Mobile AgeCI: Insights from the Development of a Mobile Training Application for Elderly Users

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Abstract. Designing mobile applications for elderly users can be very challenging. The heterogeneous prior knowledge and abilities of this user group make user-centered design processes difficult. Based on our experiences from the development and evaluation of a mobile fitness application for elderly users, we address potential difficulties in the design process of smartphone- and tablet PC-based apps for the elderly.

1 Motivation and Setting

With more than 1.3 million mobile applications in Google's Play store[4] and about the same number in Apple's App Store[5], there seems to be apps for everyone and every purpose; the categories reach from communication, news, and business over gaming, entertainment, and education, to physical fitness. However, a 2014 report on app users revealed that there are actually only a few apps for elderly people [2] that cater for impairments many elderly suffer from (such as less acute vision or reduced tactile sense) or for missing prior knowledge (such as special gestures or typing on a soft keyboard). In this work, we summarize the most important insights from creating and evaluating apps targeted at elderly people.

This paper is based upon experiences during the development and evaluation of an interactive physical fitness training app for the elderly. The goal of the application is delivering interactive exercise instructions for users of mobility aids. A key requirement is to ensure the correct execution of exercises, which requires a comprehensible presentation of the exercise. In addition, the app shall motivate its users to exercise as often as possible. In an iterative user-centered design process, a completely functional prototype has been created (see Fig. 1).

2 Developing Apps for the Elderly

The main challenges are the broad ranges of different physical restrictions, special requirements, and experiences with mobile devices or computers in general. In order to incorporate as many as possible of these conditions into a single app, we defined the requirements for the application based on worst case values derived from literature [1] and pre-tests. In comparison to other scientific fitness apps, such as GymSkill [3], this led to an application that does not need any input of numbers or text, hides advanced functions in the app drawer (hidden side menu), and has a minimum height of 12 mm for touch targets [1].

[4] http://www.appbrain.com/stats/number-of-android-apps
[5] http://techcrunch.com/2014/09/09/itunes-app-store-reaches-1-3-million-mobile-applications/

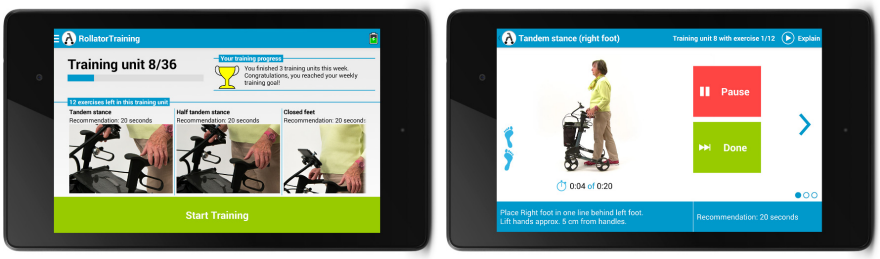

Fig. 1. The main menu of the mobile training app summarizes the current progress and previews next exercises (left). Advanced functions are hidden in the app drawer. The exercise instructions are presented via videos, textual or audio descriptions (right).

The evaluation of early prototypes was also difficult, since subjects could not differentiate between the hardware product and the software running on it. For example, subjects named the slippery surface and the weight of the used tablet PC as negative points of the app. Especially users with little or no previous knowledge on mobile device and PC use were afraid of causing damage to the system and refused to perform experiments without exact instructions. This needs to be considered when planning evaluations with elderly subjects. In our case, we started the evaluation with semi-structured interviews while guiding users through the app, which served at the same time as introduction to the app. When performing task completion experiments, we defined a maximum duration after which we helped solving the task to keep the subject's motivation.

The app is currently evaluated in a 12-week study by ten subjects between 76 and 89 years (mean: 82 years, standard deviation: 4.1 years). We record data on app usage (frequency of use, durations, and activated functions) as well as subjective ratings on the exercises. In early December, after 12 weeks of using the app for training, interviews will be performed with focus on ergonomic aspects and positive as well as negative points will be gathered. In order to contribute to closing the generation gap in mobile app use, we will share the results and insights from this evaluation with the community. The final paper will include lessons learned as well as a critical discussion of the findings.

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