

Talk and (v)Assist – Achieving Independence with Natural Speech Interaction

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Abstract

The goal of the vAssist project is to provide specific multilingual natural speech controlled home care and communication services for two target groups of older persons: seniors suffering from chronic diseases and/or (fine-) motor skills restrictions. The main objective is the development of simplified and adapted interface variants for tele-medical and -communication applications applying multilingual natural speech interaction (and supportive graphical user interfaces where necessary). vAssist aims at enhancing the perceived quality of healthcare services enabling a reduction in the costs related to their production and delivery by achieving channel independence in the supply of services so that existing hardware in the home of senior users can be used (e.g. PCs, TVs, mobile phones, tablet PCs). Further, a User-Centered Market-Oriented Design approach (UCMOD) is followed involving end users in all phases of the development process considering market-oriented aspects from the initial phase of the project. This assures that the iteratively developed

services and business models are adapted to the requirements and needs of the users. From an interface point of view vAssist leverages approaches to connect to universal interfaces for the delivery of AAL services and provides user-specific natural speech controlled interfaces in order to address a broad audience. However, the aim of vAssist is not to develop another platform for service and interface integration, but to provide specific modules in order to enhance existing services with speech intelligence. Existing platforms and initiatives (e.g. universal [18]) are considered in the exploitation strategy and technical design of the project. Overall, vAssist services are expected to be ready for the market 2-3 years after the completion of the project, as the solution bases on existing services and such that are currently already in use in senior homes, enhanced with natural speech interaction, so that service developments do not have to start from scratch.

Introduction

Currently, 87 million persons in the EU-27 are aged 65+ [1]. With increasing age also the prevalence of physical and cognitive problems increases resulting in a high demand for supportive services. These facts not only support the claim for advanced services but also for interaction paradigms that enable the compensation of age-related restrictions. In direct relation, the vAssist [8] project focuses on supporting seniors suffering from fine-motor problems and/or chronic diseases by applying multilingual natural speech interaction for the usage of home care and communication services. European statistics on diseases that lead to motor problems show that currently 1.2 million seniors suffer from Parkinson`s [6] and 630.000 from multiple sclerosis [7].

The main innovation of vAssist is expected in the reduction of costs by achieving channel independence in the delivery of vAssist services so that existing hardware in the homes of senior persons can be used. Moreover, an intelligent module enabling the interpretation of user requests by distinguishing between commands, information requests and inputs will be integrated following a triplet model. Research studies will mainly concentrate on speech behaviors to adjust the speech technology to the natural speech interaction flow of older adults. From a business perspective speech interaction shows a high potential, since previous studies indicate high acceptance rates among older persons [2] [3]. Further, speech interaction not only addresses motor restricted seniors but also those with little or no computer literacy since no new form of interaction has to be learned.

Methods

In vAssist a User-Centered Market-Oriented Design process (UCMOD) is applied considering user, technical and economic constraints in a sound methodological setup. The project is currently in the requirements specification phase. For the collection of a broad range of user data and perspectives from primary (seniors) and secondary users (informal caregivers: family members; formal caregivers: medical experts) a mix of quantitative and qualitative methods was applied. During focus groups the future vAssist system was demonstrated using a Wizard of Oz (WoZ) approach [19] and room for first experiences with an existing natural language system was given followed by guided discussions on hardware, interaction and business related aspects. Further, standardized questionnaires were applied to get a full picture of user requirements from the perspective of different target user groups. With this setup a broad range of user needs and wishes related to the future vAssist system could be covered that will be balanced in the ongoing system specification phase.

To achieve a high standardization level, vAssist takes profit from related AAL initiatives [18] by striving for an active technical exchange. Further, standard protocols are used to achieve channel independence for getting access to services via different devices seniors' currently use in their daily life. Web services take the role of a standard means of interoperability between applications that run on a variety of platforms and/or frameworks deploying a cloud computing model.

Results

First results from vAssist requirements studies highlight that future senior user's claim for static and mobile hardware solutions that present information by voice, text, graphics and videos. Further, smooth and pleasant voices, pro-active error solving strategies and high security standards related to personal data, as well as active feedback on battery status are requested. Moreover, findings from discussions with primary, secondary and tertiary users indicate a strong need for future vAssist service packages that are open to individualization offering low, mid and high cost models that differ in the number of included services and/or hardware (if needed). The evaluation of cost models and technical developments will continue during iterative lab studies and final field trials focusing on usability, accessibility, user experience and technology acceptance.

Within vAssist, ethical issues are extensively considered from different perspectives applying project internal control mechanisms including national legislations [14] [15] [16] [17], general human rights [10], data protection regulations [11], ethical frameworks [9] [12] [13] and guidelines for Ambient technologies [4] [5]. Further, an external ethical committee approves all studies with active user involvement. During the field trial phase, users will be able to use and evaluate the developed vAssist services over a longer period in their private living environments. As an exit strategy, the vAssist consortium plans to provide at least basic communication and tele-medical services even after the field trial phase to the participants. In any case if the users wish to use the services after the field trials the consortium commits to leave the deployed technical, hardware and software infrastructure that was installed in the users homes. However, after the project phase the vAssist services will need to change from pilot to commercial services that match the business model developed within the project. In the case that the multilingual natural speech controlled services are not ready for the market at the end of the project and demand a further iteration it is planned to provide basic communication and tele-medical services to the users even without the support of speech control.

Discussion

To sum up, the vAssist project strives for enhancing the quality of life of senior European citizens by focusing the development process on different points of views concentrating on the balance of user needs, business aspects, technical issues and ethical correctness. Current activities for bringing the vAssist solution to the market mainly focus on convincing organizations that provide care services to senior persons to take the vAssist services up in their current service portfolio. Moreover, first feedback from senior persons highlight that a major precondition can be seen in the robustness and reliability of the technology as well as the usability of the interaction and individualization of services packages dealing as major acceptance and market potential factors. The applied UCMOD setup faces these challenges by iterating technical developments during several evaluation phases to assure that in the

end of the project user wishes, business criteria and technical developments are well balanced and in line with the requirements of primary, secondary and tertiary users.

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