YouDo - we help! - An Open Information and Training Platform for Informal Caregivers

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Abstract. The number of people in need of care increases constantly, and in the coming few years many seniors will depend on their close relatives for their care needs. These relatives very often need support to fulfill their role as informal caregivers. The YouDo prototype presented in this paper aims to provide special training programs for informal caregivers in order to help them to improve the quality of their nursing. This work illustrates first development concepts, used methods and techniques towards a modular, extensible and user adaptable multimodal information and training platform.

Keywords. Informal caregivers, training platform, eLearning, multimodal, user adaption

1. Introduction

The number of people in need of care increases constantly. Also, there is an increasing shortage of personnel in the care sector, which is more and more in financial straits. This is the reason why many seniors will depend on their close relatives for their care needs. Not only people directly affected by serious decline in health, but also the members of their social environment need support in overcoming the difficult challenges they may face. They need access to all necessary information that will help them to improve the quality of their nursing and to fulfil their role as informal caregiver.

2. Objectives

The aim of the YouDo project is to develop an easy-to-understand and easy-to-use information and training platform. It can be used on different device types, and is able to provide helpful information for informal caregivers. The platform should also be able to take personal user needs and preferences into account and to adapt accordingly the presented content. Additionally, the solution should foster the social interaction and interchange with other people.

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Figure 1 illustrates the overall YouDo service model. The YouDo core platform is composed of three main module groups, namely the *Content Container*, the *Multimodal Content Distribution* and the *User Adaption*. The *Content Container* is responsible for gathering and persisting care related content and training materials. This content is distributed by the *Multimodal Content Distribution,* using the internet as the communication medium. The *User Adaption* adapts the content according users' needs and wishes. The direct and indirect feedback in this approach aims to maximize the accuracy for the content selection and its presentation.
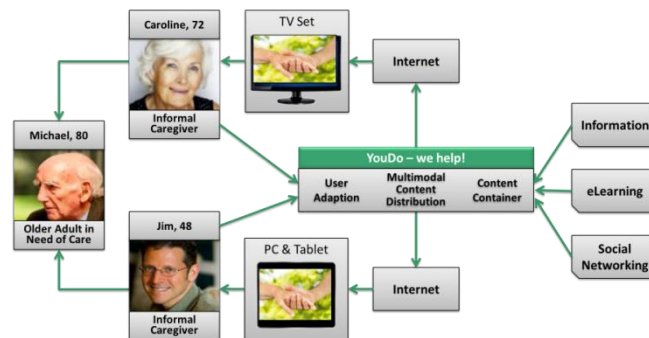
Figure 1. YouDo service model and the YouDo platform conducting of three main module groups. Content Container (right), Multimodal Content Distribution (middle) and User Adaption (left).

3. Technological Methodology

The following sections describe the YouDo core platform, composed of the three mentioned main module groups. The *Content Container* and the *User Adaption* are in the very early development stage. Some aspects of the *Multimodal Content Distribution* have already been user tested with preliminary mock-up prototypes.

3.1. Content Container

The *Content Container* represents a repository to persistently store the content to be provided to the end user. This container is filled by care professionals and training experts. Each content element needs to be annotated and categorized. This meta-data builds the basis for the identification of appropriate content an informal caregiver is in need of. The open source Learning Management System Moodle [1] is used to serve the *Content Container.* The following functions support the organization and administration of the care related content: a) content authoring possibilities, b) methods for content structuring with categories and annotations, c) support of different media types and the reuse of existing content elements and finally d) design of storyboards with prioritization options.

As YouDo targets different groups of informal caregivers, also different user preferences need to be considered. Informal caregivers may vary in their level of care related knowledge, age, physical abilities, technical skills or preferred way to consume information. To provide tailored content to all of these different user groups the system needs a detailed description of the concrete user. Therefore, an extended user management module categorizes the user during the registration process.

3.2. Multimodal Content Distribution

First pretests showed that users want YouDo to be as easy as possible over all elements and levels, like functionality, content, structure and handling. But on the other hand the technical skills are not limited for all users in the same manner. There exists a remarkable amount of users that are very adept with Information and Communication Technology (ICT). They demand more features and are capable to handle higher complexity. Consequently, this feature diversity demands more elaborated device interaction patterns. To ensure an adequate user experience for our heterogeneous target groups, it is necessary to have the ability to run YouDo on different multimodal interfaces. YouDo will be available on three different device types, namely on the TV set, on the tablet and on the Personal Computer (PC). On the TV set YouDo is operated with a simple remote control. The major limitation of this operating mode is the missing capability to enter text. As a consequence, the default feature set on this device is restricted to functions where a text input is optional. Using a tablet an equivalent full feature set can be utilized. Additionally, YouDo can be operated on another individually preferred client device (e.g., on the PC or a smartphone) by accessing a specific web URL with a suitable internet browser.

On the TV set and the tablet YouDo is presented in a so called kiosk mode. This allows us to use YouDo as exclusive application on the devices, which promises to reduce the handling complexity for the user. Furthermore, the web-based full screen internet browser allows a simple rendering of the content while guaranteeing portability to other devices and systems. Regarding security issues, the used Moodle-based *Content Container* can be configured to allow secured communication between the server and the client using the HTTPS [2,3] protocol. On the TV set the personal authentication rely on hardware identification (e.g. device serial number), and on tablets and browsers a username/password login mechanism can be used.

3.3. User Adaption

The User Adaption module group aims to a) optimize the selection of relevant care related topics in form of a *Personal Content Adviser* and b) increase the accessibility, understandability and usability of the presented content by applying user specific transformations using the *AALuis Transformation Layer* [4,5,6,7,8].

The *Personal Content Adviser* suggests relevant content to the user. To generate suggestions, a double clustering technique [9] is applied to obtain fuzzy rules [10]. These rules are continuously adapted by users' behavior. Moreover, the approach also creates new rules when a new usage pattern emerges. The content data is aggregated to describe a relationship between similar content categories. User preferences are then used to adjust this relationship for each single user. We deduce a degree of certainty for a specific content to be appropriate for the user and the most appropriate content is shown as a suggestion.

User specific settings are used during the on-the-fly adaptation process. This task is mainly performed by the built-in *AALuis Transformation Layer*. According to the 3-layer user interface model [11], the YouDo platform adapts the presented content on all three adaptation layers. This includes shallow modifications, performed by the Presentation and Input Events Layer; over medium deep modifications, performed in the Structure & Grammar Layer; to deep modifications, performed by the Content & Semantics Layer. Shallow modifications are related to e.g. text sizes and contrast

settings. Based on the apprehended user preferences YouDo is able to adjust these factors automatically and individually for each user. Medium deep modifications are related to aspects like input and output modalities or grouping of structures. The Model Based User Interaction (MBUI) [12,13] approach of the built-in AALuis framework is responsible to fulfill modifications on this level. Deep modifications involve mainly elements which are able to increase the understanding of the content. These elements are e.g. audio descriptions or artifacts with different levels of simplification. The dynamic composition of content and the detail description of user characteristics allow us to provide also on this level tailored content for each single user.

4. User Involvements

It is common knowledge that the user acceptance determines the economic impact of social and technological innovations. Early integration of the target group into the development process is a reasonable and necessary approach to achieve success. Test fields in Germany, Austria and Switzerland will secure the inclusion of 40 elderly people and their informal caregivers from the age of 80 years and older.
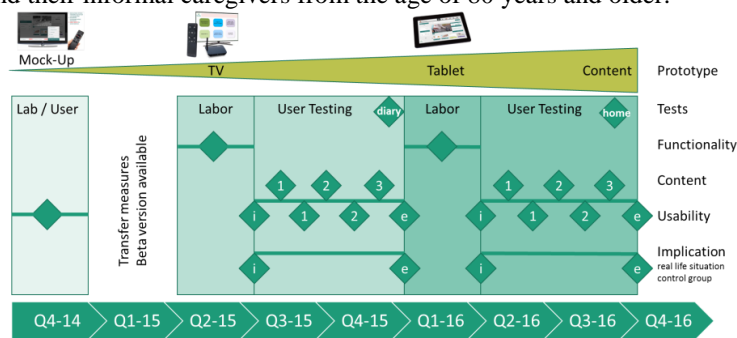
Figure 2. Test plan of the YouDo prototype including two iteration steps.

Our lab tests were defined according to the theoretical model to test user acceptance developed by Mollenkopf [14,15,16]. It secures the complete testing of all technologies and hardware alongside this concept. Our goal is to test the product as a whole in two different iteration steps. The first phase focuses on the TV-based interaction with limited functionality set, whereas the second phase focuses on the tablet-based interaction with a full feature set. The test plan considers the testing of the general usability as well as the testing of the presented content in terms of complexity, presentation and comprehensibility. Based on these evaluation results our experts will be able to develop concrete implications for real life situations.

5. Preliminary Results and Conclusion for Further Developments

Our preliminary user involvement results, evaluated in three different user workshops clarified that an easy to operate system is considered the main success factor for the YouDo project. The users expect YouDo to differentiate from a standard training system and to be more supporting during their daily life. The first results identified several issues regarding the usability. Users accepted and even asked for functional

restrictions in order to reach a higher usability. This very useful preliminary feedback was accounted for in the current development process and will thus enhance the first prototype which is currently scheduled to be ready at the end of the second quarter 2015.

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