

User Requirements for Navigation Assistance in Public Transit for Elderly People

Stefanie Müller

User Interface Design GmbH
Friedrichsring 46
68161 Mannheim
+49 621 82 06 45 70
stefanie.mueller@uid.com

Felix Kamieth

Fraunhofer IGD
Fraunhoferstr.5
64283 Darmstadt
+49-6151-155-582
felix.kamieth@igd.fraunhofer.de

Andreas Braun

Fraunhofer IGD
Fraunhoferstr.5
64283 Darmstadt
+49-6151-155-208
andreas.braun@igd.fraunhofer.de

Tim Dutz

Fraunhofer IGD
Fraunhoferstr.5
64283 Darmstadt
+49-6151-155-233
tim.dutz@igd.fraunhofer.de

Peter Klein

User Interface Design GmbH
Friedrichsring 46
68161 Mannheim
+49 621 82 06 45 70
peter.klein@uid.com

ABSTRACT

In the last decades the demographic change in Europe has become apparent. In Germany already 20% of the population are older than 65. This age group is particularly affected by the increasing complexity of modern public transit systems. In this paper we present the results of a user requirements elicitation of a navigation assistant for elderly people in public transit. This system shall have a targeted user experience and takes into account the personal profile of the different users, e.g. modeling mobility deficiencies that require walking aids and prevents paths that would be impassable. We have performed an exhaustive user evaluation in expert interviews and focus groups to identify suitable interface choices and in the process were able to exclude some systems that were considered obvious in initial assessments.

Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation]: *User Interfaces* - User-centered design, Evaluation/methodology

General Terms

Design, Human Factors

Keywords

User Interfaces, Input, User Centered Design, Mobility, Navigation, User Requirements

1. INTRODUCTION

Helping elderly people to stay mobile is the focus of the research project “inDAgo” [1]. The project’s outcome is a mobility assistant that calculates optimal routes and provides help for its owners in critical situations. It assists them when going to

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unfamiliar places and takes personal constraints into account when suggesting a route – e.g. if someone needs the help of a walker-roller, the inDAgo assistant would not lead him to a gravel path. The inDAgo system does not only consider footpaths for its routing, but takes into account actual schedules of the public transport as well. It is even planned that the assistant connects per integrated UMTS or WLAN available at the tram stations to get updates regarding actual times and delays of the public vehicles so that inDAgo can adjust a currently planned route if necessary. The inDAgo project is funded by the German Federal Ministry of Education and Research and started in November 2011.

2. RELATED WORK

The navigation system of inDAgo is based on the concept of navigation systems for motor vehicles [2]. Support targeted to elderly people in public transport needs to take special usability demands into account. A similar problem has been addressed by the Austrian project “MARIA” [3], which used a Smartphone application featuring text2speech and text recognition for an assistant for elderly people in public transport. In [4], Guernert describes an approach for providing indoor-navigation to blind people in public transit to increase mobility and self-reliance. In [5], Yao presents his work on personalization of navigation systems based on differences in navigation skills, self-awareness of navigation skills as well as the mapping of the navigation interface to these aspects of a personal profile. In [6], Aslan et al. present their study on the effects of mobile assistant on spatial knowledge, showing that human navigation works by visual identification of landmarks combined with directions instead of the creation of an internal map of the environment.

3. INITIAL REQUIREMENTS ELICITATION

To get to know the user group and to gain requirements for the future product, the first step of the inDAgo project was a usage context analysis. The analysis was conducted in two stages. First interviews with six experts, people who have every-day-contact with senior citizens, were conducted. Each interview lasted between 45 and 60 minutes based on pre-developed guidelines.

To guarantee to collect feedback and statements directly from the target group, in the next step 4 focus groups with elderly people were conducted. A focus group is a moderated discussion about previously defined topics and the group situation has an animating and inspiring effect on the participants [7]. Thus, 28 senior citizens were involved in the analysis. 19 women and 9 men participated in the focus groups and most of them were between 75 and 84 years old. Each focus group session lasted about 90 minutes. In addition two questionnaires were formulated on personal, cognitive constraints and usage of technical devices and validate the main results of the sessions.

4. REQUIREMENTS ELICITATION RESULTS

The interviews with domain experts have shown that seniors can be separated into two groups based on mobile affinity. The first group is more socially active and may show signs of sensory limitations. The latter group is less socially active and can have stronger health issues or require medical care. We made the choice to focus on the first group of socially active seniors. They have a higher acceptance of technical gadgets. Among all elderly, maintaining social contacts and social engagement as well as self-determination and safety were of high importance. The results of the analysis of the first questionnaire show that all participants have vision problems but most of them don't feel constrained by it in their daily life. Most of the participants who stated having hearing or walking problems (approx. 1/3) also stated being constrained by these.

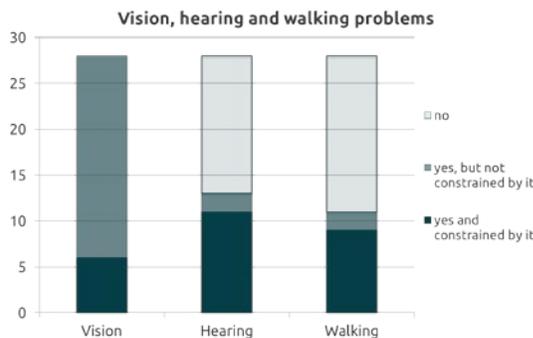


Figure 1 Results of questionnaire regarding physical constraints

The questionnaire also shows that a computer and a mobile phone are used by around half of the participants. Most only have one phone for making an important call on the way. The usage of MP3 players and navigation systems is less. While elderly people do show age-related limitations, less than 50% feel hindered by them in daily life. There is a general apprehensive tendency in elderly people towards technical gadgets. There are problems related with the use public transport: Ticket vending machines can show poor readability, different generations of vending machines offer different user interfaces and further complicate ticket purchases and a lack of display or announcements of traffic information at traffic stops. The study has shown that seniors reject a device which conflicts with their sense of self-efficacy and is seen as paternalistic. Another important finding was that senior citizens have developed workarounds for their problems in daily life.

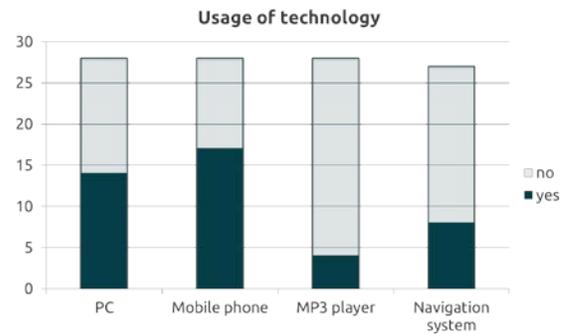


Figure 2 Results of questionnaire regarding usage of technology

5. CONCLUSION

An exhaustive requirements analysis has shown that a majority of the inDAgo assistive system's target users, senior citizens above the age of 65, have a strong disapproval of modern-day smartphones, albeit many of them use simple phones for the purpose of being able to make emergency calls. In addition, the target group also is very sensitive towards devices that have a monitoring/supervising nature, as they fear a loss of independence and the possibility of the same becoming apparent to others. A new type of device is required that can meet these requirements and we are looking forward to the process of designing and assembling such a device in the course of the ongoing inDAgo-project.

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