereby quickly receive guidance to their home position (Find Home)
- Call for help and at the same time provide the receiver of the call with their position via e-mail (Call Help)
- Save *Landmarks* that will support orientation (see definition below) (Landmark)

*Landmarks* are locations that are familiar to the user, such as a church or a crossing. These locations are different from destinations, in the way that they are solely used as support in reaching the final destination.

There are four different screens available while being guided to a destination. These are

- *Map View*, where the users position on the map is shown as well as the beginning of the route to the destination
- *Arrow View*, where an arrow shows the direction to the next turn
- *Arrow and Landmark View*, where the arrow is combined with information about upcoming *Landmarks*
- *Map Overview*, where the full route is shown on the screen

## **Design of the final prototype**

Continuously throughout the project it became apparent that there need to be

a differentiation between primary and secondary users, primary meaning the person using the application (i.e., caretaker) and secondary meaning the person(s) providing and setting up the application (i.e., caregiver(s)). Below some of the additional major design decisions are stated and briefly explained.

*Separating the functions* - There are a number of functions included in the *NavMem Explorer* and the *Home Compass* combined. The purpose of this project has not been to alter these functions but to present them in a manner easier to apprehend keeping the users in mind. The separating of primary and secondary users needs to be considered when sorting these functions.

*Avoid the Springboard Menu* - During meetings with the primary target group it became apparent that there was an issue with the *Springboard Menu* set-up in *NavMem Explorer*. This Navigation Pattern resembles the visual appearance of the *Launchpad* on most smartphones, i.e., a grid-like pattern with for instance a 3x3 set of icons. This at times created confusion of whether the user was operating within the application or rather still seeing the menu of the phone.

*Introduce more color* - Many of the users had issues separating the functions of *NavMem Explorer*. This can be explained by the use of the flat *Springboard Navigation Pattern* but also by the lack of color-coding.

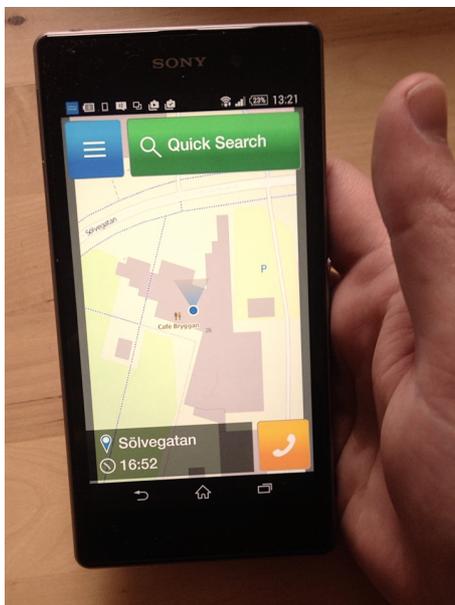
*Revamp the Start Screen* - When Launching the *NavMem Explorer* there is no way of seeing your current location without choosing a destination and thereby starting the routing. This might not be a major concern if you imagine that the users always starts the routing before leaving the front door, but what if the user sud-

denly becomes disoriented while already outside? This has to be considered a reasonable scenario given the target group.

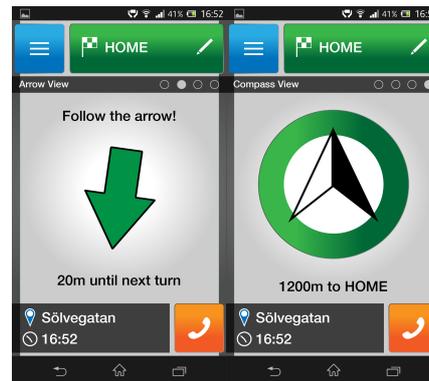
*Quick access to important functions* - In the NavMem user studies it is stated that important functions need to be easily accessed. Through meetings with the target group the ability to call for help (and thereby providing the user's current location) was established as one of the most important functions. On top of that the ability to choose a destination is obviously the main function of the application. These functions are therefore decided to be easily and quickly accessed through the *Start Screen*.

## Results and evaluation

The final prototype is briefly visualized below. For a fully interactive version of the prototype please visit <http://invis.io/VS2EXS868>.



**Figure 2** Start Screen of the Final Prototype



**Figure 3** Two of the four guidance views available to the user.

The Final Prototype was evaluated by five members of the Swedish Stroke Association and the results compared to the current version of the *NavMem Explorer*. The decision to solely compare the prototypes to the *NavMem Explorer* was made early on since the *Home Compass* contains considerably less functions and was already widely well received by the test participants.

**Table 1** Usability-scoring of the *NavMem Explorer* and Final Prototype UI (five participants), 1-5 positive scale

Characteristics	NavMem Explorer	Final Prototype
Easy to grasp	2,60	3,80
Easy to use	2,80	4,40
Self-explanatory	3,00	4,40
Encouraging	1,40	3,67

**Table 2** UX-rating of *NavMem Explorer* and Final Prototype UI (five participants), 1-5 positive scale

User Experience	NavMem Explorer	Final Prototype
Overall Rating	2,40	4,00

These results should mainly be considered as an indication that the project has been moving in the right direction. Further evaluation methods have been performed, such as observations and interviews, in order to confirm this perception. These results are however more difficult to present in a brief way.

## Conclusions

The purpose of the NavMem project is to simplify and enrich the lives of the target group. However, the current visual appearance of, as well as some technical issues with, mainly the *NavMem Explorer* application instead leads to user frustration and confusion. With that being said it is far from impossible to make the final product usable and more importantly useful to the users. The UI of the application needs to play part in helping the users overcome their unfamiliarity with modern technology. The necessary functions need to be susceptible to the users while still not exhausting their minds. This is a challenge since the target group differs widely in their preferences of guiding aids.

The user-input received during this project concludes that there are issues with the UI of, especially one of the, current applications. Further it validates that the prototypes built have taken important steps in improving the *Usability* of the application.

It is recommended to retain the differentiation between primary and secondary users moving forward. Further this is believed to be the key in finalizing a successful product. The developers need to realize that the primary target group can perform some actions within the application while others are simply too demanding, regardless the presentation.

Another area of potential improvement that has not been studied in this project is the use of auditory guidance and feedback. This feature has been requested by parts of the test participants and should be looked into. The algorithms used to remember and rank previously chosen destinations should be further developed and the use of keyboard input by the primary target group minimized.

The font use should be revisited and was intentionally not investigated in this project since it is commonly one of the last things decided during User Interface development (text is separated from the graphic elements and therefore easy to change).

The navigation patterns within the application need to be carefully chosen. The use of Springboard Navigation should be avoided because of its similarity to most menus of smartphones. Further the users current position as well as the current time should be clearly visible while using the application.

Additional hands-on testing of future prototypes need to be conducted with a wider spectrum of users included in the target group. The use of color should be further investigated and additional color schemes could be provided to the users to best satisfy their individual needs.

Further, non-UI related problems such as the issue of not being able to save destinations (i.e., locations) without actually visiting them needs to be resolved as well as technical issues with routing and compass instability.

## References

- [1] The EU 11 in an Aging Europe (Electronic), <http://www.worldbank.org/en/news/feature/2013/01/17/the-eu-11-in-an-aging-europe>, 2014-09-18