RegionAAL

The Styrian AAL-test-region in Graz, Deutschlandsberg and Leibnitz

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Abstract — **As a result of demographic change and increasing life expectancy, challenges in providing care for elderly people is expected. Furthermore, older people seek to remain in their own living environment as long as possible in order to retain a certain quality of life. Due to chronic conditions, multi-morbidity and social isolation our care system has to face challenges in order to accomplish the above mentioned. Active and assisted living (AAL) technologies try to meet these challenges but only a few technologies have been effective so far. This study measures the usability and acceptability of existing AAL-technologies which are bundled in a package for older people in home care or assisted living. Possible impacts of using AAL-technologies on the quality of life and the independence in older age are monitored between 07/2017 and 09/2018 in a two-armed randomized controlled trial (N=240).**

Keywords — active and assisted living, elderly people, independence, usability, acceptability

I. INTRODUCTION

Many older people wish to remain in their own environment enjoying the highest possible quality of life for as long as possible. This is also an aim which is echoed in many official bodies and organizations, such as the WHO, OECD and EU. However, the ageing process is typically associated with an increase in, and worsening of, chronic conditions, both physical and mental, including diabetes, high blood pressure and depression. This multi-morbidity among older people is often accompanied by social isolation and associated with real or perceived need for help and assistance. Thus, in order to be able to remain living at home, the need for external support – in terms of personal care or social needs – has been rising.

Active and assisted living (AAL) as well as innovative ICT technologies supporting older people have been developed and tested on a small-scale within research projects. However, as evaluated by the European AAL program (about 13 examples mentioned [11]), so far only a few technologies have been successful. Areas covered by these solutions range from wearable protections systems and expanded rollators to communication facilities and mechanisms to access care information. So why have relatively few of these AAL technologies been successful so far? Could one reason be that they were not researched and developed with the specific needs and requirements of this particular population group in mind?

RegionAAL is an AAL-test region project focused on the urban centres of Graz, Deutschlandsberg and Leibnitz. Its aim is to support older people in being able to reside for longer in their own surroundings. In order to achieve this goal information and communication technologies (ICT) which are be accepted by elderly people shall be used.

Besides research on the acceptance and use of these technologies, information regarding possibilities of these new systems and services shall be widespread in media and the region's population in order to foster the uptake of AAL technologies in the future.

The benefit program aims to make AAL technologies available, to get some kind of evidence on the efficacy and usability of the technologies and to bring information about these developments into our society on different levels. Similar to other AAL-test regions in Austria – there are already six – some elements comprise this project to underpin these major aims of the benefit program. These elements are:

- identifying the technologies and services to be used

- implementing and integrating a prototype of the package to be used in the test households

- preparing a study design which allows evaluation of the chosen technical approach

- implementing the prototype package in each test household

- running the system and services in a larger number of test households over the defined test period

- evaluation of the acceptance of the solutions and the efficacy of the introduced interventions

- disseminating results and information about the test region

II. RELATED WORK

The benefit programme (Austria's pendant to the European AAL programme) has included AAL test regions within its calls since 2012 whereas three regions (i.e. Modulaar, West-AAL and ZentrAAL) within this framework, even started before the RegionAAL project.

The aim of Modulaar (2012-2014, [12]) was to equip about 50 households in assisted living facilities in Burgenland with AAL technologies (in the areas safety, comfort, health and social interactions) adapted to the special needs of the households. The evaluation focused on acceptance of the new technologies, influence on quality of life and socio-economic aspects.

West-AAL (2014-2016, [13]) aimed at equipping approx. 70 households in urban and rural areas in Tyrol and Vorarlberg with AAL technologies to prolong independent life of participants in their own homes. About 80 different components / products were offered to involved care organizations and participants could choose individual settings with 4-5 components. The testing was foreseen for a period of about 18 months. Technologies concerned the management of risk factors (falls, emergency cases), chronical diseases (like dementia), mobility assistance, smart home components and attached services (e.g. transport or shopping). Used components were developed in prior projects or have been already available on the market.

ZentrAAL (2015-2017, [14]) aimed at offering an expandable software system to assist independent living. The focus group were younger seniors (aged 60 to 75 years) who were still fit but with some need for assistance, for example because of diabetes type 2 or due to mild cognitive impairment. Around 60 test households in the central area of Salzburg could be equipped. Simultaneously, a same sized control group was recruited for a period of approx. 15 months. The evaluation also included market barriers and market attractiveness of the software systems with the goal of successfully entering the market with the offered solutions.

In several workshops with those three regions, lessons learned were identified and taken into account in the various work packages of RegionAAL. Findings concerned very different aspects:

- Technologies (availability of internet; even widespread commercial products such as tablets, offer lots of technical and not reproducible problems, e.g. WLAN in half of devices was deactivated after reboot)

- Recruiting (difficulties in recruiting members of the control group and how to reach them best)

- Test phase (little use of hotlines in the test phase due to inhibitions of participants; still few social interactions but not due to technical difficulties, but rather due to non-existing contacts in many cases; Other stakeholders like general practitioners did not make use of possibilities as these kinds of services are not billable; performing surveys very often requires assistance through caregivers)

Besides the common aspects among the various AAL test regions in Austria, there are differences between all those projects according to their definition, their evaluation approaches etc.

III. METHOD

A. Study design

Instead of having a fully defined set of technologies as part of the project proposal, the first phase of the RegionAAL project was dedicated to an intense analysis on the evidence of AAL technologies (see [1] for requirements on analysis methods) and to the definition of a potential user population for the study phase of the project. Thus, the project intended to use only those interventions which were already seen as useful by elderly people and caregivers.

Based on the findings of the analysis, a potential test household was planned. Furthermore, a scientific enquiry was initiated in order to find already available technologies (e.g. in [2][3][4][5] but also in online electronic shops) which can be integrated and are able to fulfil the identified needs. Important aspects of the technology research were: technologies have to be on a product state rather than prototypes from projects; technologies shall be implementable in new buildings as well as in existing homes; the usage and maintenance shall be easy; and an ongoing functionality is guaranteed after the project end. Parallel to the technology research, workshops with caregivers and potential users were held. The aims of the workshops were to figure out which technologies may be interesting for potential users, what the usefulness would be and what are potential drawbacks when introducing the technologies. All these points were discussed with caregivers and potential users to receive aspects from different points of view.

After finalizing the actual set of interventions and technologies, two activities were started: defining / preparing the evaluation processes and implementing / adapting products and software for the use in test households. The implementation and adaptions happened in close cooperation with the care organizations represented in the RegionAAL project group. Developments and adaptions were discussed with caregivers in regular meetings to get continuous feedback about details for the technical work.

The test of technologies in households took place in two phases. The first phase was performed with eight friendly users. They tested the mobile technologies (tablet and smart watch) for two weeks. On the one hand, this created information on the instruction process and on the other hand, feedback on the use of the technologies could be collected. After the friendly user tests had taken place, the large field trial has started as the second phase. The households were recruited by the care organizations and randomized to achieve an intervention and a control group with similar size.

In addition, a baseline, a 6-months intermediate and a 12-months follow up questioning are also part of the study. The participants are interviewed on their health status, quality of life, autonomy and their experience according to electronic devices. The participants of the intervention group are asked to rate the usability of the AAL-technologies on a scale from 1 to 5 in the 6-months intermediate and 12-months follow up and are also questioned on their satisfaction and usability of the devices used in the study. The caregivers are interviewed on the care situation as well as on their satisfaction and usability

with the technologies used. [7] The control group as well as their informal caregivers also take part in the baseline and the follow up questioning, however, they are not tested on any AAL-technologies during the one-year intervention. The results from the control group are then used to point out the differences of the use of AAL-technologies on their health status, quality of life and autonomy and therefore state the relevance of such technologies for older people.

B. Subjects

The evaluation was defined as a randomized controlled trial (RCT) with the aim to include 240 participants for a period of one year. An appropriate protocol with accompanying documents (questionnaires, participants' information, informed consent etc.) were prepared and proposed to the ethics committee.

The following inclusion and exclusion criteria have to be met: The participants are over 60 years old, have a care level between 0 and 4 (max. of 160 hours of care needed per month) and do not have any kind of cognitive impairment or procuration. [6] [7] They are living at home, in an assisted living facility or visiting a day care centre in the area of Graz, Leibnitz or Deutschlandsberg and do not use any kind of senior-adjusted tablets or smart watches. Written informed consent is obtained from all participants. Furthermore, the informal caregivers or mobile care services are willing to participate in the study as well.

C. Recruiting

The participants were recruited by the three care organizations of the RegionAAL project group from March 2017 until September 2017. Already existing clients of their assisted living facilities, day care centres and mobile services were asked to participate. Furthermore, announcements in local newspapers were made. Through senior clubs and presentations on exhibitions further participants were recruited. The older people stated their interest via telephone, were screened according to the inclusion and exclusion criteria and got first information about the one-year-intervention. Afterwards, the more detailed information materials and the informed consent were sent to them. If required personal information was given by project staff. [7]

In the meantime, training programs on the applications and devices used took place for projects' staff.

D. Implementation

After signing the informed consent, appointments with participants from the intervention group were made in order to install the technical devices and to get the intervention started. The installation was realized by the technical partner in the project. At the same time, instructions on the applications and on the different devices were conducted by the project staff.

IV. PRELIMINARY RESULTS

The aim of the study should be achieved through the implementation of those ICT elements (fig. 1) that are likely to be accepted and used by end users. Evidence of ICT that is potentially useful for and acceptable to this group was identified. Existing technologies were adapted, extended and integrated - with parallels to Smart City. The one year scientific evaluation includes 219 test households (intervention group = 110; control group = 109) and assesses the effectiveness of ICT in meeting stated aims. [7]

Preliminary results from the literature review indicate that safety, support in Instrumental Activities of Daily Living (IADL) and Activities of Daily Living (ADL) and social interaction are important factors regarding the quality of life. The results of the workshops with caregivers show similarities: Technologies should assist in safety, fall prevention, ADLs, prevention and training. [8]
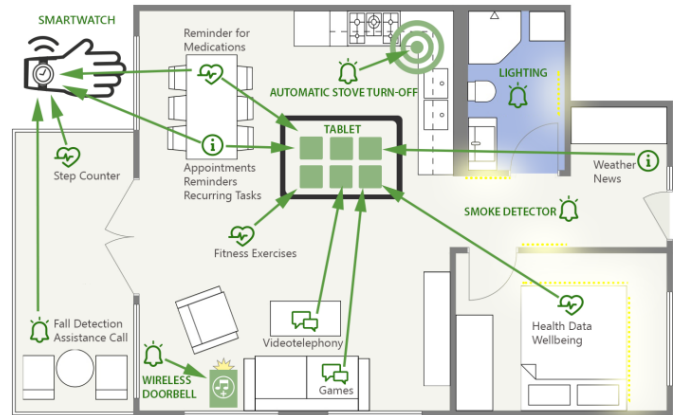

Fig. 1. Interventions and devices in use

A. Interventions

Thus, a set of core functionalities was fixed preparing a prototype of a technical setting which is used in the test households of the intervention group. Due to these intermediate findings, the AAL-technologies which are going to be tested in the one-year-study, are divided into the following four fields of application: health and wellbeing-related technologies, safety, information and communication, and entertainment. The main functions available contain: [9] [10]

- Health and wellbeing
  - vital data at a glance
  - various reminder (e.g. medication)
  - training videos and fitness trackers to stay fit
- safety
  - electric stove shutdown
  - wireless doorbell
  - fall detection
  - emergency call
  - individual light assistance
- Information
  - calendar and daily agenda

- events and meetings
- communication and entertainment
  - video phone calls
  - photos from relatives
  - games and entertainment

The main functions (fig. 1) are implemented on a number of technologies which are already available on the market, such as a Samsung Tab A 2016 tablet, a Finow X3 Smartwatch, asina platform for mobile devices, diverse apps from the PlayStore (games, video player/conferencing, for configuring the tablet etc.), an electric stove shutdown from Hager or Bedlight as part of the light assistance.

The intervention group, which is testing the technologies mentioned above, is accompanied by monthly meetings in small groups discussing and answering questions according the handling of the applications and technologies. Furthermore, a hotline was installed that is available from 8 a.m. to 3 p.m. on weekdays. Besides that, a 24/7 hotline exists for urgent matters according the stove shutdown and lightning.

V. DISCUSSION

Lessons learned that were made so far concern the recruiting process, technical installation and instruction but also practical matters like purchasing and rollout of a larger number of equipment. Especially the recruitment claimed all forces within the project team and extended the project time by several months. Local connection and various media announcements in approved newspapers were needed. However, the sample size of 240 participants was nearly met. Furthermore, the participants have very diverse knowledge on technological devices. Therefore, the planned instruction process and instruction material did not fit everyone. Individual adaptations had to be made.

The main success factors until now are

- that the used technologies can be installed in every existing household,
- that there are regular meetings to answer questions and

- a telephone hotline,
- as well as individual support for participants.

The final results will be available in January 2019 after the one year trial took place and all data are analysed.

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