Creating accessible mobility apps for seniors through user-centric design process

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Abstract. In this paper, a design case for senior mobility app is presented. We describe the case through the different frameworks that we have applied in the design process in order to arrive in an accessible and usable interface solution.

Keywords. App design, smartphone, mobility, senior end user, accessibility

1. Design approach

Nowadays, the use of GPS (Global Positioning System) devices and smartphones is increasingly widespread for travelling between cities and navigating inside a city. Such devices can help senior citizens get to their destination swiftly and safely. Paper maps, written directions and booklets with timetables are becoming increasingly obsolete. The device can calculate the optimal route to destination, display the user on a map and in case of deviation recalculate and show how to get back to the route. Spoken directions are common so that continuous staring at the screen is not necessary. However, there is a complete lack of pedestrian navigation systems specially adapted to elder people needs and skills.

Senior users of navigation tools – as everybody else – are concerned with the ease of use, adequate size of the screen, the quality of the image (high contrast, large text, and maps that are easy to read), and if available, the clarity of speech (such as spoken messages and voice commands), and of course appropriate battery capacity.
In addition to these aspects, a number of other requirements appear when senior citizens want to use navigation tools. This paper reports some of our experiences with participatory design of mobility apps for senior citizen, and the

The idea of T&Tnet project[2] is to provide personalised context-based multimodal and multinational social journey planning with affective capabilities and an easy to follow adaptive real time guidance making use of artificial reasoning techniques.
T&Tnet not only provides solutions helping seniors to get to a specific destination making use of a different transport means, but also offers navigation/orientation adapted to the user preferences in real time that makes use of transport information (schedule, delays, etc.), emotions, social networks, a collaborative evolutionary platform and message/ alarm/bring-back to the route system.

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[2] Travel & Transport solutions through emotional-social NETworking, http://ttnet-aal.eu/

The HCI and usability issues that have arisen are:

- Personalisation issues of the user interface and journey preferences.
- Accessibility information of the device (HCI) and the physical environments.
- System intelligence (learning) for improvements of items above.
- Interplay between mobile use and home use of the service.

The design process must have a special focus on three central design aspects:

- Interaction design – the flow of tasks; the use "story".
- Information design – transforming data into meaningful information, with special focus on understanding, remembering, learning, problem solving, orientation etc. It is of great importance to address cognitive accessibility.
- Sensory design – employment of techniques of communication through senses, i.e., seeing, hearing, and relating to the sense of touch (haptic/tactile).

The T&Tnet project's approach to innovation within these issues has been to involve users in the design of the service. The user-centric process is organised as follows:

- Focus groups for acquiring user requirements.
- Story telling through personas and scenarios.
- Paper prototyping and mock-up development.
- End user and expert evaluation/tests of paper prototypes and mock-ups for final design of HCI and functionality of mobile use and home use of the service.

The main focus of this activity was to model the users in relation to following aspects:

- Who/what the user is, i.e., what are the user's (dis-)abilities (motion, senses, cognition) and skills, and how he/she can or wishes to interact with the T&Tnet system.
    - Motion: Moving and manipulating objects, gait (walking, running), bending, sitting.
    - Senses: Sight, hearing, smell, touch, taste, spatial awareness.
    - Cognition: Memory, problem solving, attention/concentration, learning, reading/writing, comprehension.
- Which devices (devices, sensors, detectors, actuators) and information sources (maps, signs) the user has (home/building, neighbourhood, city, etc.) and which contacts and communication means the user has in his/her mobility context.
- What the user currently does and how she/he can interact with her mobility context (plan a journey, walk, use public transportation, be in a building, etc.).
- What the user wants, i.e., what are her/his immediate plans and objectives.

2. Design case

This approach has resulted in a number of T&Tnet mock-ups, which demonstrate a synthesis of the above-mentioned frameworks. In these mock-ups, the design issues have been concretised into an array of design decisions:

- Visual clarity

- Personal preferences according to the appearance of the service
- Choices between rich and simplified menu structures and navigation
- Choices between alternative routes
- Icon design
- Experience-based preference updates (system intelligence, reasoning)
- User guidance
- Alarms and notifications
- Social platform (help, sharing of position and content)

In Figure 1 below, examples of this mock-up prototype are shown.

Figure 1. Examples of T&Tnet mockup.