inDAgo: a peek at a mobile ambient intelligent future

Peter Klein, Stefanie Müller, Henrik Rieß
peter.klein@uid.com
stefanie.mueller@uid.com
henrik.riess@uid.com

User Interface Design GmbH, Martin-Luther-Str. 57-59, 71636 Ludwigsburg, Germany

Abstract/Summary

The elderly part of the population might often depend on support and care. Assistance is not only needed in the home-care context, but also as a sustainable mobility support. Being mobile is a fundamental prerequisite to participate in social life and amenities[1]. The inDAgo project[2] aims to fulfill the premise of a mobility assistant that takes care about their owners during their journeys. The concept relies not only on IT Infrastructure but also on service providers and helper networks (see: Figure 1: The inDAgo Architecture).

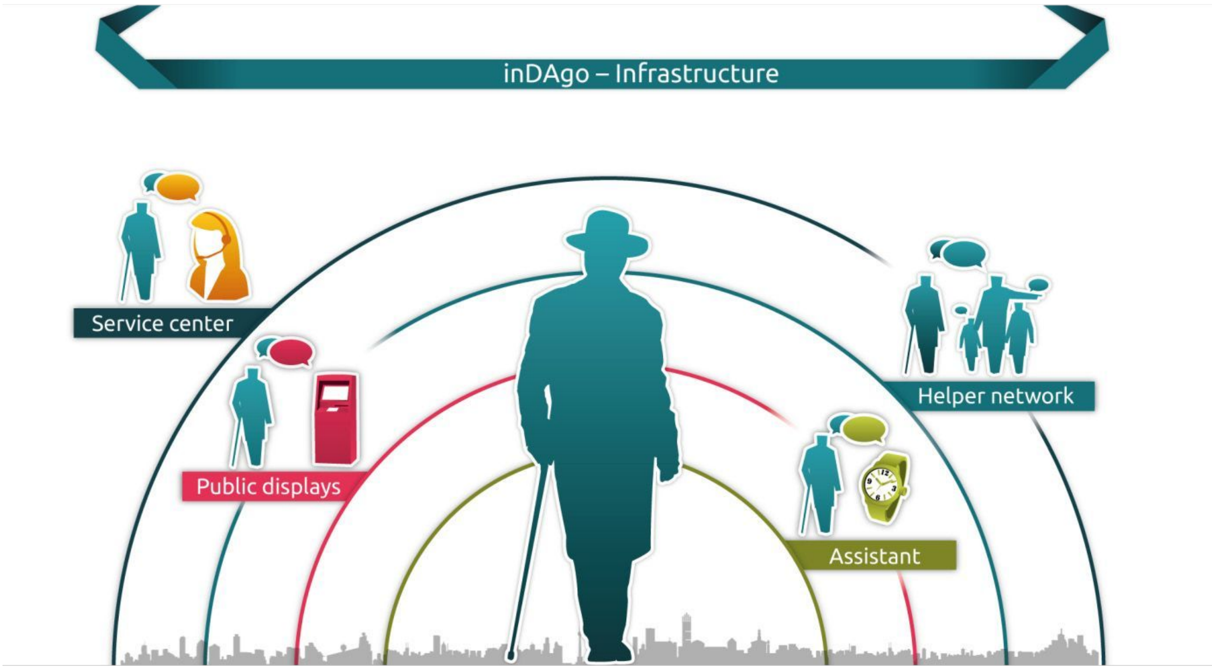

Figure 1: The inDAgo Architecture

Methods

A positive user experience of the system will depend on the quality of the service. The underlying information must be valid, trusted and accurate. The data needed will be gathered through various online resources. The maps are based on the information provided by the open-street-map project[3]. This data will be enriched by relevant terrain information e.g. acclivities. Additionally, the real-time information about traffic networks and weather conditions will be included. The routing algorithms take the person's mobility and preference profile into account when computing an optimized route.

Gathering this information and calculating an optimal route is part of the geo-information research in this project. Making this information accessible for the users is part of the user experience[4] research which is the focus in this paper. As with all user-centered design approaches[5], the project started with an elaborated analysis phase.

We conducted interviews with n_e=6 domain experts (à 60min). We asked about the work with elderly and persons with reduced mobile capabilities. Information about the context, their mental models and how they perceive the problem space of mobility for elderly gave us insight in their daily routine and their perceived problems.

We included the end users in our research: four focus groups with a total of n_f=28 participants (19 female, 5 male) were conducted. In the aftermath we extracted the main arguments and put the statements in a questionnaire where the participants could rate them according to a five point Likert scale. Those results backed the observations from the focus groups.

Based on results from our contextual analysis we created some persona (see Figure 2: Rosemarie Herzig - one of the inDAgo Persona) and visualized three main usage scenarios as storyboards (see Figure 3: Persona and Scenario Toolbox).

Figure 2: Rosemarie Herzig - one of the inDAgo Persona

The scenarios covered the tasks of consulting a doctor, meeting with friends (adhoc) and visiting the city for leisure and cultural reasons. The scenarios follow the guidelines of the scenario based design approach from Rosson[6]. The scenarios and storyboards were presented to our focus group participants who verified them.

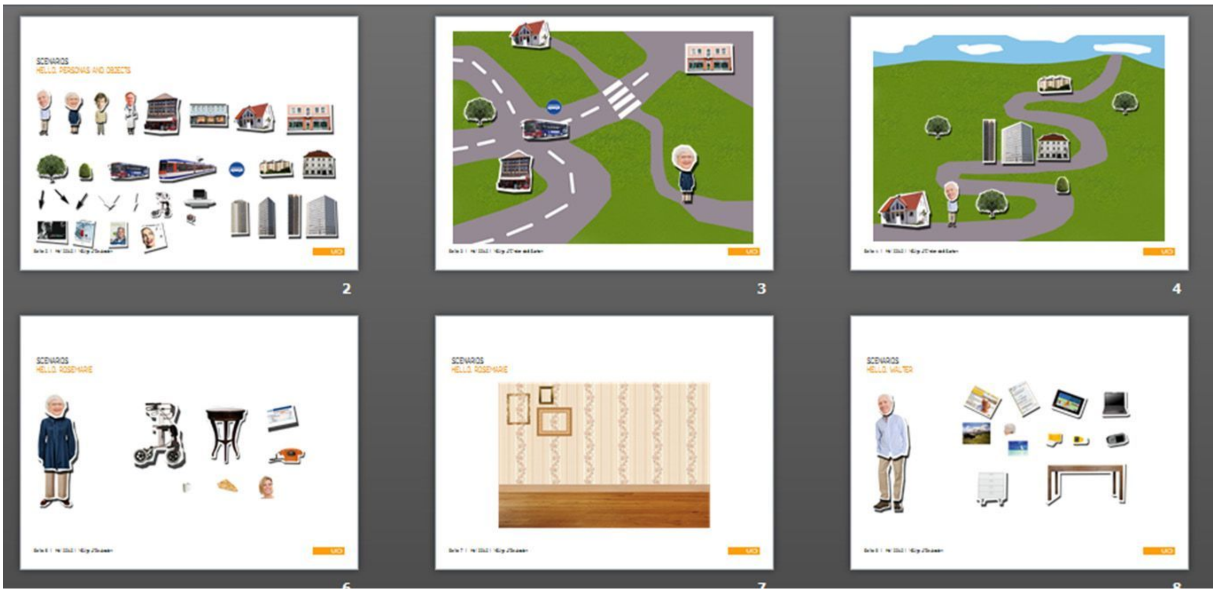

Figure 3: Persona and Scenario Toolbox

Results

During the focus groups, on-site visits and interviews it became clear that not one member of our target group owned a smartphone. At this point we assumed a smartphone or tablet app as the way to go. Our research showed that there were numerous aspects that prevent a smartphone solution:

- poor display quality (sunlight, size, no twenty-twenty vision)
- lack of usability
- technical anxiety
- burdensome learning (“why should I learn those things, I’ll be dead in five years”(sic))

Smartphones or tablets have (had) the benefit of always available display space. In an urban environment with a dense display infrastructure of public accessible displays (e.g. ticket machine, ATM, …) this advantage vanishes. Using the infrastructure of the city will be a major point as can be seen in various research results[7].

In this setting three aspects pose a challenge:

1. The cross-linking of diverse services like bank terminals with the AAL infrastructure of the inDAgo middle-ware.
2. Providing a user interface that can be used intuitively no matter what the hardware provides (e.g. screen size, touch, hardware keys, gestures, audio ...).
3. Offering a device with minimal interaction possibilities and a high acceptance factor to serve as an assistant.

The cross linking will be met with the application of the UniversAAL framework[8]. The user interfaces for diverse public displays can be written as so called UI-handlers in the UniversAAL framework.

Thinking about a device which would function as a ‘little helper’ when no (display) infrastructure is at hand lead to the concept of wearables and ubiquitous computing. Those wearables, gadgets, jewelry or everyday objects like a bunch of key could interact with the user in different modalities. E.g. a talking hat that connects to a hearing device or shoes which give hints by vibrating or color changes (see Figure 4 for some ideas).

Figure 4: Some early ideas and hardware demonstrators

Another 'helper' aspect of the inDAgo system is the usage of a social network. In this network people can offer their help to others who are currently stuck. If – for example – a wheelchair driver is deadlocked with no reasonable chance of freeing himself, he might signal his situation to the inDAgo helper network. If a member of the network is near, he or she will be informed about the situation. As a fallback there will be a 24/7 helpdesk implemented. Options about the implementation of a social (online) community around inDAgo are currently discussed.

References

1. Gaßner, Dr. K., Conrad, M. *ICT enabled independent living for elderly*. Institute for Innovation and Technology (iit), 2010.

2. "*Regionale Alltags- und Freizeitmobilität für Senioren am Beispiel der Stadt Darmstadt*" (inDAgo) is supported by the German Federal Ministry of Education and Research (BMBF). – Further information is available at www.indago-projekt.de.

3. Open Street Map Project: http://www.openstreetmap.org/.

4. Hassenzahl, M. & Tractinsky, N. *User Experience – a Research Agenda. Behaviour and Information Technology*, Vol. 25, No. 2, March-April 2006, pp. 91-97, 2006.

5. DIN EN ISO 9241-210, *Ergonomics of human system interaction - Part 210: Human-centred design for interactive systems*, 2010.

6. Rosson, M. B. & Carroll, J. M. *Scenario-based Design.* In: J. A. Jacko & A. Sears (Eds.), The Human-Computer Interaction Handbook (p. 1032-1050). Mahwah: L.E.A, 2003.

7. Gil-Castineira, F., Costa-Montenegro, E., Gonzalez-Castano, F., Lopez-Bravo, C., Ojala, T., Bose, R., *Experiences inside the Ubiquitous Oulu Smart City*, Computer, pp. 48-55, June, 2011.

8. Gorman J., Mikalsen M., Stav E., Walderhaug S. *universAAL – European Commission collaborative research and development to develop an open architecture and platform for Ambient Assisted Living (AAL).* International Society for Gerontechnology, 2010.