

Assistive Solutions in Practice: Experiences from AAL Pilot Regions in Austria

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Abstract. Since 2012 six AAL pilot regions were launched in Austria. The main goal of these pilot regions is to evaluate the impact of AAL technologies in daily use considering the entire value chain. Additionally, go-to market strategies for assistive technologies based on an involvement of all relevant stakeholders are developed. Within this paper an overview of the specific objectives, approaches and the status of all Austrian AAL pilot regions is given. Taking into account the different experiences of the different pilot regions, specific challenges in establishing, implementing and sustaining pilot region projects are discussed and lessons-learned are presented. Results show that a careful planning of all project phases taking into account available resources is crucial for the successful implementation of an AAL pilot region. In particular, this applies to all activities related to the active involvement of end-users.

Keywords. Pilot projects, AAL, assistive technology, self-help devices

1. Introduction

AAL (Active and Assisted Living) products and services aim at promoting older people's independence and social participation, improving their personal safety and well-being as well as supporting healthy lifestyles. In the course of the last years, a wide range of technologies and services were developed that have the potential to contribute to an

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increased quality of life of older people. Beyond their ability to support every-day activities and their acceptance within the target group, the development of holistic service concepts and sustainable business models are critical for successfully introducing AAL solutions to the market.

Since 2012 six AAL pilot regions were launched, co-funded by the Austrian Ministry for Transport, Innovation and Technology (BMVIT). Within these pilot regions, AAL products and services are put into practice and tested over a longer period of time than typically possible in other projects. Overarching goals are: evaluating the impact of AAL technologies in daily use along the entire value chain; and developing go-to market strategies involving representatives from businesses and the housing sector as well as stakeholders from research, health care, insurances and the public sector.

A number of initiatives and projects aim at setting up living labs for assistive technology on a European level [1]. Within the European Innovation Partnership on Active and Healthy Ageing (EIP on AHA), 74 regional and local organizations have been awarded the status of a “reference site” in 2016 [2]. Overarching goal of this initiative is to accelerate the scaling-up of innovative approaches and practices by fostering active knowledge exchange. In Germany a pilot region for assistive technology will be established as part of the SmartSenior project [3]. The gAALaxy project [4] which started in May 2016 is aiming at developing innovative, holistic and market-driven AAL bundles with affordable, retrofit, easy-to-use and maintainable smart home solutions. During the evaluation phase, up to 180 private test households connected to diverse service and care providers in Austria, Italy and Belgium will be involved. Within the ACTIVAGE project [5], a multi-centric large-scale pilot will be set up in nine deployment sites across Europe. Goal is to provide evidence on the benefit of the deployment of an interoperable IoT-enabled active and healthy ageing platform.

So far, knowledge exchange between the Austrian AAL pilot regions primarily took place on a bilateral basis or was initiated by the Austrian Research Promotion Agency (FFG). For example, guidelines for the implementation of pilot studies [6] and the involvement of different stakeholders in the development of business models for AAL solutions [7] as well as a taxonomy for the classification of AAL solutions [8] were developed.

With this paper, we aim to foster this exchange between AAL pilot regions and discuss specific challenges in establishing, implementing and sustaining projects across the different contexts and experiences of all AAL pilot regions funded thus far.

1.1. Austrian AAL pilot regions

We begin by providing an overview of all AAL pilot regions, their principle aims, approaches and current status. Table 1 summarizes the projects and their basic information.

1.1.1. moduLAAR

The research project moduLAAR (A modular and scalable AAL system as lifestyle element for silver-ager up to assisted living) [9] was Austria’s first co-funded test region project with a great demonstration character and aimed to measure the impact of AAL technology on the quality of life of older adults and to enhance the public perception of AAL in general, but also among policy makers and different stakeholders.

Table 1. Overview on Austrian AAL pilot regions

| Project | Project duration | Pilot location | Pilot households | Pilot duration |
|----------------------|------------------|----------------------|------------------|-----------------|
| moduLAAr [9] | 09/2012-12/2015 | Burgenland | 50 | 18 months |
| West-AAL [10] | 01/2014-05/2017 | Tyrol and Vorarlberg | 74 | 12-18 months |
| ZentrAAL [11] | 01/2015-12/2017 | Salzburg | 60+60 I, II | 15 months |
| RegionAAL [12] | 09/2015-09/2018 | Styria | 100+100 II | 12 months |
| WAALTeR [13] | 12/2016-11/2019 | Vienna | 83+35 II | 12+6 months III |
| Smart VitAALity [14] | 01/2017-12/2019 | Carinthia | 100+100 II | 15 months IV |

^I Instead of households, individual persons are involved in ZentrAAL

^{II} Participants in experimental + control group

^{III} Duration of experimental + quasi-experimental phases

^{IV} Duration of quasi-experimental phase

In the project 50 flats, which are mainly connected to a care facility and provided care services on demand from the Samariterbund in the rural region of Burgenland, were equipped with AAL technologies from the domains safety, social inclusion, health and comfort. Some flats were recently built, 11 flats provided care services without a nearby care facility and 14 flats were private properties. The system provided consisted of a tablet computer, a mini PC for continuous activity tracking in the living environment, an NFC enabled blood pressure monitor, a weighing scale and a mobile phone as well as a mobile emergency call system with GPS, and domotic sensors. Additionally, a cloud server was provided for formal and informal care persons (e.g. to share photos). The *LeichterWohnen* Android app for Android tablets formed the central user interface and from the end-users view the core component of the overall system.

The average age of the participants was 71 years. The participants had a low affinity to technology and 76% lived alone. To measure the impact on quality of live, a number of quantitative and qualitative instruments, mainly standardized questionnaires, have been used which were adopted partly to satisfy special needs of the target group. The results clearly showed a positive effect of AAL technology on the quality of life in an age group where maintaining the same quality of life can be already seen as a success.

The project was closed at the end of December 2015 and in the final stages, a multi-stage exploitation strategy was developed to enable a low-cost entry into the use of AAL technology for the end-users by promoting lifestyle and health aspects at first. The modular architecture of the system allows an easy extension depending on the change of user needs later on. Steps towards commercial exploitation in co-operation with partners based on the outcome from moduLAAr and other projects are ongoing.

1.1.2. West-AAL

The aim of West-AAL (the second Austrian test region funded within the Benefit programme) [10] is to identify and analyze existing AAL solutions as well as ICT based smart home systems and smart services to allow a requirement based evaluation of the fit and potential benefits of single as well as bundles of solutions for older people and (in-)formal caregivers with respect to their distinct influencing surroundings. Therefore the consortium of West-AAL consists of six different user organizations which ensure a variety of environments and access to up to 74 households. For example, urban as well as rural regions are covered, older adults living in their own property and others living in a rented apartment are involved, households with and households without direct access to professional care services provided by public or private organizations are part of the project. Additionally to the preliminary evaluation of the identified solutions, West-AAL

evaluates the effectiveness of a top-down versus a bottom-up approach on how to proceed in bringing AAL solution bundles to the user under controlled environments. Three user organizations allowed their users and their informal cares (relatives, friends etc.) to choose from a set of potential West-AAL bundle components. The bundle consists of 19 different solutions and 41 applications, assigned to five solution categories: leisure and culture (e.g. entertainment and games), information and communication (e.g. voice, video and text communication, management of appointments), health and care (e.g. tele monitoring), living and buildings (e.g. lamps and light control, optical guidance systems, indoor climate, entrance control) safety and security (e.g. fall detection, person localization in emergency cases, emergency and alert management). After that each responsible care organization is in charge to make the final decision on the individual packages. The top-down approach was chosen by the other organizations. They pre-defined the potential components of the West-AAL bundle and later the older adults made their final decision on which solutions should be implemented in their environment. Same applied for the interoperability respectively integration inside the bundles and also regarding the existing ICT-based surroundings and services. The implemented innovative, individual and affordable West-AAL solution bundles have been implemented in over 70 households and are periodically evaluated by the users. Out of 73 current test persons participating in 71 households, 40 users are living in assisted living barrier-free flats, 20 users in housing units for elderly and 13 users in private housing. First results regarding the effects of the West-AAL solution bundle and its individual components, each classified according to the AAL Taxonomy [8], show a clear trend to have a positive impact on quality of life indicators, such as activity, mobility, comfort, independence, health, safety and social interaction. So far no negative effects on the quality of life indicators have been identified. Still on the one hand, even under controlled environments, the long term impacts need to be evaluated for a longer time period and with a higher number of participants. On the other hand, the qualitative analyses carried out show already solid research results and are strongly enriched by the quantitative methods to identify trends.

The research project West-AAL will run until the end of May 2017. The evaluation of the solution bundles is still carried out and the results on all evaluation dimensions will be presented at the end of the project. This will also include recommendations regarding the business opportunities and measures that have to be taken to roll out AAL solution bundles on the market.

1.1.3. ZentraAL

Most of the technological solutions for supporting older people focus on comfort and consequently on functionalities to support people in their everyday life. As beneficial as these technologies can be, by taking over simple activities they can also cause functional skill losses and increase care needs. Therefore, the AAL pilot region Salzburg (ZentraAL) [11] focusses on the development of technology-enabled services to prolong independent living (and to reduce/delay care demand) by aiming to maintain or even improve functional abilities and the current health status of older adults living in sheltered housing schemes.

Consequently, these people will be trained to use these technologies and get to know the benefits of AAL usage. In order to ensure end user acceptance of the developed services, lead users are involved in all relevant project phases starting with the requirements analysis [15]. The developed system *MeinZentraAL* provides

functionalities with respect to safety, fitness, community, apartment automation, appointments and entertainment.

MeinZentrAAL is tested and evaluated with 60 older people in sheltered housing schemes in the province of Salzburg for a period of 15 months. In addition a control group of 60 people is also established for the same period of time. The field trial started in April 2016 and will finish in July 2017 [16].

1.1.4. *RegionAAL*

Only a few AAL technologies have been successfully introduced to the market up to now. Within the Styrian pilot region *RegionAAL* [12] the question on what may be the reasons why many AAL solutions haven't been successful so far is addressed. One reason might be that research and development did not sufficiently consider the specific needs and requirements of this particular user group.

Therefore, *RegionAAL* takes (based on an evidence analysis) as its starting point ICT based interventions, which are acceptable for this target group and have been proven beneficial; appropriate technologies are searched for those interventions, further developed and integrated in a way that makes them easy accessible and usable for the involved users. The developments of *RegionAAL* cover functionalities for the areas safety, communication and interaction with care organizations. A scientific evaluation of the effectiveness of the technology intervention will be performed.

The development of the service modules is nearly finished; the test phase lasting 12 months is about to be started with in 100 households (as of January 2017). The design of the accompanying scientific evaluation also foresees a control group with about the same number of households.

1.1.5. *WAALTeR*

The Viennese AAL pilot region *WAALTeR* [13] is one of two pilot regions funded in the latest cycle of the benefit programme. It is also the first in Vienna, promising to yield new insights of AAL in large scale urban environments. The consortium is a diverse mix of care service providers, research institutions and companies developing technology. As lead, the Vienna smart city agency TINA ensures that results are embedded in the overall smart city strategy and associated policy making. In line with the funding scheme, the overall goal of the project is to support the independent and self-determined life of the elderly within their own homes.

WAALTeR aims to equip 83 households with AAL technologies with the focus on integrating existing products and prototypes, rather than developing novel components. The *WAALTeR* system covers three service areas: social integration (e.g., through neighborhood networks), safety (e.g., fall detection) and health (e.g., tele-monitoring). Mobility is defined a cross-sectoral theme that is reflected in all service areas.

The project is committed to engaging the target user group throughout the design of the system and its accompanying services. To this end, the project has started to recruit participants for design workshops in which requirements, needs and ideas for the technology are assessed and co-designed. An 18 month long evaluation study is planned to start by the end of the year in which we additionally involve 35 control households. An experimental study design is applied to measure the impact of the technology intervention on quality of life, physical activity, loneliness, frailty, self-esteem as well as to evaluate technology acceptance and user experience.

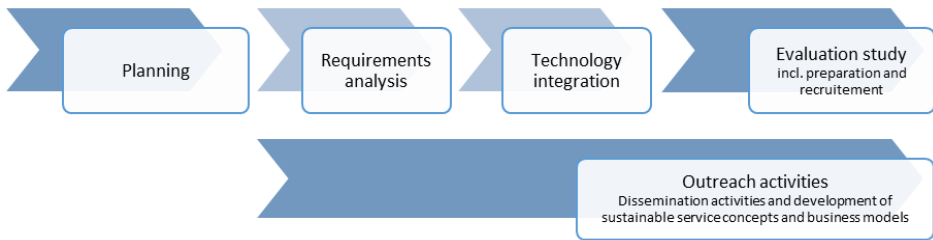


Figure 1. Lifecycle of AAL pilot regions

1.2. Smart VitAALity

Smart VitAALity [14] is the second of two pilot regions funded in the latest cycle of the benefit programme. It will implement a large-scale ($n = 100+100$) and long-term (15 months) evaluation of an integrated AAL system in a smart city “Health, Inclusion and Assisted Living” setting within older people’s households in Carinthia.

The Smart VitAALity system offers future users utility-based, expandable, modular, intuitive and user-friendly services that are currently well integrated in existing everyday processes. The approach is based on the principles of modular-function packaging, deep service integration and adaption towards the continuum of needs.

The functional clusters (health, wellbeing and social inclusion) are geared to support the long-term sustainment of quality of life (sQoL) and its dimensions (well-being, health, social inclusion). This should allow older people to live longer independently and happier in their own private homes.

The evaluation is based on a multi-domain strategy (usability, acceptance, sQoL, socio-economic models) – whereas a core component will be a quasi-random-controlled trial ($n=100$ intervention group, $n=100$ control group). The results will be the basis for the development of a sustainability concept.

1.3. Lifecycle of AAL pilot regions

The implementation of an AAL pilot region involves several stages from the initial planning to the development of sustainable concepts and business models for sustaining the pilots beyond the end of the projects. The phases requirements analysis, technology integration and evaluation correspond to the phases of the UCD approach [17], the phases planning and outreach activities were added because of their importance for the successful implementation AAL pilot regions. Figure 1 provides an overview.

Within the *planning phase* a consortium of research, industry, end-user and additional partner organizations is set up in order to ensure access to all necessary resources (e.g. SW and HW components), expertise and competences (e.g. user research, business modelling) necessary for the implementation of the pilot region. A work plan is set up defining the roles and responsibilities of all partners together with a concept for the AAL system to be deployed and a draft methodology for the evaluation. For the Austrian AAL pilot regions this phase also included the development and submission of a project proposal within the benefit programme.

The *requirements analysis* phase covers all activities related to collecting ideas, needs and wishes related to the design of the AAL solution to be deployed, co-design activities as well as activities aiming to raise awareness for the project within the target group (in preparation for recruiting households for the pilot study). Within the

technology integration phase the individual AAL service components are adjusted and integrated into one or multiple service packages according to the user requirements.

The core phase of every pilot region is the implementation of the *evaluation study* in older user's households. This phase comprises the ethical clearance, recruitment of participants, defining an evaluation methodology, deploying the systems to the user's households and running the study as well as the data analysis. According to pre-defined evaluation parameters the impact of the technology intervention on individual (e.g. quality of life), system-related (e.g. user experience) and socio-economic factors (e.g. cost efficiency) is analyzed.

Outreach activities are performed throughout all phases of a pilot region and cover the dissemination of (scientific) project results as well as the development of sustainable service concepts and business models (scaling up activities). Within all pilot regions, showcase flats are set up as a channel to present the project developments to interested parties. The involvement of stakeholders such as public bodies and (social) insurances is crucial in this phase.

2. Method

This paper is based upon a reflection on past activities within the Austrian AAL pilot regions. Consequently, the main responsible person of the coordinating organizations and additional key project team members of all six Austrian AAL pilot regions were involved in the analysis process. Section 3 collates the results of all pilot regions, structured along appropriate project phases in order to meaningfully contrast relevant experiences. While not all pilot regions are at the same stage, results were discussed according to the progress made (as described in section 1.2). The overall discussion and the lessons learned described in chapter 4 look across all projects and their results and seeks to draw out common insights.

3. Results

The following provides a synopsis of approaches, experiences and lessons learned across the Austrian AAL pilot regions in relation to the different phases of establishing, implementing and sustaining a pilot region.

3.1. Planning phase

The experiences from the Austrian AAL pilot regions show that bringing together the right partners for the implementation of a pilot region is challenging, also if municipalities or regional authorities are involved. When setting up the project consortium, it is important to involve partners that are jointly able to cover all the necessary roles along the project lifecycle. This is crucial not only for the implementation of the pilot region, but also for scaling up activities. The involvement of key persons with long experience in the AAL domain can help to lead the planning activities but also to drive the implementation of the project.

One important finding of the first Austrian pilot regions is that the effort involved in recruiting participants for the pilot study is easily underestimated. Therefore it's

necessary to engage end-user organizations and allocate sufficient resources to this task. Thus, pilot regions, such as WAALTeR which launched recently, aim to create awareness amongst potential participants of the pilot study from the very beginning of the project.

The commitment of end-user and care organizations to actively contribute to the project has also shown to be important for aligning the technology according to the specific needs and real demands of the users. Thorough planning of which technologies are to be best suited to reflect these needs of the defined target groups is critical. In addition, a clearly defined concept for a multi-domain evaluation (taking into account individual, system-related and socio-economic factors) is necessary to ensure that the project outcomes will bring evidence on the impact of the technology intervention on individual and socio-economic level.

3.2. Requirements analysis

The experience from all Austrian AAL pilot regions has shown that the requirements analysis plays an important role in designing the AAL services and service packages to be evaluated. Various resources can be leveraged to adjust the technology according to the needs of the targeted user groups: the experience gained in previous R&D projects, the expert know-how of the involved end-user organizations as well as an active user involvement and co-design activities performed within the pilot region project. While within the first pilot region moduLAAR the requirements were defined primarily based on previous experience and expert know-how, later pilot regions increasingly applied participatory approaches.

In ZentrAAL for example, a comprehensive participatory approach has proved successful. User requirements were gathered by involving lead-users (older people living in sheltered housing schemes as well as employees of a social care organization) contributing with their intimate knowledge about the needs in daily life. Based on lead user input, personas (fictional characters to represent different user types) and scenarios (possible interactions of personas with the technical system) have been developed and subsequently revised with the lead-users. Similar approaches were followed in West-AAL and RegionAAL and will be followed in WAALTeR and Smart VitaALity.

In RegionAAL, experiences have shown that both, an involvement of professionals already working in the field for many years as well as the active contribution of end users through workshops is necessary to gain a comprehensive view on how the provided services have to be designed in order to meet the everyday needs of older users. In addition to the analysis of functional requirements, additional insights can be gained based on an early involvement of the defined user groups. One of the first activities performed in WAALTeR was a workshop to co-design the information material for the project with a view to understand why older people should be interested in engaging with the project. In West-AAL one major outcome of the requirements analysis was that the dimension of maintenance & support plays a major role in testing and piloting but also for sustaining and scaling-up the AAL intervention in the post-project phase.

3.3. Technology integration

There are several challenges related to the technology integration phase of AAL pilot regions. In general, integrating single components into an AAL service package and adopting these technologies according to the needs of older users is a time-consuming

task. The experiences from moduLAAR have shown that also the integration of technologies that did not exist at the time of planning the project can lead to additional efforts. For example, while tablet devices were outside the scope of the project as a frontend for the end-users, they became available on the market during the integration phase and therefore had to be considered.

Another source of unforeseen efforts within the technology integration phase, are needs that were not considered in the planning phase, but that emerged during the requirements gathering phase. Within RegionAAL, this led to the integration of a fall detector and alarming functions on the used smart watch device. In general, only a fully integrated system that is aligned to the user requirements has the chance to be accepted by the users within the evaluation study.

AAL pilot regions are usually bound to a maximum duration of three years, which raises additional challenges for development. West-AAL, for example, developed a priority-list of integration activities to ensure that key services were allocated sufficient resources in timely fashion. Due to the limited resources of partners and the limited interoperability of components, the consortium prioritised the integration of safety and security relevant components, also taking existing solutions (e.g. social alarm) into consideration. In addition a process-orientated integration approach was chosen, which not just takes technical processes into account but also non-technical business processes. Cost considerations are essential for the creation of sustainable business models.

Another strategy to address limited resources and stability needs is the integration of (market-)proven solutions, which has proven beneficial in ZentraAL. Commercially available solutions (e.g. iLogs MOCCA tablet application [18]) have been used as well as community-based open source components (e.g. home automation platform FHEM [19]).

3.4. Evaluation study

Experiences from the pilot regions moduLAAR, West-AAL and ZentraAL (pilots already finished or currently running in January 2017) have shown that challenges exist that relate to the recruitment of participants, the definition of an evaluation methodology, the deployment of the AAL services and service packages to the user's households and to the actual implementation of the study.

Even though a lot of resources have been allocated for performing the evaluation, the efforts required for recruiting participants have been underestimated in moduLAAR. An unexpected low number of people living in the facilities of the involved end-user organization agreed to participate in the study. Experiences from ZentraAL show that at least three months have to be planned for the recruitment of the trial participants.

An important factor for a successful implementation of the pilot study is the development of a suitable evaluation methodology. While early pilot regions followed a pre/post design, more recent pilot regions chose (quasi-)experimental designs (involving a control group) – which implies higher efforts for recruiting the study participants.

In moduLAAR, a mix of standardized quantitative and qualitative instruments were applied in a pre/post study design [20]. The standardized setup allowed to achieve comparable results within all study participants. The evaluation design was also approved by external experts and submitted to the responsible ethics committee as well as the Austrian data protection commission. Thus, sufficient resources have to be allocated for the development of the evaluation methodology.

Another task that proved to be resource-consuming, is the deployment of the AAL services to the users' households. For example within West-AAL, the roll-out of the AAL solution bundles took longer than planned. Related to this, a parallel evaluation with an identical start and end date for all households is highly challenging. Experiences from modulAAr and ZentrAAL have shown that also organizational issues have to be considered carefully: storage and insurance for the components, appointments for internet installation as well as for the installation and introduction of the AAL system. In parallel to the system roll-out, trainings have to be scheduled and the support system has to be set up. Continuous support of the study participants and the maintenance of the installations have shown to be time-consuming (and therefore should not be underestimated when planning the pilot study).

Overall systems that are to be tested have to fulfill the expectations that are raised. Dropouts are higher when systems are not clearly further developed when testing in iterative cycles. Long-term studies have to be done with a stable system. If users cannot rely on the provided services, and analysis of the impact of the technology intervention is impossible.

3.5. Public outreach activities

Within all Austrian pilot regions various dissemination channels are used to raise awareness for project activities and the topic of AAL in general. In addition to press releases, articles placed in newspapers, magazines and relevant journals also press conferences are held. An important outreach activity within all pilot regions is to establish one or multiple showcase flats that serve as stage to host press conferences, press visits and to demonstrate AAL solutions to a broader audience (e.g. 260 visitors in the ZentrAAL showcase flat in 2016). Public outreach activities have also shown to be beneficial for raising interest on the project among potential study participants.

Dedicated activities to foster the exchange of experiences among Austrian and international pilot regions (as for example a public event organized by ZentrAAL or the "Tour d'Autriche" of the RegionAAL project team) have shown to be beneficial. Currently an intensified exchange among the Austrian pilot regions as well as a joint (online) presentation of the pilot regions is planned under the umbrella of the Austrian innovation platform AAL Austria [21].

In addition to dissemination activities, also follow-up activities are planned within the pilot region projects. For example, within West-AAL an AAL competence center will be set up at the University of Innsbruck (Department of Strategic Management, Marketing and Tourism) to combine AAL-relevant research and piloting of innovative AAL solutions. Users and solution providers will receive access to research results and have the chance to test new solutions and prototypes.

4. Discussion

The experiences of the Austrian AAL pilot regions show that a careful planning of all project phases is crucial for a successful implementation of a pilot region. Major challenges are limited time, personnel and financial resources as well as the active involvement of representatives of all relevant user groups and other stakeholders in all phases of the project.

Therefore, before starting a pilot region project, it is necessary to ensure that the project consortium comprises all necessary resources and competences to cover all tasks along the project lifecycle. The involvement of end-user organizations is crucial, on the one hand to get access to their expert know-how on the target group, but even more importantly to ensure that representatives of all target groups can be actively involved in all phases of the project. Within the requirements phase, a participatory approach involving older users and other relevant target groups in the analysis of functional and non-functional requirements has proven successful. This also helps to prioritize services according to the actual needs of the users, and thus to focus on the important system features in the technology integration phase. The integration of solutions, of (market-)proven solutions is another strategy to address limited resources, but to ensure the necessary stability of the AAL services and service packages within the pilot study.

Further, also the actual implementation of the pilot study is accompanied by resource-intensive preparation tasks such as the recruitment of study participants, the development and ethical clearance of the evaluation methodology, the deployment of the system to the users' households as well as the ongoing support of the users and the maintenance of the installations. All these challenges can only be addressed by appropriate planning and the allocation of sufficient resources. A careful planning of the evaluation methodology is necessary to ensure that the project outcomes will bring evidence on the impact of the technology intervention on individual and socio-economic level.

Public outreach activities such as the establishment of showcase flats not only allow to raise awareness for the project and for the topic of AAL in general, but also address potential partners for follow-up activities.

In addition to the challenges discussed in this paper, also a seamless communication between all involved stakeholders is necessary for the successful implementation of AAL pilot regions. For ethical considerations it is necessary to keep in mind that expectations are raised when asking people to participate. A clear communication of potential failure is necessary.

Additional challenges arise from legal frameworks relevant to the implementation of pilot regions. A new regulation of the EU [22] will be in place for all EU member states in 2018. The collection of data and the processing has to be clearly defined and just collected for single purpose. The use of data for further research, if not stated in an informed consent, is prohibited. By this it is necessary to ask for permission to use the collected data for further studies. A strong binding to the participants even after the time of a project will be necessary to use resources efficiently.

This paper and a dedicated workshop within the eHealth Summit 2017 [23] should only be a starting point to establish a platform for the exchange of experiences between the Austrian and international AAL pilot regions, as well as for discussing similarities and communalities of pilot projects in the health sector.

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References

- [1] Siegel, C., & Dorner, T. E. (2017). Information technologies for active and assisted living– Influences to the quality of life of an ageing society. *International Journal of Medical Informatics*.
- [2] Website European Innovation Partnership on Active and Healthy Ageing (EIP on AHA) Reference Sites, https://ec.europa.eu/eip/ageing/reference-sites_en, last accessed on 20 March 2017
- [3] Website SmartSenior, <http://www.smart-senior.de>, last accessed on 20 March 2017
- [4] Website gAALaxy, <http://gaalaxy.eu>, last accessed on 20 March 2017
- [5] Website ACTIVAGE, <http://www.activageproject.eu>, last accessed on 20 March 2017
- [6] IntegrAAL – AAL in der Praxis. Ein Leitfaden zu Fragen der Implementierung und Effizienzsteigerung. Available online : http://www.wpu.at/integraal/index_htm_files/IntegrAAL-%20Abschlussbericht%202014-12-30.pdf
- [7] Selhofer, H., Wieden-Bischof, D., & Hornung-Prähauser, V. (2016). Geschäftsmodelle für AAL-Lösungen entwickeln: durch systematische Einbeziehung der Anspruchsgruppen (Vol. 2). BoD–Books on Demand.
- [8] TAALXONOMY – Entwicklung einer praktikablen Taxonomie zur effektiven Klassifizierung von AAL-Produkten und –Dienstleistungen (Guidebook), Available online: <http://www.taalxonomy.eu/wp-content/uploads/Downloads/benefit%20846232-TAALXONOMY-D4.3-Guidebook.pdf>
- [9] Website moduLAAR, <http://www.modulaar.at>, last accessed on 20 March 2017
- [10] Website West-AAL, <http://www.west-aal.at>, last accessed on 20 March 2017
- [11] Website ZentrAAL – Salzburger Testregion für AAL-Technologien, <http://www.zentraal.at>, last accessed on 20 March 2017
- [12] Website RegionAAL, <http://www.regionaal.at>, last accessed on 20 March 2017
- [13] Website WAALTeR – Wiener AAL-TestRegion, <http://waalter.wien>, last accessed on 20 March 2017
- [14] Website Smart VitaALity, <http://www.smart-vitality.at>, last accessed on 20 March 2017
- [15] Schneider, C. & Trukeschitz, B. (2015). "Let users have their say" - Experiences on user involvement from the AAL Pilot Region Salzburg. 6th International Carers Conference, Göteborg, Schweden, 04.09-06.09.
- [16] Trukeschitz, Birgit, Cornelia Schneider, Daniela Krainer, Johannes Oberzaucher, Susanne Ring-Dimitriou, Siegfried Eisenberg, and Ulrike Schneider. 2015. " Geplantes Evaluierungsdesign von „meinZentrAAL“, ZentrAAL-Forschungsbericht, Wien (unpublished).
- [17] ISO. 9241-210: 2010. Ergonomics of human system interaction-Part 210: Human-centred design for interactive systems. International Standardization Organization (ISO). Switzerland (2010).
- [18] Website iLogs MOCCA eHealth platform, <http://www.ilogs.com/en/12mocca>, last accessed on 20 March 2017
- [19] Website FHEM home automation platform, <http://fhem.de>, last accessed on 20 March 2017
- [20] Siegel, C., Prazak-Aram, B., Kropf, J., Kundi, M., & Dorner, T. (2014). Evaluation of a modular scalable system for silver-ager located in assisted living homes in Austria–study protocol of the ModuLAAR ambient assisted living project. *BMC public health*, 14(1), 736.
- [21] Website AAL Austria, <http://www.aal.at>, last accessed on 20 March 2017
- [22] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Available online: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.119.01.0001.01.ENG&toc=OJ:L:2016:119:TOC
- [23] Website eHealth Summit 2017, <http://www.ehealthsummit.at>. last accessed on 20 March 2017