Quantitative and Qualitative Rating and Ranking Studies for Consolidation of an Application Portfolio for Large Scale Pilots

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Quantitative and qualitative rating and ranking studies
for consolidation of an application portfolio for large scale pilots

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The ReAAL project intends to deploy a critical mass of Ambient Assisted Living applications and services for ca. 7000 users in seven EU countries, based upon the universAAL platform, previously developed with EC support, with the intent of kick-starting the market for interoperable AAL services, applications and devices. ReAAL will facilitate the emergence of an AAL ecosystem by showing the platform usefulness, and spreading the related technical knowledge through an associated community of interest. Here, ReAAL will establish a multi-dimension evaluation methodology to measure the impact of the deployment of the AAL ecosystem in terms of the social, economic and health indicators.

Whether health, safety, comfort, social integration or support of mobility – assistance might be needed in any possible aspect of daily life. From an investment point of view, the AAL market should allow individuals in danger of losing independence to pick the set of applications and services of Ambient Assisted Living (AAL) over time in conjunction with actual needs, as they arise. Open platforms are supposed to be the enabler for such gradual system evolution and support products and services to become more affordable, future-proof, adaptable, and accessible. The ReAAL project investigates these assumptions via a number of pilots, each with a different focus. If the platform's usefulness can be shown and the related technical knowledge is spread to an associated community of interest, a self-organizing AAL ecosystem will emerge, from which diverse stakeholders will benefit: application and technology vendors, service providers, public authorities and policy makers, sponsors, and the consumer masses, foremost those people who wish to be able to avoid dependency on nursing homes, preferring to continue to live independently in their own homes.

Problem

This paper reports about the consolidation of the ReAAL application portfolio. The criteria for the ranking of independent living applications have been identified and are discussed. In addition, a first list of applications is presented that could be deployed at the pilot sites. The ranked list of independent living applications will be dynamic and will be iteratively updated to accommodate advancing insight throughout the project phases, as such that ReAAL can provide an up-to-date application list that is highly compatible with the defined criteria. In fact, even the criteria might be enhanced and altered to meet the needs of all relevant stakeholders. In close cooperation with the project partners, four stakeholder groups have been identified that will directly be involved in the use and development of the applications, either at the front-end or the back-end. Among others, age-related bodily changes (Mead, Lamson & Rogers, 2002), life-time experiences, technology generational influences (Docampo Rama, 2001), care roles (e.g., receiver, giver, provider, etc.) and financing roles (e.g., buyer, seller, providers, etc.) will have an impact on the perceptions, opinions, and values towards independent living applications.

Methodology

In the first months of the ReAAL project, a preliminary portfolio of 47 independent living applications was gathered, described and archived. These applications were rated and ranked in a number of qualitative and quantitative rating studies ($N = 20$) with relevant stakeholders (caregivers, service providers and developers, and older adults), which provided rich in-depth data about independent living applications suitable for the ReAAL project and pilots. Qualitative and quantitative data was gathered during focus groups in Spain and The Netherlands, and quantitative data was also gathered via an online portal. The goal of the rating studies was to provide recommendations for the ReAAL application portfolio. The criteria for the ranking of independent living applications were identified and discussed within a number of brainstorming sessions. The ranked list of independent living applications is dynamic and will be iteratively updated to accommodate advancing insight throughout the project phases, as such that ReAAL can provide an up-to-date application list that is highly compatible with the defined criteria and the criteria might be enhanced and altered to meet the needs of all relevant stakeholders.

Qualitative Findings

The qualitative data from the focus group in Spain showed that participants were positive about the relevance of the applications on self-management and an older person indicated that the independent living applications could support social connectedness and reduce loneliness. A number of the participants specifically reported about the privacy issues that are related to the use of video recordings by means of webcams and one older person argued that privacy can also

be at stake when multiple people have access to the mobility data of users. Privacy and data encryption was also perceived as an ethical concern. A number of possible usability issues were discussed and the focus group participants provided recommendations to enhance the ease-of-use of independent living applications: need for simplicity, interface requirements to support age-related changes in visual perception, simple error control to help users recognize, diagnose, and recover from errors. These usability requirements are similar to the usability heuristics of Nielsen (1992; 2005) and accessibility results from gerontechnologie research (see Nap, 2008). In respect to the costs, some perceived the benefits more important than the costs, and the costs will be reduced whenever larger volumes are produced. Finally, one participant mentioned that EU cross-border funding and financing should be considered in respect to the costs of the applications.

From the focus groups in The Netherlands it appeared that visual communication is valued high. A number of service developers were positive about screen communication and this could be considered a large step forward in development. Medication reminders were also valued positively by one of the older adults and caregivers. The caregivers commented positively about the reliable/complete picture of patients as an advantage of medical data forwarding. However, a variety of stakeholders reported that physical face-to-face contact remains important. Interestingly, application developers reported positively on medical data forwarding, also because these services are part of their business. Older persons and caregivers indicated that these type of applications can be perceived as an intrusion of the privacy of older people, as reported by one of the participants. Furthermore, some of the service providers suggested that a smartphone could positively contribute to localization as these devices are easily accessible for older people and provide individual control. Some caregivers indicated that applications that support social problems are desirable and a number of service providers reported positively about the contribution of these applications in the social sphere and in respect to prevention. However, physical contact remains important – as mentioned by all stakeholders – and digital support should therefore ideally be accompanied by physical face-to-face visits. Most stakeholders had positive perceptions about domotics, and importantly, home automation could potentially increase and maintain independent living, as indicated by one of the participants:

Quantitative Findings

The quantitative data showed that a number of applications score positively (above scale mid-point) on Relevance for Independent Living, Need of Service, Openness, and Status, and a number scored low on Risk (failure). Weighting factors were applied on the criteria (i.e., relative importance of the criteria or items) after a number of independent living experts scored the five criteria. Two rounds of ratings were performed: first one with thirty-three independent living applications, and second a rating round with fourteen independent living applications. From the overall mean with the weights applied and the Risk scores reversed, the following applications from the first rating round are recommended – in a non-specific / random order – to be considered for the ReAAL project and pilots: Self-management diaries, Task scheduling, Rehabilitation Portal, Safety-at-Home, Medication Reminder, Teleassistance service, SIMAP Alarm, and ITHACA Hypertension. From the second rating round, the following applications are recommended (non-specific order): MiBida screen-to-screen, and Magic Walk, Kwatch, and Cognitive box could also be considered, although they score on some criteria lower than the scale mid-point. The recommended applications can be considered as exemplar applications that score sufficiently high on the criteria. Overall, the ranking is not intended to recommend specific brands. In respect to AAL service domains, the following list was created with the top 5 applications per domain, to provide a wider palette of applications that score relatively well (above scale mid-point).

Service domain	Application	Mean
Comfort Services	Task scheduling	3,94
	Welfare Services Network	3,43
	Agenda and Reminder	3,35
	Informationservice	3,04
	Cleaningservice	3,00
Security/ Surveillance services	Teleassistance service	4,11
	Self-management Diaries	3,87
	Magic Walk	3,84
	Medication Reminder	3,78
	SIMAP Alarm	3,78
Treatment, Nursing & (tele)care services	ITHACA Hypertension	3,75
	Rehabilitation Portal	3,73
	Application of NetMedical	3,55
	Home Sweet Home	3,51
	Configurable health care system	3,49
Welfare services	MiBida screen-to-screen	4,40
	Good morning service	3,73
	Kwatch	3,63
	Agenda	3,59
	Cognitive Box	3,56

Discussion and Conclusion

As discussed before, the goal of the ranking is to support the ReAAL project in choosing applications that are compatible with the stakeholders' needs. Since, the criteria 'Need of Service' for the pilot site received the highest weight from the independent living experts, it can be argued that the ReAAL pilot sites take the final decision in which application(s) will be included during the evaluation phases. The results described in this paper hopefully support the pilots in making a well-thought-out decision in the choice of applications that will be implemented and evaluated, as such that these support independent living to the greatest extent; are needed at the pilot site, are open and interoperable with the universAAL platform and applications; are beyond a Beta developmental stage; and have a low risk of failure.

Possible limitations of the quantitative rating studies are the small sample size, nevertheless, the ratings and rankings are an iterative process and the sample size will increase during the project phases. Another possible limitation of the ratings is that the raters had to score the applications using a description of the application made by project members, which possibly results in a different rating score than whenever people experience and perceive an application in-situ. A final limitation of the work is that it was planned to rate all applications on more criteria than the 'general criteria', e.g., on costs, usability, ethics, etc. These criteria were included in the qualitative focus group studies. Because the raters reported that it was too difficult to rate applications on these criteria without perceiving and/or experiencing the application, it was decided to skip these criteria in the quantitative studies and analyses at this phase of the project and re-run the studies whenever all applications are mature and working.

In conclusion, the quantitative and qualitative rating and ranking studies provided us with a number of in-depth results. A preliminary list of potentially valuable independent living applications for the ReAAL project and universAAL platform has been developed based on five general criteria, which will be extended iteratively by considering ethics, usability, and costs. Future additional ratings will provide more insight in the applications that suit the ReAAL portfolio most. The portfolio is still open for additional applications and criteria, using the gaining insights throughout the project phases

Acknowledgements

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