

USABILITY CRITERIA FOR AAL SOLUTIONS AND SMART HOMES FOR ELDERLY PEOPLE

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ABSTRACT: In the wake of the EU research project DALIA an advanced Ambient Assisted Living Solution has been developed and broadly tested. The field test has focused on older adults and their informal and formal caregivers to provide a safe stay-at-home environment. The goal was to support them in every day challenges such as medication intake, social isolation or emergency cases. The analysis of the user interviews has shown a significant need to simplify the usage of the product DALIA and make the operation more intuitive. In order to ensure a high level of usability and a low entry barrier for people without IT-knowledge, the idea Emma – the flexible life assistance with its two interactive tools *EmmaHome* and *EmmaHelp* was developed.

The base station with integrated multilingual speech assistant forms the heart of *EmmaHome*. It provides functions such as voice-based messaging, emergency call, medication and drink reminder, stove monitor and other functions designed in a modular way, according to the needs of the users. Intelligent smart home products, sensors and support modules for more safety and comfort at home can be integrated.

EmmaHelp is a community platform with an integrated webshop, chatbot and recommendation system. It enables the broad integration of regional and supra-regional actors and serves as information hub. At the beginning, an individual profile is drawn up by ascertaining the current situation of the care condition. Emma develops a tailor-made amount of care services from a comprehensive range of service providers and products. The service is coordinated – from booking to cost monitoring - directly on the Emma-platform.

We are constantly striving to further develop Emma functionalities. The EU project "DAPAS" combines several AAL solutions into one product. The solution is being tested in a randomised study in Austria, Portugal and Luxembourg at the beginning of December 2019.

1 INTRODUCTION

The European population is under an intense process of ageing. It is estimated that in 2060 more than a quarter of the European population will be older than 65 years [1]. Therefore, Active & Assisted Living (AAL) aims to improve older adults' lives through the use of information and communication technology (ICT). Active & Assisted Living enables to prevent and manage chronic conditions and to increase independence and participation in society. ICT solutions support older adults to live independently at their own homes, facilitating the self-

management of daily tasks and increasing their quality of life. This requires also simple, age-appropriate ICT solutions to offer the best possible support concept.

With the population getting more aged, several challenges regarding health, wellbeing and care of these people have to be taken into consideration. The good news is that we live for more years. The challenge is to live more years, healthy and feeling that we are part of our community. Due to the rapid development of technology, older people are often unable to keep pace with the new ICT of the younger generations. This requires interfaces for older people who can participate in the community by the use of these channels.

The term Activities of Daily Living (ADLs) is used for the activities that are performed for self-care. Older people who are living alone have to handle all their personal activities and instrumental activities. As a person ages, Activities of Daily Living slowly become more difficult to accomplish independently and gradually take more time to complete. The aim is to support older adults in their daily living situations and to maintain as well as improve good health.

2 METHODS & CONCEPT

Our answer to these problems that ageing causes is our product Emma, which is designed to support older adults in everyday living situations in many different ways. Emma offers assistance in various areas of the lives of older adults in order to maintain their independence within their own four walls. Emma - the flexible life assistant consists of the base station *EmmaHome* and the community platform *EmmaHelp*.

The base station *EmmaHome* with integrated multilingual speech assistant forms the heart of *EmmaHome* and was developed over the last seven years on the basis of numerous national and international funding projects. As a result of the previous projects, different ways of using the system have proven to be very difficult for older people. This has led to the development of a speech control system, because speech is one of the most natural forms of communication. For example, the functions of emergency call, drink reminder, medication reminder, appointment reminder and also the sending and receiving of messages can be completely controlled and activated by the user through speech via *EmmaHome*. The system enables the user to set up and delete e.g. reminders and appointments directly via speech. The connected smart home components offer additional value and useful applications in the areas of safety, comfort, but also ambient and assisted living (AAL). For instance, users have the option of connecting a smart scale, a smart blood pressure monitor, a smart blood glucose meter and a number of other smart health products to *EmmaHome* to facilitate self-health monitoring in everyday life. Other smart home components enable the emergency services to provide faster assistance in the event of an emergency case by using an automatic door lock or detecting fires with intelligent smoke detectors. *EmmaHome* is a flexible system with a lot of functions, in which modules and features can be combined flexible to create a system that users really need and is customized to their individual requirements.

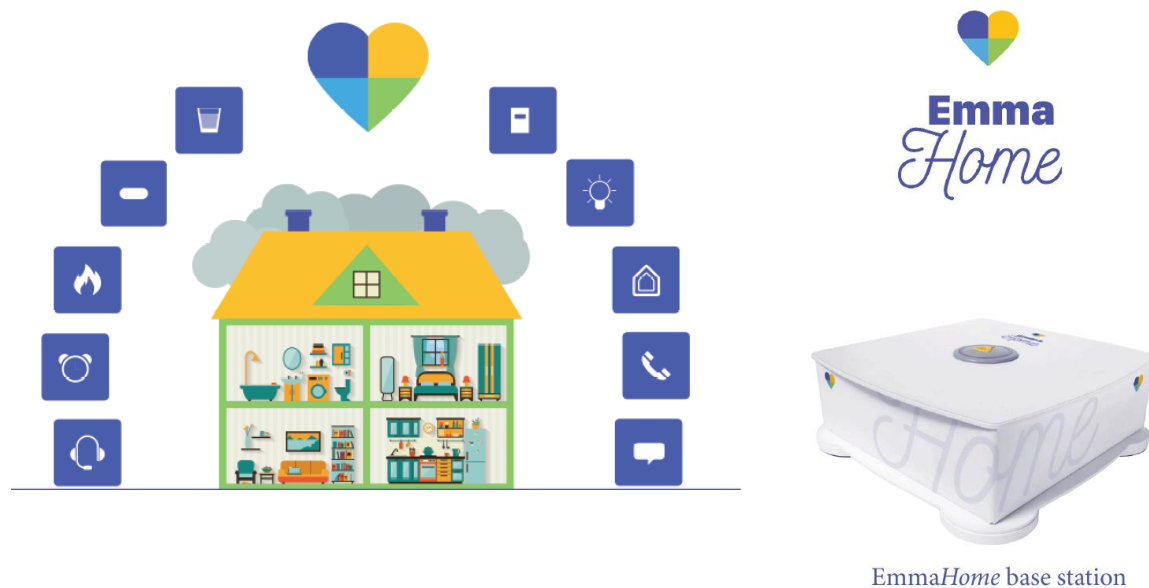


Figure 1: EmmaHome base station and features

The *EmmaHelp* platform relieves family members and carers in particular by providing information of care and support, products on the subject of care and services that are relevant to everyday life. After registration, an individually adapted support profile is generated via an integrated chatbot. The profile contains tailor-made information on care-relevant topics, but also services and service providers from the region concerned that could be useful. For example, gardening services, pedicure services or even hairdressers are offered in the vicinity if the relevant information has been provided. Products such as the *EmmaHome* module and products from external providers can also be purchased. Relatives of persons in need of care are able to exchange information and communicate on topics regarding care over the platform. The *Emma* app enables efficient organisation and coordination of many support activities also via smartphone.

While *EmmaHome* supports people in need of care, *EmmaHelp* supports informal carers and is specifically adapted to their needs.

3 FIELD TESTS & EVALUATION

We are constantly striving to further develop *Emma* functionalities. Within the framework of the EU project “DAPAS – Deploying AAL Packages At Scale”, already existing innovative ICT solutions from existing AAL products, which are based on the needs of older people and their carers, will be brought together and further developed.

The holistic solution is being tested with a longitudinal, randomized, controlled, multicenter trial, including an additional product evaluation (after every prototype amendment) and a qualitative evaluation at the end of the trial. The trial will be conducted in three different countries, Austria, Luxembourg and Portugal and constitutes the major part of the project. The trial will start at the beginning of December 2019.

Within the study, which is divided into three stages, the older adults are asked about the usability, the improvement of their life situation, the applicability of the functions and the change of their quality of life. The DAPAS solution consists of two user interfaces, a tablet and the voice-controlled base station, EmmaHome is therefore an essential part of the DAPAS solution which forms the base station.

Through this study we will gain further and more precise information about the usability criteria to develop our system even closer to the needs of older adults.

4 FUTURE

Every day, large, heterogeneous and unstructured amounts of data (big data) are created. Today, data is the central resource for economic success. Increasing digitalisation is generating more and more data in all areas of the economy. Modern analytical methods make these large amounts of data accessible and usable.

The aim is to draw action-relevant, i.e. economically and scientifically usable, knowledge from the multitude of heterogeneous data streams (user data, transaction data, linguistic texts and sensor data etc.). Very large amounts of data are obtained from relevant sources, interpreted and used.

In particular, we will continue to focus in the future on knowledge and expertise about Natural Language Processing (NLP), Artificial Intelligence (AI) and Machine Learning (ML), search engines and technologies, data-driven business models, Knowledge Management, learning and further education as well as legal framework conditions in the field of data protection (Data Protection Basic Regulation, DSGVO).

The core areas of (Big) Data Management and Dig Data Analysis will continue to be an important part of Emma. In the future, Emma will not only help and react in emergency situations, Emma will also provide predictions and react before an accident happens. This modern data analysis allows the system to detect a situation before it becomes critical to be able to react prematurely and have help on site

5 REFERENCES

[1] „ Population projections 2008-2060, From 2015, deaths projected to outnumber births in the EU27 Almost three times as many people aged 80 or more in 2060 “ STAT/08/119 26 August 2008

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