



Informatics

Exploring the meaningful Use of Ambient Assisted Living Technologies

Evaluation of user-centred Approaches for and with Elderly

DIPLOMARBEIT

zur Erlangung des akademischen Grades

Diplom-Ingenieurin

im Rahmen des Studiums

Media and Human-Centered Computing

eingereicht von

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Wien, 29. November 2024

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DIPLOMA THESIS

submitted in partial fulfillment of the requirements for the degree of

Diplom-Ingenieurin

in

Media and Human-Centered Computing

by

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to the Faculty of Informatics

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Naomi Karner, BSc

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Danksagung

Mein allererster Dank gilt meiner Betreuerin und meinem Betreuer, vor allem Janis Lena Meißner, dafür, dass sie mich in meiner Forschung und meinem Thema unterstützt und bekräftigt hat. Es war eine sehr interessante, lehrreiche und gewinnbringende Erfahrung, einen Forschungsansatz selbst wählen und umsetzen zu dürfen.

Hinter kreativen Arbeiten und Forschungsansätzen stehen immer viele Überlegungen, die Einbeziehung verschiedenster Personen und man ist oft auf die Mitwirkung und Unterstützung von verschiedenen Menschen und Gruppen angewiesen. Aus diesem Grund möchte ich bei der Danksagung mit jenen Personen fortfahren, die sich die Zeit genommen haben, ihre Erfahrung und Meinung in den Interviews zu teilen und rund um den Workshop mitzuwirken. Herzlichen Dank an die interviewten Expertinnen und den interviewten Experten, dass sie ihre Zeit aufgewendet haben, um mit mir zu sprechen und meine Fragen zu beantworten. Ich habe wertvolle Einblicke erhalten und konnte sehr viele wichtige Aspekte für meine Masterarbeit mitnehmen. In Bezug auf die Vorbereitung und Durchführung meines Workshops geht mein Dank an die Teilnehmerinnen und Teilnehmer, die sich auf den interaktiven und kreativen Ansatz der Veranstaltung eingelassen, ihre Meinungen offen geteilt und so engagiert mitgewirkt haben. Der Workshop hat mir interessante Aspekte gezeigt und mich viele Punkte in meiner Forschungsarbeit aus den zuvor umgesetzten Methoden zusammenführen lassen. Besonders danken möchte ich auch der Kulturreferentin der Seniorenresidenz in Wien, wo der Workshop stattgefunden hat. Ohne ihr Engagement bei der Aquirierung von Teilnehmerinnen und Teilnehmern und bei der Vorbereitung, wäre der Workshop nicht zustande gekommen.

Zuletzt danke ich meiner Familie - allen voran meinem Verlobten Stefan, der mich stets auch in privat schwierigen Zeiten motiviert hat, meinen Blick frei von Sorgen auf die Zukunft zu richten, um das Beste aus mir herauszuholen und daran zu glauben, dass ich all mein Potential ausschöpfen kann und darf. Meiner Mama, dafür, dass sie mich zu dem Menschen gemacht hat, der ich heute bin. Meinem Papa, dafür, dass er mich motiviert und meinen Ehrgeiz weckt, wenn ich es brauche. Meinen Großeltern und engsten Freunden danke ich dafür, dass sie mir immer gut zugeredet, sich mit mir inhaltlich ausgetauscht, mir ihre Zeit geschenkt und den Raum gegeben haben, den ich gebraucht habe - und mir stets das Gefühl gegeben haben, dass sie alle voll hinter mir stehen.



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Acknowledgements

My biggest thanks go to my advisors, especially Janis Lena Meißner, for supporting and encouraging me in my research and topic. It has been a very interesting, educational, and rewarding experience to be able to choose and implement my own research approach.

Creative projects and research approaches always involve extensive reflection, the inclusion of various people, and often rely on the cooperation and support of different individuals and groups. For this reason, I would like to continue my acknowledgments with those who took the time to share their experiences and opinions in the interviews and participate in the workshop. Many thanks to the interviewed experts for dedicating their time to speak with me and answer my questions. I gained valuable insights and was able to take many important aspects away for my thesis. In terms of the preparation and execution of my workshop, my gratitude goes to the participants who embraced the interactive and creative approach, openly shared their opinions, and contributed with such engagement. The workshop provided me with fascinating perspectives and allowed me to connect many points in my research from the methods applied previously. Special thanks also go to the cultural advisor at the senior residence in Vienna, where the workshop took place. Without her commitment in recruiting participants and assisting with the preparations, the workshop would not have been possible.

Lastly, I thank my family – especially my fiancé, Stefan, who has always motivated me in difficult personal times to look ahead with a clear mind, bring out the best in myself, and believe in my potential. My mother, for making me the person I am today. My father, for motivating me and igniting my ambition when I need it. To my grandparents and closest friends to whom I am grateful for their constant encouragement, their willingness to discuss ideas with me, and for giving me their time and the space I needed, while always showing that they fully support me.



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Kurzfassung

Aufgrund des demografischen Wandels wird die Bevölkerung immer älter - steigende Zahlen von zu pflegenden Personen stehen einer Personalknappheit in der Pflege gegenüber. Ambient Assisted Living (AAL) ist ein 2004 entstandener Schirmbegriff, der Technologien, Plattformen und Produkte umfasst, die dabei helfen sollen, im Alter ein selbstbestimmtes Leben zu führen und zudem Erleichterung und Unterstützung für das Pflegepersonal bedeuten können. Der AAL-Markt steigt weltweit stetig, was zu einer für die Zielgruppe unübersichtlichen Anzahl an Produkten führt, während zudem individuelle Bedürfnisse in den Hintergrund rücken können. In dieser Diplomarbeit wurde der sinnvolle nutzerzentrierte Zugang zur Auswahl, Installation und Nutzung von AAL-Produkten im Hinblick auf die Zielgruppe ab 65 Jahren erforscht. In weiteren Forschungsfragen wurde die Kategorisierung von AAL Technologien, die Konzipierung eines interaktiven Workshops und die Beziehung Mensch-Technologie erforscht. Die Methodik umfasste Literaturforschung, die Durchführung von Experteninterviews, sowie die Entwicklung und Durchführung eines Workshops mit der Zielgruppe. Eine aus Nutzerinnen- und Nutzer-Sicht als positiv aufgefasste Beziehung zu AAL-Technologien zu etablieren und erreichen, ist komplex und stark von individuellen Bedürfnissen abhängig. Die positive Assoziation könnte über das Pflegepersonal aufgebaut werden, auch ein Generationenwechsel könnte langfristig dafür sorgen, dass sich die allgemeine Beziehung zu Technologie verändert. Die Ergebnisse zeigten weiter, dass innovative Ansätze wie beispielsweise die Promotion von AAL Produkten durch Mitglieder der Zielgruppe zur Förderung der Nutzung und Etablierung einer positiven Einstellung gegenüber AAL-Technologien beitragen könnten. Pflegekräfte spielen zudem eine zentrale Rolle bei der Auswahl und Einführung von Produkten, weshalb neue Technologien in deren Ausbildung integriert werden sollten. Die Interviews und der Workshop mit der Zielgruppe ergaben, dass die Überdenkung des Begriffs 'AAL' in Betracht gezogen werden sollte. Produkte sollten zudem klare Zwecke erfüllen und die Bedürfnisse der Zielgruppe in Bezug auf Praktikabilität, Zuverlässigkeit und Kosten berücksichtigen. Es wurde ein Konzept entwickelt, wie AAL-Produkte nach ihrem Zweckbereich kategorisiert werden können, diese lauten: 'Gesundheit', 'Sicherheit', 'Pflege', 'Freizeit', 'soziale Dienste', 'Dienstleistungen' sowie 'Wohnen & Umwelt'. Ein interaktives Workshop-Konzept wurde entwickelt und mit der Zielgruppe getestet, um aus deren Sicht Erkenntnisse über den sinnvollen Einsatz von AAL zu sammeln. Künftige Forschung sollte die evaluierten Fragen in Bezug auf spezifische Pflegekonzepte und Länder und die vorgeschlagenen AAL-Kategorien vertiefen.



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Abstract

Due to the demographic change, the population is aging. More people in need of care face a shortage of caregiving personnel. Ambient Assisted Living (AAL), a umbrella term introduced in 2004, encompasses technologies, platforms, and products designed to help people lead self-determined lives as they age, while also providing relief and support for caregiving staff. The AAL market is growing steadily worldwide, resulting in an overwhelming number of products for the target group, which can cause individual needs to be overlooked.

This thesis explored the meaningful selection, installation, and use of AAL products for the target group aged 65 and older. Additional research questions focused on the categorization of AAL technologies, the design of an interactive workshop as well as the improvement of the human-technology relationship. Methods included literature research, interviews with three experts, and the development and conduct of a workshop with the target group.

Establishing a positive relationship with AAL technologies is complex and heavily dependent on individual needs. Positive associations can be fostered through caregivers, and a generational shift may, in the long term, naturally improve attitudes toward technology. The results further indicated that innovative approaches, according to experts, could help with the promotion of AAL technologies. Caregivers play a central role in selecting and implementing products, making it essential to integrate new technologies into their training. Interviews and the workshop with the target group suggested reconsidering the term 'AAL'. Products should also have clear purposes and meet the target group's needs for practicality, reliability, and cost. A categorization concept was developed, organizing AAL products by purpose areas: 'health', 'safety', 'care', 'leisure', 'social services', 'services', and 'home & environment'. An interactive workshop concept was developed and tested with the target group to gain insights into the meaningful use of AAL from their perspective. Future research should deepen the evaluated questions regarding specific care models, countries, and the proposed AAL categories.



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Introduction

1.1 Problem Statement

Most people want to stay at home for as long as possible for when they get older [52]. Fewer people want to move to a stationary nursing home or retirement home for elderly people [46]. According to the organization 'Hilfswerk Österreich', in 2016 only 16 percent of all care-needing people in Austria were taken care of in a nursing home, while the other 84 percent were cared for in their own homes [55]. According to this article, forecasts of Austria's nursing-strategies for the upcoming years also include nursing at home as a primary solution. Reasons are the reduced costs compared to stationary nursing systems, as well as people's wish to stay at home as long as possible. This also correlates with the Austrian Social Ministry's nursing forecast from 2019 for the year 2030, which includes putting care at home in the foreground as one primary goal [15].

Additionally, a shortage of qualified nursing staff meets an increasing number of people in need of care [32]. Digital solutions are evaluated and developed further to support staff members and the independence of people in potential need of care [29]. In response to these shifting priorities, the market for products relating to the so-called field of Ambient Assisted Living has grown massively and will expand in the upcoming years ([21], [4]). *Ambient Assisted Living* (referred to as 'AAL') encompasses technologies and products, which should help elderly people to live as independent as possible for as long as possible [30]. This includes for example fall detection systems and vital parameter monitoring. The grown market around AAL technologies results in a number of possibilities and products. This can be overwhelming for elderly and other stakeholders involved. Furthermore, AAL products have to meet the often very individual requirements of elderly people and their homes [30]. The number of products available on the market often fall short in sufficiently introducing technologies to the users and explaining the usage, responsibilities and possible effects to them. Users are dependent on someone installing, explaining and supporting those products. With regard to that, sometimes it is

not considered important enough how they feel with that - if they are happy, comfortable, if they have fun and how their general relationship with these technologies looks like.

The Austrian 'Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz' (BMSGPK) also defines the reasonable usage of digital products and technologies including assistive systems, artificial intelligence and robotic in nursing settings as a primary challenge in the upcoming years [15].

Byrne et al. [10] highlight the importance of establishing a way for end users to evaluate AAL technologies so they can choose those that fulfill their individual needs in order to optimize their engagement with the technologies. According to Byrne et al., only the technical aspects of AAL have been taken into consideration for an AAL evaluation criteria.

Given the importance of AAL technologies regarding their future involvement in caring for older people, there is a need to examine the field from a user centred perspective, but this should go further than only the evaluation of functionalities and technical aspects themselves. A way to provide AAL products to elderly so they can select them reasonably, use them independently and feel comfortable with the usage and exploration of AAL products should be evaluated. Overall a meaningful usage of AAL services includes not only the fulfilling of technical functionalities (for example detecting when a person falls to the ground). There should also be a way for elderly and their relatives or caregivers to easily select a product which provides the needed functionality (to make sure the product is the right one), meets the individual requirements of a person and their home (to make sure it will work properly), provides sufficient support at eye level and makes the person feel comfortable having the technology at home (to help the user build a positive relationship with the technology).

Petrie [33] explains, that research on digital technologies for elderly does exist in various areas, for example regarding the development or support of technologies. But she emphasizes, that it is necessary to really understand the user group, evaluate users' needs and perform research in the HCI (Human Computer Interaction) field specifically for elderly, also under careful consideration of participant groups in user studies. Here, she highlights the importance to choose the participants thoughtfully regarding the number of participants and their ages. Petrie also mentions her worry about the lack of HCI research about technology for older people and the problematic consideration of elderly as a standardized group.

Sun et al. evaluated AAL Home Care Systems within their research around opportunities and challenges of AAL [46]. They mention, that the interaction and communication between the elderly who receive assistance and other stakeholders from their communities are important to support the discovery of services and keep elderly from becoming isolated.

1.2 Motivation

A personal motivation for the research field of Ambient Assisted Living comes from my experience in selecting and evaluating AAL products for certain use cases and user groups in nursing homes and private settings. Meeting all the individual expectations and requirements with a huge selection of products to choose from is a challenge. At first it is difficult to find the right product which offers all or most of the required functionalities. On another level, it is hard to identify differences in quality and levels of complexity regarding the installation and independent use of the products. Often these challenges can not be foreseen. Personal experience shows, that many products are bought and never used for various reasons. Therefore finding an approach to meaningfully select, introduce, apply, use and support the use of AAL products is a personal concern. A personal interest in user-centred research in various fields also exists generally, especially regarding the use of digital technologies and solutions in daily life. New solutions and technical or digital inventions lead to many advantages, however, individual needs of the main target groups still might get lost on the way to the final product. This is where the research fields of Media and Human Centred Computing (MHCC) and Human Computer Interaction (HCI) take up the challenge to look deeper into how the humans, who are supposed to use the final product, might actually interact with the technology. This often includes questioning the design multiple times and investigating the whole development and usage process. These two aspects result in a personal interest in investigating AAL from a user-centred point of view.

Demographic Change

One reason for the rapid development of the field of AAL originates in the increased life expectancy and demographic change of the world population ([14], [30], [46], [19]). The demographic change shows that the world population is growing older, for example, compared to the year 1980, in 2021 there were more than twice as many people who were 60 years or older [45].

The 'Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz (BMSGPK)', the Federal Ministry of Social Affairs, Health, Care, and Consumer Protection in Austria, presents the expected development of the Austrian population with regard to the 'Pflegepersonal-Bedarfsprognose für Österreich', meaning the demand forecast for staff in the field of nursing care in Austria [35]: The expected development of the population, including how many people will be of which age at which time, is important for the demand forecast of qualified staff that is supposed to take care of those in need. According to the presented demand forecast, the Austrian population will increase by around six percent between 2017 and 2030, according to the forecast of the demand for nursing care staff in Austria by the Austrian social ministry. However, the number of people aged 75 and over will increase by 25 percent. Statistics in the source further show that the number of people who are between 75 and 79 years old will increase by around three percent, while the number of people aged between 85 and 89 percent will increase

by more than 50 percent.

A population development forecast for Austria from 2022 [42] shows, that the number of people aged 65 or older will increase from 19.7 percent in 2022, to 29.1 percent within 60 years until 2080. This development originates from the so-called 'Baby-Boom'-generation, a generation which is known for high birth rates. Representatives from this generation are now successively retiring and responsible for the higher numbers of older people.

Figure 1.1 shows the detailed Austrian population structure which is predicted until 2080 and is based on the data and graph by Prof. Dr. Thomas and Dr. Fuchs in their prognosis for population and employed persons ('Prognose der Bevölkerung und Erwerbspersonen bis 2080') [47]. Looking at the graph and starting on the left there was a total population of 6.65 million in Austria in the year 1910. In that year, only 0.4 million people were aged 65 or older while there were 2.6 million under 20 years old and 3.65 million between 20 and 64 years old. In 2022, there were already more people aged 65 or older (1.77 million) than people who were under 20 years old (1.75 million). Population numbers are generally increasing, the graph shows a predicted total population of 10.24 million people for the year 2080. Within the general predicted increase of the population number, especially the number of people aged 65 or older is predicted to increase, while the number of 20 to 64 year olds is predicted to decrease until 2060 and only slightly increase until 2080.

Thomas et al. [47] also evaluate the ratio of working age to retirement age. Relating to the demographic quotes 1910, 2022, 2040, 2060 and 2080, they show that in the year 2022, for each person 65 years old or older, there were 3,1 persons who were aged between 20 and 64 years old. In the year 2024, the ratio of working to retired persons is predicted to decrease to 2.1:1 and from 2042 it will be 2:1, predicted to decrease further.

The growing number of elderly, thus people (potentially) in need of care, faces a reducing number of people able to care of them, as the population gets older and there are less younger ones to provide nursing services [35].

Challenges and opportunities in Nursing Care

Nursing Care currently faces a variety of challenges. The first and foremost problem is the ongoing staff shortage, while there are more people in need of care due to demographic change [24]. Including the increasing demand for care due to the demographic change and also staff that is going to retire in the next years, in Austria an additional number of 3900 to 6700 of care experts is needed every year until 2030, according to the care needs forecast from 2020 [35].

With regard to AAL and challenges in nursing care, Braun et al. state, that assistance for care takers has to be a goal [8]. The care needs forecast also suggests various measures to meet with the challenges arising from staff shortage in nursing care: New and innovative education concepts and training places, promotion for the job and image improvement as well as connecting nursing staff regionally and nationally are named besides the deeper engagement with digital solutions to support nursing staff [35].

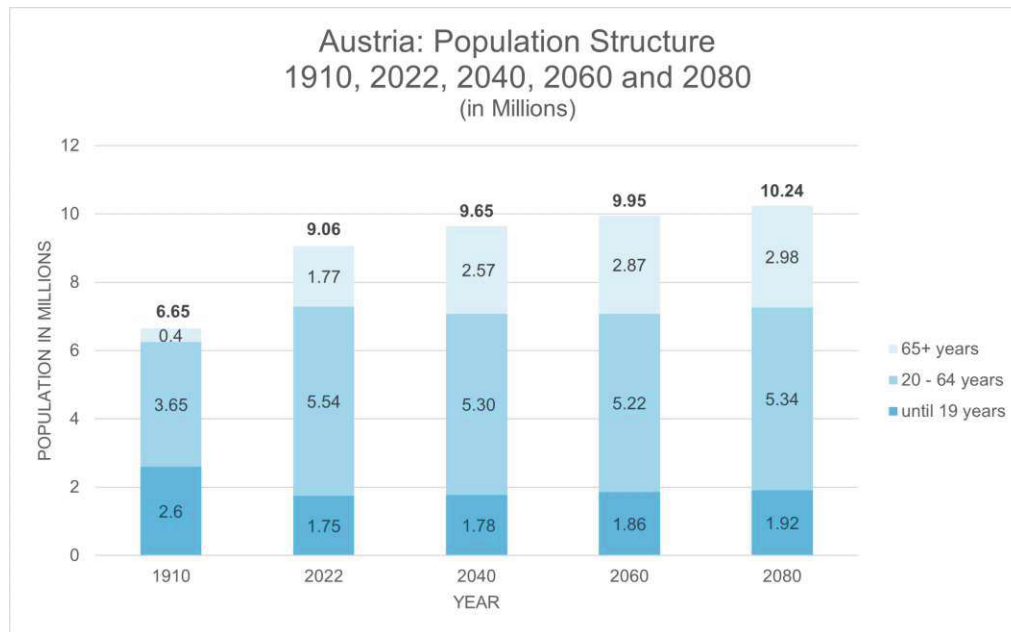


Figure 1.1: Population Structure in Austria for the years 1910, 2022, 2040, 2060 and 2080, based on [47]

Lehmann et al. [25] discuss the use of robotic solutions to deal with ongoing staff shortage in the area of nursing care. There are different robotic solutions and classifications for them, however Lehmann et al. focus on so-called companion robots and socially assistive robots (SAR). In a study in a nursing home, they aimed to examine the positive and negative aspects (including hopes, fears and concerns regarding ethical questions and also the fear to lose a job) of an SAR solution in nursing homes by questioning the caregivers. Results show that prior evaluation and collection of expectations of caregivers is very important in order to successfully establish a SAR in a nursing home.

The Market for AAL Products

Braun et al. [8] researched in 2016, that the market for AAL products grows yearly in the United States of America, especially because of the demographic change which leads to an increased number of (potential) users. Various research programs already existed at that time and governmental funding was used as a way to push development in this field. However, Braun et al. write about the potential of assistive technologies and state, that there was no market breakthrough yet in 2016.

Grand View Research did a research around the development of Ambient Assisted Living Market trends all over the world [37]. They evaluated the historical range of the market development from the year 2018 to 2022 and provide a forecast for the years 2024 to 2030. Within the report, they valued the global market for AAL at 7.36 billion US Dollar in 2023 and expect it to grow at a compound annual growth rate of 26.8 percent until

2040, for Europe expecting an annual growth rate of 26.3 percent. The market shares by product show, that products from the area 'Safety and Security' had the biggest part overall, followed by the segment 'Communication Devices' and 'Medical Assistance Products'. Regional comparison shows, that the market in North America is the strongest one, while the one in Asia Pacific is the fastest growing one. Looking at Europe, the market is growing due to governmental investments for projects around digital and smart home solutions. Another reason for the increasing AAL market in Europe is the growing demand for technologies in the AAL field. According to Grand View Research, the biggest companies in the AAL section are for example 2PCS Solutions GmbH, Assisted living Technologies, Inc. and Alcove. 2PCS [16] is a company based in Austria, that provides various solutions for alerting and locating systems for elderly, both in a stationary nursing setting and in ambulatory care at home. There are mobile and permanently installed solutions to make sure elderly are safe and preserve their independence.

Reichstein et al. [36] evaluated challenges that arise for the launch of AAL technologies on the market. They firstly outline how important it is to develop sufficient technologies to help overcome challenges in nursing care, followed by the presentation of a study. For their study, experts were asked in a survey about different challenges based on a hypothesis model featuring different suggestions. Results from the quantitative study show, that the predefined challenges 'Expenses' (this includes for example high costs for developing and launching AAL products) and 'Integration Capability' (limited possibilities so integrate AAL products in infrastructure and connect them to devices and provide them to people who need them) were identified as main influences in the market launch of AAL products by the experts.

Research for and with Elderly

Regarding research for and with elderly, an important aspect to consider is the definition of the target group - who is meant by 'Elderly', often also called 'Seniors', 'Older Adults', 'Older People' or 'Older Individuals'? Narrowing the focus on the included group of users might be useful for research projects, but surely has its limitations. In her paper from 2023, Petrie highlights the importance to avoid viewing elderly as 'one homogeneous group' when examining digital technologies [33]. Montserrat et al. also mention that elderly are not a homogeneous group regarding peoples habits of using technology in their daily lives and how they are related to them [12].

For the research of approaches around AAL in this thesis, the term 'Elderly' was used to refer to a group of people from a certain age who are in potential need of assistance or could potentially profit from the use of digital assistance tools. This does not imply that people aged 65 and older are perceived or can be perceived as part of a standardized group. Particularly with regard to the interactive workshop method that was applied in this research, the individual backgrounds of the participants had to be taken into account and there also lied a focus on including individual needs as a central aspect for the meaningful use of AAL. In summary, the term 'Elderly' was chosen as an appropriate description of the referred user group, as research thesis focused on an AAL user group with a

common potential assistance need. At the same time, the individual user requirements were significantly incorporated into the research on the meaningful application of AAL technologies.

1.3 Research Questions

This master thesis and the underlying research are guided by one main research question and three sub-research questions:

Which aspects might make the selection, installation and use of AAL technologies more meaningful and comfortable for elderly users?

(Main Research Question)

How could AAL technologies be categorized?

(Sub-Research Question I)

What is a concept for a workshop, that interactively involves the target group to gain insight in the meaningful use of AAL?

(Sub-Research Question II)

What aspects might be considered to create positive engagement with technologies in elderly people's daily lives?

(Sub-Research Question III)

To address and answer the research questions, three different methods were implemented. These were conducted in two phases as part of the research: The first, exploratory phase consisted of a literature review and semi-standardized expert interviews. The second, creative phase focused on establishing an interactive workshop with the target group. Here, the implementation of the designed workshop with the target group and the derivation of a general workshop concept were the main priorities. All mentioned methods contributed to answering the described research questions on different levels, as described in detail in Chapter 3 - Methodology.

1.4 Goals

At the beginning of the research, some general goals were set for the project, aligning with the previously defined research questions. The first goal was to evaluate various approaches to categorize, classify, and analyze AAL technologies and propose a new categorization approach through a comparative analysis. Aspects identified through the literature review were intended to serve as the basis for establishing an interview guide for interviews with two to four experts in the fields of care and digitalization. Subsequently, the goal was to integrate relevant findings from the first two methods, 'literature review' and 'expert interviews,' into the third methodology, the workshop with the target group.

1. INTRODUCTION

The goal here was to design a workshop based on various interactive tasks that would facilitate an open exchange with the participant group. The workshop was also intended to be developed into a general concept that could be applied in other scenarios to gain insights into user groups. For the expert interviews and the workshop with the target group, the goal was to research and implement aligning ethical research practices.

The aim of this research was to explore what constitutes a meaningful approach to accessing and using AAL technologies from a user's perspective. In this context, 'access' encompasses the entire process surrounding the acquisition of AAL products: starting from how users learn about AAL technologies (how they become aware of them, who conveys the information to users, and what needs to be addressed to make this process user-friendly for stakeholders), to the selection, purchase, installation or setup, and the ongoing support and guidance in everyday life.

The purpose and inherent value of the products themselves, as well as the fundamental or at least theoretical benefits of the technologies, were not supposed to be questioned. Instead, the focus was laid on evaluating what is required to ensure that users who can and should benefit from these technologies gain access to them in a way that is comfortable and convenient for them. This includes the modality and approach to preparing and distributing information, addressing and resolving any uncertainties, selecting systems that meet individual needs, and providing guidance throughout the usage process.

Overall, the research also emphasized that (potential) users should not only be involved in the development and design of AAL technologies, but also integrated in the research on what users and other stakeholders need to ensure effective access to and meaningful usage of AAL technologies.

Related Work

This chapter provides research results on related work, scientific literature and projects around the general term and aspects of 'AAL', categorization of AAL products and the design and research for and with elderly, including ethical aspects and responsible research practices.

2.1 Ambient Assisted Living

2.1.1 Term, Definition and Relating Areas

In 2002, the World Health Organization (WHO) released the policy framework 'Active Ageing - A Policy Framework' [31]. It explains challenges that come with the demographic change and introduces the concept of 'Active Ageing', a term that was first introduced by the WHO in the 1990s and focuses on enhancing the quality of life while getting older:

'Active ageing is the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age' [31] [p. 12].

The concept 'AAL', which is the short form of Ambient Assisted Living, was developed in 2004 during research programs in Europe [8]. 'AAL' sometimes also stands for 'Active & Assisted Living' or just 'Active Assisted Living', a term used in newer publications such as the one by Sailer et al. [39]. In the book-introduction, Sailer et. al also describe AAL as '*Alltagstaugliche Assistenzlösungen für ein selbstbestimmtes Leben*' in German. Literally translated this means '*Assistance solutions suitable for everyday use for a self-determined life*'.

Tsitsipas et al. [49] explain, that Ambient Assisted Living is about applying smart tools to someones home, creating a smart environment, to help seniors and people of their

inner circle, like relatives or caregivers, with tasks of the daily life. In that scenario, seniors live in their own home.

'Aging in place is defined as a situation where a person can age in the place of his or her choosing for the remainder of his or her life' [28] [p.164].

This is how Miller et al. [28] define 'aging in place' in their paper from 2021, published in the book *HCI International 2021 - Posters from the 23rd HCI International Conference*. They present their research on isolation and loneliness related to aging during the COVID-19 pandemic and on how social care robotics could be used as a solution. Miller et al. further specify, that technologies are being used as support to enable people to age in their own place as long as possible, for example using smart home systems, wearables and robots. However, disregarding where people choose to age (at home, in a nursing home / assisted living facility), social isolation seems to be a common burden over all of them. Social care robots, for example robotic pets like Joy for All ¹, are being explored as a way to lower social isolation.

Kleinberger et al. [22] explain, that AAL technologies are intended to support older people in aging where they wish to. Additionally, healthcare systems can be relieved, and public financial expenses can be reduced.

Sanchez-Comas et al. [40] explain, that the area of Smart Home Technology was extended to other relating fields, while at first it was mainly about energy-management and keeping someone's home safe. The field was then widened by areas like the Internet of Things (IoT) and Artificial Intelligence (AI), leading to an increased research on how smart homes and technologies might support elder's independent living at home. In this context, Sanchez-Comaz et al. write about how a home equipped with smart technologies can support elderly or disabled people within their daily lives. They then dig deeper into the topic of human activity recognition, as this is a core technology for smart home and ambient assisted living technologies.

Like Sanchez-Comaz et al, Tsitsipas et al. [49] also outline, that AI is used within AAL solutions. They name the monitoring of a persons health and ways to make energy-use more efficient as examples of AAL and AI use. AI uses sensors in elder's apartment to monitor a person's activities, identify dangerous situations and decide if an alarm by the AAL system is necessary.

Target Group and Stakeholder

The general target user group for AAL technologies, as mentioned broadly in literature, are people aged 65 or older ([14], [54]). But also people with disabilities or long-term illnesses, are included in the target group who could profit from the successful application

¹Joy for All robotic companion pet: <https://joyforall.com/>

of AAL technologies [11]. Kleinberger et al. also mention people with handicaps besides older people [22].

A variety of stakeholders around the application and use of AAL technologies has to be considered. The *elderly / senior older ones* are, as the target user group, the first ones mentioned, followed by people who are in charge of caring for elderly, who include *members of the family* and also *professional health carers, nurses and external care providers* ([30], [11]). O’Grady et al. [30] additionally mention *governments* also as stakeholders because of their motivation to optimize caring scenarios by applying AAL technologies.

2.2 Categorization of AAL Technologies

The term ‘Ambient Assisted Living’ refers to various fields and areas. In total, seven sources were analyzed regarding their way to approach the term AAL regarding categories, services-definitions or priorities. An overview is presented in this section. A combining approach to categorize AAL technologies is provided in the Findings-Section 4.1.1.

Belbachir et al.: AAL as ‘clusters of activities’ [5]

In their paper from 2010, Belbachir et al. [5] evaluate Ambient Assisted Living regarding the target group of elderly and how the demographic change influences the need for Austria and Europe to come up with new ways to deal with the corresponding situations. They present funding programs and projects by the European Commission. Referring to the associated challenge-definition by the European Commission, Braun et al. present AAL ‘activities’ grouped as four **clusters** of tasks performed by a person at home, which are:

- Cluster 1 - ‘**Home Care**’:
To this cluster, Belbachir et al. assign solutions that address the medical health of a person, such as tele-health and tele-care services, which are necessary to make sure illnesses are prevented or detected at an early stage. Therapy management and care-tasks are also related to this cluster and nutritional aspects are mentioned as well. The cluster ‘Home Care’ relates to activities which are performed at a persons home and integrates, besides the cared for person, other stakeholders such as their relatives and caregivers.
- Cluster 2 - ‘**Safety, Security and Privacy**’:
This is another cluster that is related to a persons life at home and includes safety-measures to make sure a person can live independently in their home. It features services such as systems which are detecting risks and alarm when situations get critical.
- Cluster 3 - ‘**Health and Wellness**’:
This cluster is associated not only with a person’s life at home, but also with the

surrounding world. Here, solutions that should increase elder's motivation to stay active and fit and support the mental and physical health, are mentioned.

- Cluster 4 - '**Social Interaction**':
Again referring to the surrounding world, this cluster includes activities that should help increase the social interaction of elderly, to make sure they do not live isolated.

It is mentioned, that the other identified clusters, which are 'Well being Person', 'Hobbies', 'Mobility', 'Working Life', 'Information and Learning' and 'Supply with Goods and Chores' have at that time not yet been taken into consideration for AAL-services [5].

Ludwig et al.: Categorization of health-enabling services [27]

With a literature review approach, Ludwig et al. [27] aimed to define categories for health-enabling services. In total, 1447 sources were taken into consideration after a first research, while 23 publications were analyzed in detail. Leading to the final selection, 1085 sources were dismissed due to their titles, 299 were excluded after an analysis of the abstracts and after a full text analysis, 27 sources were used to define the pursued categories. Within their research, Ludwig et al. focused explicitly on publications about telehealth technology services, that are computer-based, addressing the health of elderly (people who are 65 years or older) and applied in an individual's home or in a nursing home. It was the goal not to include sources that discuss telehealth in a general way or just technological details rather than the actual integration for users within healthcare provision. The final **six categories for health-enabling services for elderly** proposed by Ludwig et al. are:

- Category 1 - '**Handling adverse conditions**':
The first category includes services that are used in case of an emergency or dangerous situation to make sure a potentially harming outcome for elderly is avoided. Ludwig et al. present five scenarios for applying services from this category. The first scenario is called *manual emergency call*, meaning emergency rescue buttons that have to be pressed by the user manually in case of an emergency and including solutions that are used at home or outside and also combined with other telecare systems such as wristbands that also track the activity or position of the user. The second scenario is the *automated detection of deviant behavior*, which addresses services that aim to monitor the usual behavior of an individual and are able to detect when something is unusual or wrong by analyzing and comparing activity patterns and sensor data. If something unusual is detected, an emergency call chain starts by calling the user itself and afterwards a help center if the alarm is not canceled. The *automated detection of falls* is the third scenario, where different solutions for fall monitoring at home and outside are presented. It is their goal to detect falls and alleviate the fear of falling and not being found. Another scenario is called *automated detection of cardiac emergencies* and includes services that help with the recognition and alarming in case of emergencies concerning the

cardiovascular system by evaluating sensor data monitoring facts such as heart rate, blood pressure and oxygen levels. The last presented scenario is the *handling of potentially dangerous situations*, which includes services or projects that feature the repeating and continuous questioning of people who are at risk of developing a medical problem because of their healthcare history, for example chemotherapy patients or people at a certain age. Critical answers to daily asked questions trigger a call of the patient or caring persons.

- **Category 2 - 'Assessing of health':**
 Within this category, Ludwig et al. present services that should help with the gathering of information about a persons health and therefore reach three goals. The first goal *recognition of unknown diseases and medical conditions* is basically about finding out why conditions arise and if there is a medical background, for example by evaluating monitoring-data of people in their daily life and combining that information with how they feel and what decisions they make in a day, for example avoiding a certain task or place. The second goal then is about the *monitoring of known diseases*, a commonly-known use-case for telecare that includes services monitoring the physical and medical areas most commonly affected by illness as people age. Like that, quality of life may be improved for example by minimizing the effort to travel for medical check ups because telecare systems collect the necessary information to monitor medical conditions. Lastly, the *monitoring of therapeutic interventions* is the third goal. Here, services that help with the monitoring of patients after treatments are included. For example, telehealth services are used to monitor a patients condition after a coronary artery bypass graft by checking on the patients recovery symptoms.
- **Category 3 - 'Consultation and education':**
 This category presents, for example, digital medical consultations, that help with the care and monitoring of affected persons by providing consultations via video conference tools or normal phones. These consultations can be combined with the monitoring of health data with sensors. Another proposed service provides a whole platform that features additional information to educate patients. These platforms can also be used by the personnel caring for the patient, for example by digitally providing medically relevant images and information for a doctor and also connect with physicians virtually to talk about the diagnosis and treatment.
- **Category 4 - 'Motivation and feedback':**
 This category, for example, features medication reminders or reminders to self-check certain health data, like the body weight. Messaging tools are also used to send motivating messages and encourage patients within their recovery management of certain symptoms and the use of telehealth systems.
- **Category 5 - 'Service ordering':**
 The sixth category addresses services that generally support a senior in his or her daily life, not necessarily related to medical issues. Specifically, the category

includes telehealth services that help a person with ordering services or help relating to so-called *instrumental activities or daily life (IADL)*. This includes daily life tasks like help with the household, ordering food, running errands or organizing prescriptions for medication.

- Category 6 - '**Social inclusion**':

As the name suggests, this category is about services that support and motivate the social life and well-being of elderly. Ludwig et al. present projects as examples. Those projects feature telehealth platforms that already include services forcing the social inclusion of the user, for example by providing video conference tools and reminders for local events that might be of interest for the user.

Ludwig et al. outline the importance of the last two categories, thus saying they have not been included in telehealth projects very often at that time.

Braun et al.: AAL Functionalities [8]

Braun et al. [8] present a study that evaluated the fears and expectations of users regarding assistive technology. It was the goal to understand the users needs better, so that this knowledge can be included in the development of AAL technologies. They present a set of functionalities, which was (amongst other aspects and fields) evaluated based on case studies. Four different systems were presented to the participants of the study as examples. They then answered questionnaires about their general technology affinity, regarding how they feel in certain situations, if they agree, that the presented scenarios are acceptable or important or if they feel uncomfortable with them. The answers were given on Likert-scales, allowing the participants to decide how much they agree with the presented statement or described scenario. It was the goal to find out, whether the participants think the functionalities are useful and desirable. Generally, the results showed that all functionalities were perceived positively and usefully, however they showed the participants are not very ready to invest money. Functionalities about safety were rated higher than those about comfort. The **functionalities** mentioned by Braun et al. are:

- Functionality 1 - '**Notfallerkennung**' (**en: emergency detection**):
This functionality includes the detection of situations, that are life endangering. For example, this includes falls or accidents.
- Functionality 2 - '**Sturzprävention**' (**en: fall prevention**):
In contrast to the first functionality, this one is about preventing the fall rather than only detecting it. As an example, a proactive home control is given as a way to prevent falls.
- Functionality 3 - '**Krankheitserkennung**' (**en: illness detection**):
This functionality is about finding changes in ones behavior, which might indicate first signs of a disease such as dementia.

- Functionality 4 - '**Energieeinsparung**' (**en: energy saving**):
In the fourth functionality, ways to save energy such as control of the heating or electricity are mentioned.
- Functionality 5 - '**Einbruchserkennung**' (**en: break-in detection**)
- Functionality 6 - '**Wohnkomfort**' (**living comfort**):
The last functionality is generally about increasing the living comfort at home.

The results of Braun et al. further showed, that it is important to the participants that the system is easy to use. Furthermore, low prices and maintenance costs as well as energy use is important for the participants.

Vimarlund et al.: Types of services and challenging areas of needs for AAL [51]

Vimarlund et al. [51] present a case study which was conducted in March 2020 in two retirement homes in Stockholm. Both organizations have implemented measures to contain the spread of the coronavirus and protect their residents. The data was collected through a survey. It was the case study's goal to detect challenges that come with the integration of Ambient Assisted Living technologies, as well as evaluate the residents' needs. Vimarlund et al. also wanted to find out what residents expect from AAL-services. Their results show that during restrictions due to COVID-19 measurements, residents were more interested in using digital solutions for social contact and networking, rather than healthcare services. Participants mentioned using smart solutions to make appointments or access laboratory results, but apart from that they did not mention any desire to use AAL-services to support their health. Results also show that the most important demands by members of the target group were clear guidance to policymakers and suppliers, as well as control mechanisms and customer orientation. The authors underline that it is necessary to integrate the needs of potential users in the market development, and to use research as a base for creating guidelines for all stakeholders on the market. The specific **areas and types of services** identified by Vimarlund et al. within the study-results are:

- '**Social services**'
The goal of these services is to keep the elderly from isolation. Participants mentioned activities related to this service-category such as staying connected with family and friends and communicating with multiple others. Other activities connected to these services are E-Commerce tasks like ordering things online. Informing oneself online about economic and political news is also included in the list of activities mentioned in relation to this category. Challenges and needs identified for these services are for example the provision of a suitable platform and clear instructions.

- **'Socio-cultural and leisure services'**
Mentioned activities in this category include leisure time activities like concerts, movies, theaters and shows, e-books and e-trips. The goal is to make sure elderly stay socially active.
- **'Health and social care services'**
Within this area, healthcare applications that make it possible to track someone's health are mentioned. Furthermore, information services are included, for example providing information about epidemics.
- **'Secure and safe services'**
To minimize risks and fears, this area includes activities around the provision of reliable and reviewed sources and information and data protection.

Calvaresi et al.: Categories of support for AAL [11]

Calvaresi et al. [11] did a systematic literature review in order to give an extensive overview over the term 'AAL' and how it is approached in literature. The paper was released in 2016. Results show, that most solutions tend to include patients and physicians in their research, while other target groups of AAL services are left out. Furthermore, the focus lies on the monitoring of patients and activity recognition. It is also mentioned that the usability and effectiveness of AAL solutions is not evaluated properly. According to Calvaresi et al., an understanding of a user's demands and his relationship to the technology is necessary. Solutions tend to be developed due to what is technologically possible, rather than to what recipients actually need. In total, 10 research questions were evaluated in the publication. One research question was about examining a taxonomy for AAL solutions and defining supports for AAL and how they changed over the years. The **eight categories of support** identified in the by Calvaresi et al. analyzed papers are:

- Category 1 - **'Activity recognition'**:
This category includes recognizing activities of daily living, so-called ADLs.
- Category 2 - **'Control vital status'**:
This refers to all tasks around remote health and vital parameter measurement.
- Category 3 - **'Position tracking'**:
The third category includes supports that are used to localize persons indoors and outdoors.
- Category 4 - **'Interaction'**:
This category is about the interaction with assistive technologies.
- Category 5 - **'Multimedia analysis'**:
Here, supports about the creation of various multimedia contents are included.

- Category 6 - '**Data analysis**':
This includes supports about analyzing data sets.
- Category 7 - '**Data sharing**':
This category includes supports around data sharing between AAL stakeholders.
- Category 8 - '**Communication**':
Supports improving the cooperation and communication of users are included in this category.

O'Grady et al.: Key facets of the AAL concept [30]

O'Grady et al. [30] explore the term AAL around the general definition, the existing challenges and status of development. They also propose an AAL architecture and generally explore the facets of Ambient Assisted Living. The **four facets of AAL** are described as:

- Key Facet 1 - '**Home**':
AAL should support people in their home regarding **health and safety** aspects. Important technologies for AAL at home are smart environments and Ambient Intelligence. O'Grady et al. present various examples, including solutions for fall detection, vital parameter measurement, diabetes blood sugar level management, sensor installation in a home for activity tracking and smart home technologies.
- Key Facet 2 - '**Mobile**':
This facet includes **activity management and mobile services**. A range of examples of AAL systems and projects is given, including mobile applications.
- Key Facet 3 - '**Community**':
The third facet incorporates **social inclusion, entertainment and leisure activities**. Social inclusion generally is a main goal of AAL.
- Key Facet 4 - '**Work**':
Another facet presented by O'Grady et al. is the support of people at work regarding **access, health and safety**.

Project 'TAALXONOMY', 2014 (Project [18], Guidebook [26], Table [17])

The project 'TAALXONOMY' [18] was carried out in 2014 and 2015 in Austria with a duration of 8 months. The project started in September 2014. It was the project's goal to establish a new concept to categorize AAL products and services and provide a practical AAL-taxonomy. Existing categorizations, initiatives and definitions were evaluated and a new system to classify AAL products and services was generated. The project objectives also outlined the analysis of technologies and quality of life aspects and the inclusion of stakeholders in various project phases.

The result of the project is the 'Taxonomie zur effektiven Klassifizierung von Produkten und Dienstleistungen aus dem Bereich Active and Assisted Living (AAL)' [26], translated to English it is called 'Taxonomy for the effective classification of products and services in the area Active and Assisted Living (AAL)', a guidebook presenting the new categorizing system. The guidebook gives a general introduction of AAL and explains, how the taxonomy is structured and can be used to classify AAL solutions. In the first step, a scope of application has to be selected.

TAALXONOMY Classification:

In the TAALXONOMY-Table [17] there are the following scopes of applications (representing level 1 of the taxonomy). In the subcategory (level two), the fields of application are listed for every category. On a third level, called 'functions', the applications (use cases) are listed.

- **Scope of Application 1 - Health & Care:**
This category includes subcategories like, for example, *health care and prevention, body and vital data, nutrition and diet, therapy and drugs and pharmaceuticals*. On a third level, as an example, the subcategory *body and vital data* includes, amongst others, use cases like 'Measurement and/or monitoring of physical and vital data'.
- **Scope of Application 2 - Living & Buildings:**
Within this scope, subcategories like *electricity, light, water, environment and accessible housing* are listed. The subcategory *water* lists 'water supply', 'water saving' and 'sanitary facilities' on the third level.
- **Scope of Application 3 - Safety & Security:**
The category 'Safety & Security' groups subcategories like *building surveillance, falls, person localization and emergency management and alarms*. *Person localization* lists the functionality 'people localization in buildings and outdoors'.
- **Scope of Application 4 - Mobility & Transport:**
Passenger transport, transport of supply and goods, travel information and navigation and orientation are, for example, listed in this category.
- **Scope of Application 5 - Work & Training:**
This category includes *work support and learning and training*. There are no applications listed on level three.
- **Scope of Application 6 - Vitality & Abilities:**
Here, *physical and cognitive abilities* as well as *social skills* are listed on level 2. *Physical abilities* include, for example, applications like 'hearing', 'talking', 'breathing', 'lifting and grabbing items', and more on level three.
- **Scope of Application 7 - Leisure & Culture:**
The category 'Leisure & Culture' includes *sports and fitness, entertainment and media, culture, pets* and some more fields. Not all of the listed fields have applications

listed. *Entertainment and media* for example includes 'images', 'video', 'music and audio books' and 'internet and Web 2.0'.

- **Scope of Application 8 - Information & Communication:**

This category includes the following fields: *information and knowledge, consulting, coaching and assistance, communication and organization*. *Organization* includes 'document management', 'appointment and task management', 'government services' and 'financial services'.

The TAALXONOMY-Guidebook [26] explains, that the TAALXONOMY has a hierarchical structure and the application area represents the first and top category. Below that, one or two sub-categories exist for each application area and those sub-categories contain the use case of the technology. All use cases receive a unique ID within the TAALXONOMY. The ID starts with a 'T' and has up to 6 digits. The 'T' is always the same, the next pair of numbers represents the application area, referring to the list above, and the following number pairs represent the sub-categories according to the TAALXONOMY.

2.2.1 Challenges of Ambient Assisted Living

Understanding the environment and behavior of the user group

In their paper from 2019, Choi et al. [13] evaluate the development of the population in South Korea, while also pointing out to other parts of the world including Europe. The paper addresses the various challenges arising in healthcare due to the aging population - increasing medical costs, the need to improve the overall well-being of people, the necessity to integrate both physical and mental factors and provide individual care. Choi et al. propose Ambient Assistance as a way to face these challenges. They also point out, that the whole environment and behavior of seniors has to be considered, therefore they evaluate the integration of Smart Home and healthcare based on living characteristics and behavior of elderly. In their study, a concept for categorization of seniors' lives leads to a second part where in-depth interviews were conducted to evaluate Smart Home rooms together with participants. As a result, an AAL healthcare platform (defined as a platform combining Internet of Things, Healthcare and Architecture) is presented as a solution to handle aging population. Effective health management can be achieved once AAL platforms are designed based on behaviors and desires of elderly. Choi et al. identify the undefined administration and independent development of AAL-services as major set-backs of AAL-solutions.

Acceptance of AAL systems

Van Heek et al. [50] discuss the importance of user acceptance of AAL technologies. In their study, they evaluated a user group including not only elderly, but also users who are in need of assistance because they are affected by an illness that is unrelated to age. The paper evaluates how it is necessary to evaluate and understand the target group in

order to design something useful for them, that is also accepted by the users. Therefore the perspective of a user should be included when technologies are developed. The paper presents a study where the authors evaluated a proposed AAL system with participants who have different user perspectives regarding their age, how disabled they are and what needs they have. Within the results, Van Heek et al. explain that privacy and data security matters are important for all users regarding their acceptance of AAL systems. While there was a general acceptance for AAL systems throughout the evaluated group of participants, results further showed that there is a higher acceptance amongst people who are in need care and support (because of their age or disabilities) than amongst people who have no experience with disabilities and needing care. People who depend on assistance have a positive attitude towards AAL, but they are also those who are the most concerned about privacy and data security matters. These aspects have to be considered during the development of an AAL system. It is important to also include future users in the development process to integrate their preferences and suggestions in order to increase the acceptance for the finished product.

Kowalewski et al. [23] took a deeper look into the acceptance of medical technologies. They base their research on two areas: The diverse user group in terms of age, experience with technical systems, and level of care. Additionally, medical technologies often relate to a sensitive area regarding data-categories, intimacy and privacy. Results from their study with the user group show, that there is a general acceptance for medical technologies. However, they see differences in the level of acceptance between men and women. Kowalewski et al. urge, that it is important to understand potential users regarding how they feel with their age and situation and how that might influence their acceptance of medical technologies.

Ziefle et al. [53] conducted a study to evaluate user acceptance regarding medical home monitoring in someones home. They write about the importance to evaluate the users' acceptance and integrate them in the evaluation process. Results from their study show, that the users' acceptance for the technology depends on the room it is installed in.

Acceptance amongst professional caregivers is also discussed by Van Heek et al. [50] because they were included in the study and it seems to be very low. Reasons for that might be according to Van Heek et al. that professionals are afraid that their work is not needed anymore or they are concerned due to ethical reasons.

Relating to the challenges of AAL systems and their development, aspects on research and design for elderly are presented in the following section.

2.3 Elderly-focused Research

2.3.1 Research and Design for and with Elderly

The previous section discussed some challenges arising within the development and implementation of AAL systems for elderly. Including future users in the research to overcome barriers and challenges is important, for example discussed by Choi et al. [13],

Kowalewski et al. [23] and Van Heek et al. [50]. Including the perspective of future users in the AAL research is also very important according to Beringer et al. [7]. Skorupska et al. outline the strengths and opportunities of research with elderly - for example getting information about their perspectives and understanding their requirements [41]. Some aspects how to integrate members from the target group are presented in this subsection.

In their study, Kowalewski et al. [23] organized **focus groups** and constructed a **questionnaire** based on results from the previously held focus groups. In a second study, they included a total of 280 members of the target group who took part in a questionnaire, after a medical scenario was explained to them beforehand.

When Ziefle et al. [53] addressed the acceptance of medical monitoring systems at home and of smart home technologies in their study, they implemented qualitative and quantitative methods to include the user group in the research. At first, **focus groups** were conducted in a pre-study-phase, followed by a **questionnaire**.

A newer paper by Sorrentino et al. [44] presents a user-centred design process for a telepresence and monitoring system, featuring **focus groups** and a **survey**, both including members of the target group. There were four development phases implemented around a Human-Centred Design (HCD) approach. A first study evaluated the needs of the target group with focus groups and questionnaires. The results from this phase were considered during the second phase, the development. In a third step, a study was conducted to test the development in a real environment. The final step involved evaluating the collected results and formulating guidelines.

Beringer et al. [7] propose a qualitative research study, where elderly were interviewed about AAL systems. The study included **semi-structured interviews** with 12 elderly, in which they were asked questions. Additionally, a **short film** was showed to the participants to collect their thoughts and feedback on the film.

Workshops with Elderly

In Sweden, Henning et al. [20] implemented a Future Workshop (FW) to engage with elderly and other stakeholders in order to concept a senior housing concept. The motivation was to find new ways to conquer with the challenges arising from nursing care relating to the demographic change. The authors describe how they started the workshop with an informal phase so everyone could get to know each other, followed by the explanation of rules for the participation and a general introduction to the topic. Afterwards, the different planned phases were conducted. During the phases, different methods of engagement with the participants including brainstorming-outcomes written on flip-charts and the establishment of bottom-up-lists and top lists were conducted. Creative tasks included painting, crafting and building collages.

A project that was conducted in Chile by Briede-Westermeyer et al. [9] gives insights on a so-called co-creation workshop, where different stakeholders including members from the user group, in this case elderly and pre-elderly, as well as professionals took part.

The workshop took a whole week and there were 19 participants. The contents included information about the workshop method, the underlying problem, designing prototypes and findings for future work. The workshop was evaluated with a questionnaire in the end.

Austin-Wells et al. [3] conducted a study with elderly to find out which presentation format they would prefer. There was a bigger study in plan and the presented study was done beforehand, to find out which presentation style participants from the target group (elderly) would prefer. As a method, they conducted three focus groups, each with 5 to 10 members of the target group (seniors aged 65 or older). Three different presentation methods were shown to each participant: one presentation with showing content via an overhead projector, one with flip-charts and one with a power point presentation. The feedback from the participants showed clearly, that they preferred the power point presentation in all three focus groups. Reasons were the bold colors, the included graphics and the possibility to show text in large font size. Overhead projector presentations were ranked on place two, followed by flip-charts which were liked least by all participants.

Ethical Aspects for Research with Elderly

In her paper about ethical considerations, Arrant [2] emphasizes some aspects regarding user research with elderly. Older adults are part of a vulnerable population and require dedicated attention and sensitivity. It is recommended to choose an environment with enough light and no disturbing noises for the study. Communication with elderly participants should be thoughtful, as they may experience challenges with hearing, reading, understanding consent forms, and grasping the study's purpose. Proactively engaging with participants is mentioned as well. It has to be considered that cognitive functions may decline with age so the participants might not be able to follow easily. When discussing potential benefits, one should be mindful that talking about possibilities can be hurtful for some. Participants always have to be approached with the utmost respect. A foundation of trust should be built with participants. Researchers should think about age-related biases and address them throughout the research process. Additionally, they should pay close attention to every detail to ensure the study's clarity and inclusivity. Researchers have an ethical duty to act responsibly, particularly when working with vulnerable populations within a medical context.

Skorupska et al. [41] list seven challenges for the research with elderly. Age-related requirements must be taken into account. This includes interaction with members of the user group, the language used, as well as consideration of general challenges surrounding the establishment of IT systems.

As mentioned by Skorupska et al. [41], the 'European Code of Conduct for Research Integrity' [1] should be followed. The code of conduct presents four principles ('reliability', 'honesty', 'respect' and 'accountability') and good research practices in eight contexts (including, for example, 'research procedures' and 'data practices and management').

Innovative Approaches

Montserrat et al. did research on blogging for elderly and their motivation for contributing on blogs, thus acting as content creators [12]. Compared to other studies in this area, they confirmed that elderly are mostly encouraged by self-focused motivations and less by other-focused ones. They also identified new motivations, for example 'external motivations' as Montserrat et al. call them. Here, external influences by friends or family motivate elderly to start blogging.

In 2020, Reuter et al. [38] examined digital content creation as a way to improve digital skills of elderly so they are not left excluded from services which are more and more provided digitally. They argue, that an active involvement of older adults in digital tasks helps improving their skills. Reuter et al. mention contribution of older adults via radio shows and online forums. For their research, Reuter et al. also worked with Sonder Radio², a radio show for elderly where elderly also contribute as presenters and in workshops.

2.4 Related Work: Summary and Take-Aways

This chapter presented related work around the term of Ambient Assisted Living, approaches to categorize AAL technology, challenges in AAL and research focused on elderly in general. The following aspects were particularly taken into account in the ongoing research of this work.

AAL, the short form for Ambient or Active Assisted Living, was established in 2004 [8] and encompasses services, platforms and technologies that should help elderly growing old as independently as possible [30]. AAL is related to the concepts of 'Active Aging', established by the WHO [31], and 'Aging in Place' [28]. Those areas are related as AAL aims to support elderly to stay active and age actively, preferably in their own homes or a place of their choice. While the main target group encompasses older individuals aged 65 and above or people with disabilities [14], there are various stakeholders (like family members and caretakers) involved in the AAL concept [11]. The challenges of AAL include, for example, understanding and meeting the individual needs of older people and their homes [13], as well as promoting the acceptance of AAL assistance systems among stakeholders [50]. Within this thesis, the general background of AAL, its challenges, opportunities and stakeholders were especially utilized for the conceptual development of the contents for the expert interviews and the workshop.

Various sources approach and examine AAL from different angles. Analyzed approaches ranged from clusters of activities where AAL is applied [5], to challenging areas of needs for AAL [51], health-enabling services [27], AAL functionalities [8], categories of support for AAL [11] to so-called 'key-facets' [30] and a TAALXONOMY [18]. Methods to integrate elderly in research, for example with workshops [20] or focus groups ([23], [53]) were researched as a basis for the definition of an own approach to categorize AAL

²Sonder Radio: <https://www.sonderradio.com/>

2. RELATED WORK

technology. Another focus lied on ethical considerations for research in this area ([2], [41]), which were taken into account for the workshop with the target group.

Lastly, innovative approaches to motivate elderly as digital content creators were presented, namingly blogging for elderly [12] and the work of Reuter et al. that presented a radio station for elderly amongst other suggestions [38]. These innovative approaches were considered in the search for new methods to establish meaningful access to AAL technologies.

Overall, broad research on the topic of AAL - its opportunities, possible challenges and application areas exists. However, user-centred approaches for research regarding AAL mainly focus on the functionalities, advantages and the design of technologies, rather than the evaluation how a meaningful access can be provided to these technologies that could propose significant support for elderly and relief for the nursing care system. Amazing technologies, even when they are ideally designed for a certain group, have limitations when the target group does not know how to access them or does not feel comfortable doing so. This is where this thesis picked up to focus on these aspects, explore ways to gain insights on how meaningful access to AAL technologies for the target group can be provided and how innovative concepts can be combined in this field.

Methodology

3.1 Overview

The methodology divides in two main phases, while the first one follows an exploratory approach and the second one follows a creative approach. The first phase consists of a literature research and interviews with experts. The second phase follows an experimental approach with the conduction of a workshop featuring a set of interactive and tasks with members of the target group, analyzed with observation and a questionnaire.

Phase I: Exploratory Research

The first research phase defined and structured the background information about Ambient Assisted Living. After a literature research, experts were asked to share their knowledge and experiences, as well as thoughts around the examined field of AAL. Two main methods were conducted: literature research and expert interviews.

A **literature research** around the area of Ambient Assisted Living was conducted, with the goal to provide an overview on how to categorize the different areas or product lines of Ambient Assisted Living. It was another goal to provide relevant definitions and background information about the topic, as well as research ethical aspects for the workshop with the target group.

In addition to a literature research, it was the planned to conduct two to four **semi-structured expert interviews**, depending on the interview partners available. Experts to be interviewed were either experienced professional caregivers or carers who accompany elderly with the introduction of AAL technologies, or experts in the field of digitization and AAL projects. Experts were asked about their thoughts on the development of AAL and what products they liked or did not like to use or support, as well as possibilities and challenges they saw in this field. Finally, they were asked about their opinions on some suggestions how to simplify working with AAL. The one-on-one interviews with experts were scheduled for around 45 minutes and had a predefined structure (including certain

topic-categories with a number of relating questions). If possible, the interviews took place in person, otherwise online-interviews were scheduled. Experts were asked for their permission for audio recording. To prepare the results for the qualitative analysis, all audio recordings were transcribed and afterwards transferred to a structured results table to provide an overview and compare different interview results.

Phase II: Creative Research with the User Group

Following the results of the previous research phase I, a second research phase was planned with a more creative approach to gain insight into the needs and thoughts of the target group in a **workshop-setting**. Members of the target group, which was defined as people aged 65 or older, were asked to join a workshop group session to interactively engage with the topic Ambient Assisted Living. Creative aspects in the workshops included a task where the 'perfect prototype' was designed together in a symbolic way. Discussions about images shown during the workshop completed the program. The goals of this workshop were to gather the target group's thoughts on AAL and evaluate how a positive interaction with technologies could be achieved. The workshop was planned to take place in person, preferably in an environment the participants already knew and felt comfortable with. Participants were supposed to be at least 65 years old, while it was irrelevant if they were experienced with AAL technologies already. Basic information about the participants and some feedback about the workshop were collected afterwards. Handwritten and digital notes, pictures and audio recording were used to support the analysis of the workshop.

Addressing the Research Questions

Figure 3.1 illustrates a **Methodology Overview** of the selected methods and how they corresponded to answering the previously defined research questions, which were:

Which aspects might make the selection, installation and use of AAL technologies more meaningful and comfortable for elderly users?

(Main Research Question - MRQ)

How could AAL technologies be categorized?

(Sub-Research Question I - SUBRQ1)

What is a concept for a workshop, that interactively involves the target group to gain insight in the meaningful use of AAL?

(Sub-Research Question II - SUBRQ2)

What aspects might be considered to create positive engagement with technologies in elderly people's daily lives?

(Sub-Research Question III - SUBRQ3)

Methodology - Overview

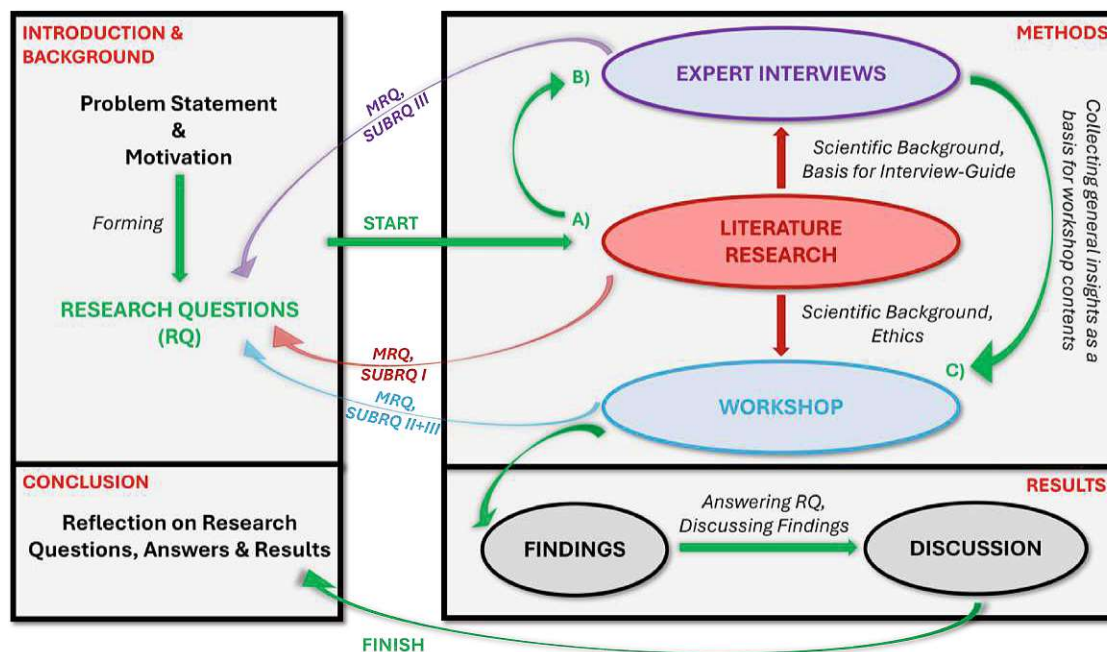


Figure 3.1: Research Concept - Methodology Overview

In Figure 3.1, the thesis' *Introduction & Background* is visualized on the top left. The research questions were formulated after defining the problem statement underlying the research for this master thesis.

On the top right of the figure, it is visualized how the *Methods* were structured. As a first method, marked as *A)*, **Literature Research** on related work was done to collect information to help answering primarily the main-research-question (MRQ) and the first sub-research-question (SUBRQ1). Additionally, scientific background on expert interviews, research, design and workshops with elderly and ethical aspects was collected. Secondly, **Expert Interviews**, marked as method *B)* in the figure, were conducted to contribute to answering primarily the main-research-question (MRQ) and the third sub-research-question (SUBRQ3). General take-aways and information for the workshop were also collected. Lastly, the **Workshop**, marked as method *C)* in the figure, was conducted with the target group in order to address primarily MRQ, SUBRQ2 and SUBRQ3.

The bottom part of the figure illustrates how the process is completed and concluded with the evaluation of results and discussion of reflections around the research.



Figure 3.2: The first hand-drawn illustration of the collected sources in order to find an approach to identify 'areas of purpose'

3.2 Evaluation of AAL Categories

Different approaches on how to address the categorization of AAL-technologies and services were collected during **literature research**. For the analysis, sources that examine AAL from various perspectives were utilized. These included not only sources that directly address the categorization of AAL products but also encompassed various aspects related to the topic to broaden the view on the categories and incorporate the user perspective. A detailed presentation of the sources is provided in Section 2.2. To facilitate analysis and comparison, an initial hand-drawn visualization was created to provide an overview of which aspects are mentioned by each source. In this illustration, shown in Figure 3.2, as a first step, six sources were roughly visualized, and matching aspects were color-coded to assign them to corresponding 'Areas of Purpose', which were: health, social, home / care, safety, environment and services. The 'Areas of Purpose' were further refined in terms of wording and ultimately established as the categorization approach. This involves assigning AAL technologies, services, platforms and products to a category that describes the purpose they are intended to serve. This is visually represented in 3.3, where the final areas are explained: *Health, Safety, Care, Social Life, Services, Home & Environment* and *Leisure Time*. Each area received a color code,

Process of defining the 'Areas of Purpose':
 For each aspect: What do the technologies, services etc. in specific areas serve for - why are they necessary for the target group?
e.g. in 'health' --> should serve someone's health in some way

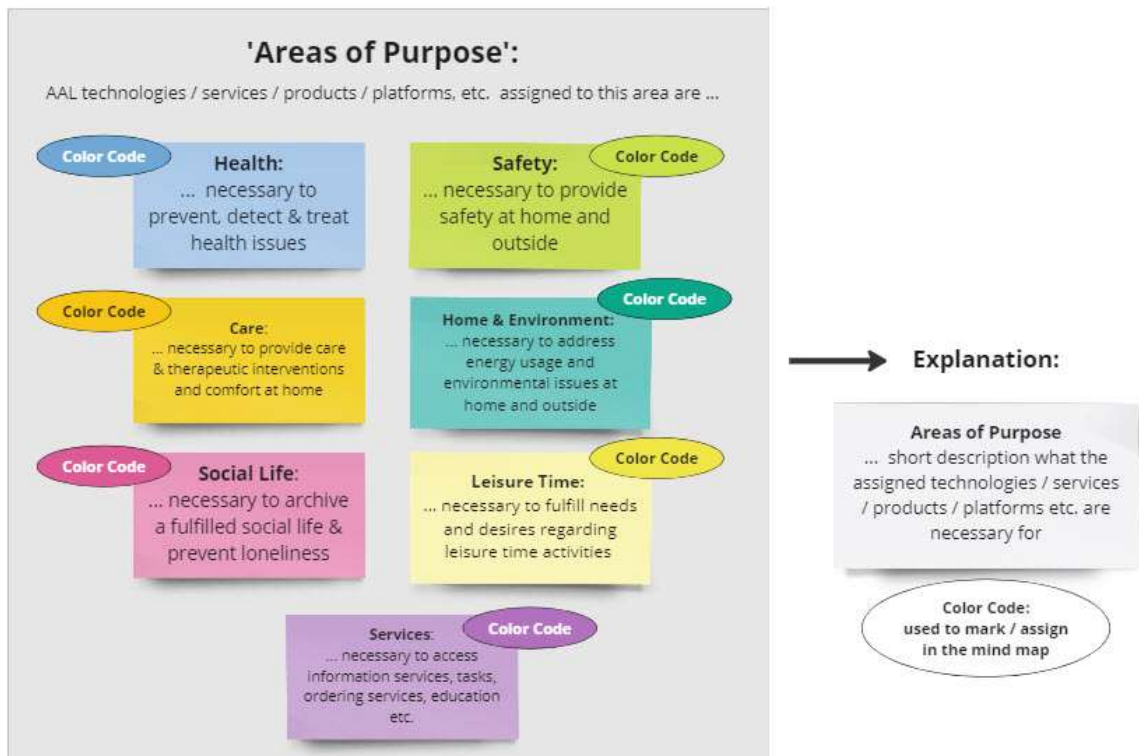


Figure 3.3: Illustration to explain how the 'Areas of Purpose' were defined and assigned.

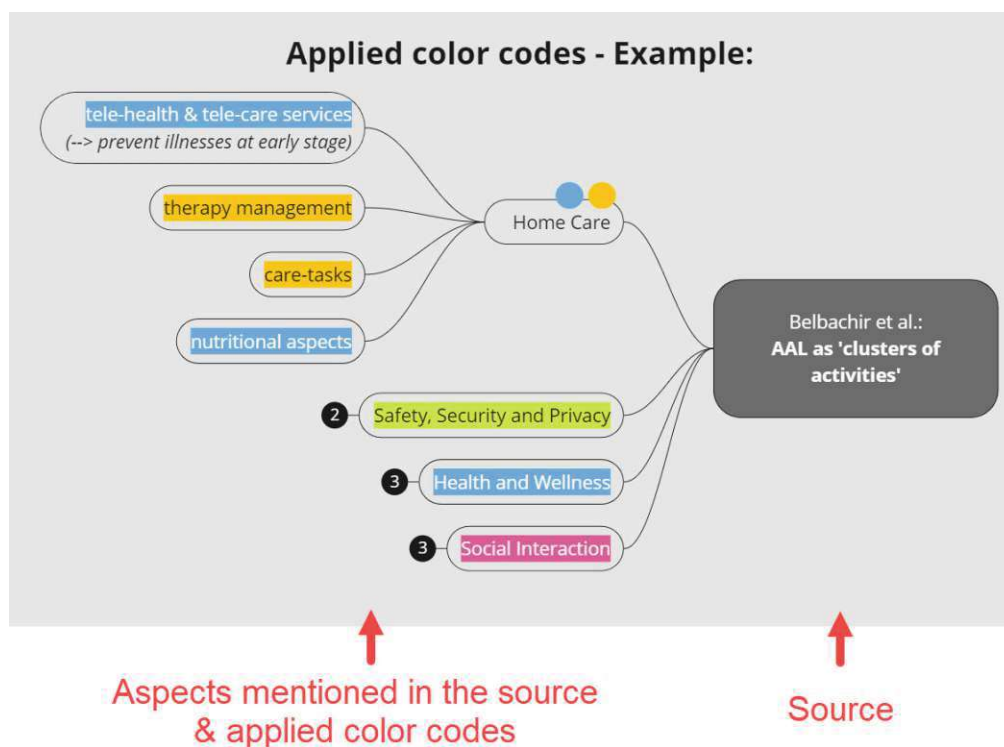


Figure 3.4: Example how the color codes were applied to a source in the mind map

which was later used to evaluate the aspects found in literature. For the more detailed evaluation of the final seven sources, a mind map was drawn on a Miro-Board¹, to help visualizing and comparing them. Figure 3.4 illustrates how the color coding was applied to a literature source in the mind map. The detailed findings of mind map evaluation are presented in the Findings-Section 4.1.1.

3.3 Expert Interviews

Semi-Structured Interviews

The expert interviews were prepared and conducted as semi-structured interviews, because this offered more flexibility than a standardized interview format, as also explained by Trescher et al. [48]. Berger-Grabner [6] outlines the following procedure for a semi-structured interview, which was used as a basis for the conduction of the interview-method: A literature review should be done before conducting the interviews to get a theoretical basis of the topic. Afterwards, an interview guide with three to four main categories should be established. It is also recommended to ask the experts if they would like to stay

¹Miro-Platform: <https://miro.com/>

anonymous. There are some considerable aspects, like how to act during an interview to show the expert that the interviewing person is interested in the content and listening carefully. The interviews should not take longer than 60 minutes.

Interview Guide

After the literature research that was conducted as a first method, there were some aspects taken into consideration for the interview guide. They included the general situation around nursing care in Austria and how the experts would assess it, as well as the market evolution for AAL products and technologies. The term AAL itself and how to promote the use of AAL technologies was another considerable aspect. Around these considerations and the research questions for the thesis, an **interview guide** with four main categories (additionally to the introduction and conclusion) and some sub-categories was constructed, it is shown in table 3.1. For each category, there were open questions predefined. They could be asked in any order during the interview. How many questions were asked and in which order, was open to the situation and how it would fit into the conversation.

INTERVIEW GUIDE	
Main-Category:	Sub-Categories:
Introduction	-
Care and Support for Elderly	Current situation in Austria Challenges and opportunities
Ambient Assisted Living	Overall term and evolution, priorities Categories Experiences with AAL products Selection of AAL products Legal basis / situation
Human-Technology Relationship	Experiences Opportunities
AAL-Promotion: New Ideas	Feedback on the AAL-club-idea Own ideas
Conclusion	-

Table 3.1: Interview-Guide with the pre-defined categories and sub-categories for the semi-structured expert interviews.

Experts

It was the goal for the interviews, to talk to experts from the field of digitization and AAL project and product development, as well as nursing care in general to get insights

into the work with AAL products and members of the target group. The experts were met in contacted via phone or E-Mail and asked to take part in an expert interview for this master thesis. It was an open request and it was made clear, that taking part in the interview was completely voluntary. In total, four experts who were previously known from a professional context were contacted, while three of them - named in the previous section - agreed to take part in the interview.

The first expert, who will be referred to as **Expert I**, is a very experienced qualified nurse in Austria. Her experience comes from personally working in nursing care as a certified nurse in hospitals, nursing homes and rehabilitation clinics. The expert also has experience in home nursing. Later in her career, she was promoted to regional management in and then she managed and coordinated nursing homes and nursing care sections in larger healthcare institutes. The expert has experience in accompanying the installation and introduction of new and digital products within the nursing care section and knows about the development, needs and opportunities of the nursing care section.

The second interview was conducted with an expert in designing and producing Ambient Assisted Living products, specifically fall detection and avoidance systems. The expert, referred to as **Expert II** founded a company specialized in designing these products, successfully selling them all over the world. His expertise includes insights into the challenges and opportunities around designing, developing and producing AAL products, as well as the evaluation of these products with users, the introduction to customers and end-users and the research in the field of AAL products.

The third interviewed expert, referred to as **Expert III**, is an expert in digitalization projects in the healthcare section, specifically in coordinating projects for rehabilitation clinics in Austria. Within her role as a project manager, she oversees the following steps: the evaluation of digital and AAL products regarding their functionalities and specifications, the economic cost-benefit consideration, the selection and legal documentation, the purchase and management of the implementation and installation, and the accompaniment of the end-users of the products.

Organization and Ethics

Time, date and platform (online or in person) were agreed on, while the experts were asked to gift 40 to 65 minutes of their time for the interview. For online interviews, information about the online meeting (Microsoft Teams² (MS) Meeting) was sent by email. In advance of the interviews, the corresponding documents were sent to the experts - all documents can be found in Appendix A:

- **Information sheet** (German: 'Informationsblatt') to inform about the background of the thesis and interview and declare contact persons

²Microsoft Teams: <https://www.microsoft.com/de-at/microsoft-teams/group-chat-software>

- **Declaration of consent** (German: 'Einverständniserklärung') within the information sheet, with the possibility to declare whether it is allowed to record the interview and also to declare whether the name of the expert should be anonymized, as Berger-Grabner [6] recommends to clarify before the interview, if the expert would like to be called by name or not.
- **Data protection declaration** (German: 'Datenschutzerklärung')

Prior to the interview, the experts were asked to read the documents carefully and sign the declaration of consent, give their preferences on the anonymization and recording and the data protection declaration to confirm the usage of the collected data. The documents were sent out in advance to make sure the experts have enough time to read them carefully.

Conduct of the Interviews

Depending on the administrative possibilities and availability of the experts, the interviews were either conducted in person or as online meetings. Expert II was interviewed in person, while Expert I and III were talked to via MS Teams. Including greetings and chatting in the beginning and thanking the experts in the end, the first interview with Expert I took 47 minutes, the one with Expert II took 52 minutes and the interview with Expert III took 48 minutes. To facilitate analysis at a later time, audio recordings were created for all interviews after the interviewees agreed to it. Complementary handwritten notes were also taken. The approach to the analysis and evaluation is explained in the next subsection.

Processing, Analysis and Evaluation Method

In a first step, the interviews were be transcribed from the audio recordings to create written analysis material for the further evaluation. Berger-Grabner [6] explains two methods for transcribing interviews - one focusing on the 'what' the interviewee said, the other on 'how' it was said. For this work, the focus for the transcript lied on the shared verbal content rather than on facial expressions and how something was said. The second step included reviewing the collected material and structuring it for a so-called inductive category formation following the concept of Mayring's summative content analysis, as explained by Trescher et al. [48]. Following this approach, the content collected during the interviews was assigned to interview-categories. The interview-result-categories were developed during the review of the transcript material and handwritten notes, when key parts were highlighted. As a basis, the four categories with eleven sub-categories were adopted from the interview guide and were expanded by 25 further refinement categories. In the third step, the content of all three interviews was assigned to these categories in an analysis matrix. The overview of the identified interview categories and the analysis matrix including interview findings are shown in Appendix A.3.

3.4 Interactive Workshop

3.4.1 Participant Acquisition and Administrative Preparation

It was the goal to conduct a workshop with the target group of people 65 years or older in an environment the participants felt comfortable with, to gather their insights and thoughts on the topic AAL. To gather participants for the workshop, a senior residence in Vienna was contacted with a request to host the workshop there with residents as voluntary participants. In this residence, elderly live independently in their own apartments, which is why there was an interest in talking to them to get their thoughts on using digital assistive systems to support their daily lives. Via E-Mail exchange with the cultural advisor of the residence, detailed information about the master thesis and the research, as well as the workshop-contents and the goal for the user research was provided and questions were cleared. It was confirmed, that it would be possible to conduct the workshop as planned, if participants could be found for the user study. In a first personal meeting with the cultural advisor of the residence, the organization of the workshop, the contents and administrative details (such as where the workshop would take place, materials and date of the workshop) were discussed and agreed on. To gather participants, an invitation with details about the user study was prepared.

Organization and Ethics

The workshop was agreed to take place in a lecture room within the residence. The cultural advisor confirmed, that the potential participants already knew the room before and had taken classes and courses there. The room was equipped with a large table with seats and a projector and screen. Furthermore, materials such as pin boards, pins and a whiteboard were also available and could be used during the workshop. A coffee machine was also set in the room that could be used if participants were interested. The workshop was set to take place on 18th of October and as for the time of the workshop, it was agreed that the late morning would be a good time to choose, because participants might be free between breakfast and lunch.

The following workshop-related documents were prepared beforehand and sent to the cultural advisor of the residence for approval:

- **Invitation to take part in the workshop** (German: 'Einladung zum Workshop 'Digitale / Technologische Alltagserleichterungen') which was later handed out by the cultural advisor of the residence
- **Information sheet** (German: 'Informationsblatt') to inform about the background of the thesis and workshop and declare contact persons
- **Declaration of consent** (German: 'Einverständniserklärung') within the information sheet

- **Data protection declaration** (German: 'Datenschutzerklärung') to explain how the gathered data will be used
- **Participant-Questionnaire** to be handed out in the end of the workshop

All documents can be found in Appendix B.

Consult with the TU Wien Ethics Committee

The workshop included participants from a potentially vulnerable user group (elderly aged 65 or older and possibly impaired due to the age). Therefore it was the goal to consult with the TU Ethics Committee beforehand, to make sure all important aspects were considered during the user research phase. A member of the TU Wien Ethics Committee Mentor Program for students of TU Wien was contacted and had a look at the workshop-related documents. The feedback included two aspects: A clarifying statement should be added to the information about the workshop and a small change should be done in the questionnaire. The workshop agenda and documents were altered accordingly.

3.4.2 Preparation of the Workshop Contents

It was an important goal to have a workshop setting and program the elderly felt comfortable with so they would share their thoughts and participate freely in the tasks planned for the workshop.

Aspects to consider in advance

The cultural advisor of the residence gave valuable insights into the group of potential participants by explaining their daily routine and preferences and what might be important during the workshop. This was discussed during the preparation meeting and the following aspects were therefore included in the planning and preparation for the workshop:

- It is important to talk very loud and clear and move the lips clearly. This will help the participants to understand what is said and contribute to the workshop.
- No physical exertions should be necessary to complete the workshop tasks. Members of the target group, thus potential participants, might not be able to participate in them and feel excluded.
- It might need sort of a warm up phase for the participants to settle down in the workshop situation, so it would be a good idea to offer some snacks and beverages right in the beginning as an ice-breaker (this was originally planned to happen in the end of the session).

- The participants might have difficulties understanding certain terms, for example english words or anglicisms. Therefore, all documents and workshop materials were revised to make sure everything is understandable. This includes an explanation of the word 'workshop', avoidance of anglicisms and English words and also a new title for the workshop featuring a German description rather than the using 'Ambient Assisted Living'.

Additionally, results from scientific research on workshops and research with elderly, presented in Section 2.3, were considered during workshop preparation and implementation. Table 3.2 explains how the important aspects were considered.

Workshop Agenda

The workshop agenda was prepared as following, further described in section '3.4.3 - Detailed Workshop Content':

1. **Let's get to know each other!** (Welcoming snacks & beverages are offered and a welcoming sign is presented on a pinboard - shown in figure 3.5)
2. **What is happening today?** (Administrative things like signing the forms, general information about the speaker, the research and the plan for the workshop is presented)
3. **What is 'digital Assistance' about?** (Short information about what AAL technologies and digital assistance tools are provided)
4. **Let's call it by its name - but how?** (Aim to find a good term for it, that everyone feels comfortable with)
5. **What characteristics does the perfect assistance tool need?** (Creative 'design' of an assistance tool together with the participants by putting together important characteristics about AAL products from a personal point of view, followed by a short discussion about the results)
6. **That (doesn't) appeal to me** (Participants sort cards with examples of AAL products printed on them - accompanied by a discussion)
7. **New ideas around the topic** (Discussing new ideas on how to promote the use of AAL products)
8. **Thank you!** (Time to wrap up, offer snacks, answer open questions, hand out the questionnaire and thank the participants)

CONSIDERATION of ETHICAL ASPECTS for the WORKSHOP	
Considerable Aspects	Implementation
Careful selection of the workshop-environment (enough light, no background noises, etc.) [2]	A room with enough light in a quiet part of the senior residence was organized. There was no background music (though it was considered to create a more relaxed setting) to make sure the spoken words can be understood easier.
Engaging proactively with the participants so they don't feel uncomfortable because they might need some time to sort their thoughts [2]	For all workshop tasks, there were pre-designed contents and tangibles provided to stimulate the conversation and give time to sort thoughts during the discussion.
Remember to talk carefully about advantages that might come from interventions [2]	Especially for AAL products referring to social interaction, it was avoided to ask participants directly if they use certain technologies - instead images and examples were shown and participants were invited to talk freely only if they wished.
Use of careful and clear language [41]	The workshop documents were altered accordingly to make sure they are understandable. Clear and careful communication was also a main goal during the workshop.
Keep unconscious bias in mind [41]	It was kept in mind as good as possible, also trying to reflect on the own verbal expressions during workshop

Table 3.2: Table showing how certain considerable aspects for workshops and research with elderly were implemented and kept in mind for the workshop-method.

3.4.3 Detailed Workshop Content

Presentation Slides

A power point presentation was prepared to guide through the workshop. Austin-Wells et al. researched, that power point presentations are a favored presentation style for elderly [3]. To make sure the presentation slides were understandable and convenient for the participants, some guidelines for barrier-free and well-structured power point presentations were followed ([43], [34]). Firstly, the TU Wien presentation layout was used as a basis for the slides. This layout already follows certain guidelines for barrier-free



Figure 3.5: A sign representing the 'mood' for the workshop - what the participants can expect from it.

presentation design. Secondly, the predefined default layouts were used without many alterations, as this is recommended to keep the structure of the slides clear and readable and each slide was given a title [43]. With the font 'Arial', a sans-serif font was chosen and used with a minimum font-size of 18pt without formatting so participants can read it easily [34]. To make sure the color contrast is clear enough, all slides were checked with the power point functionality hiding the colors, an example is shown in Figure 3.6.

Introduction

The **first agenda item** primarily featured a time frame for the participants to get to know the workshop speaker, have a bite to eat or drink something if they wish, acclimate to the situation and settle on a place around the table. Items necessary for this step were: the room where everything takes place, snacks & beverages, cups and napkins.

In the **second point on the agenda**, all administrative things were covered. This included explaining the forms that had to be signed and asking the participants to sign them. An introduction to the research and effort of the master thesis was provided, as well as an introduction of the researcher / speaker. The checklist for this step included printed versions of the forms, pencils and the presentation shown on a projector and screen.

The **third agenda item** (introduction to the topic) featured a quick overview of examples for AAL products from the fields *Healthcare*, *Smart Home*, *Safety* and *Social Interaction*. For each of them, a few examples were shown with images and a short explanation was

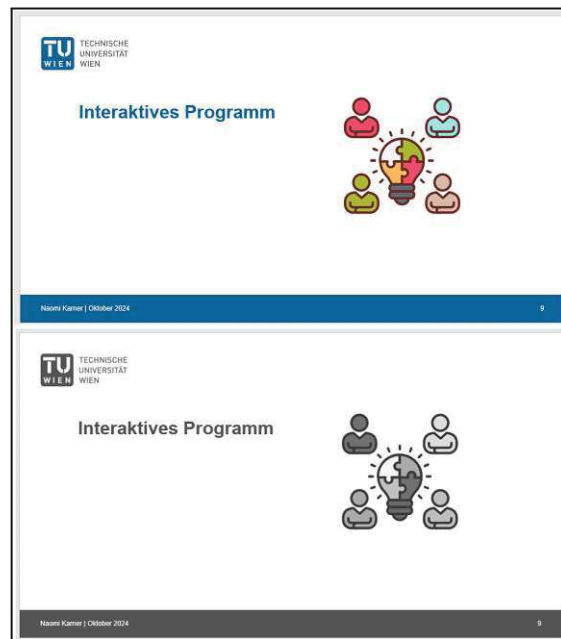


Figure 3.6: Example: Comparing presentation slides with color and hidden colors.

given. Participants were encouraged to share their thoughts or experiences if something came to their minds while looking at the examples. Questions or shared thoughts were discussed with all participants.

The **fourth to seventh agenda item** featured interactive tasks for the participants.

Task 1: Finding a good and user-friendly term to describe AAL systems

For the first interactive task, participants were asked to choose a headline for a fictional advertisement in a fictional newspaper. In the scenario, the advertisement promoted an AAL-event, where AAL technologies were presented and could be tried out. Participants were asked, if they were reading the newspaper, which headline they would find appealing and interesting for that advertisement. Important aspects were: What does the headline need to be understandable and interesting? Which headline would make them read the advertisement? Should the headline be in german or english? There were six headlines proposed, which could be inserted in the gap in the advertisement. There were also additional blank inserts, if the participants had new ideas. The participants were asked to choose one option (or write down a new one), insert it in the gap and talk about their choice. It was explained, that the headline should somehow describe the previously (in the introduction) discussed products. Figure 3.7 shows the fictional newspaper article and the proposed inserts. This task was planned to be performed in groups.



Figure 3.7: Interactive Task 1 of the Workshop: A) shows the fictional newspaper article with the fictional advertisement for an AAL product presentation; B) shows the prepared inserts where participants were asked to pick one or a new one as a headline.

Task 2: Defining important Characteristics for technological Assisting Systems

In a first step, participants were asked to choose one of four areas (healthcare, safety, social interaction, smart home) for this task. Figure 3.8 shows the slides with the task description. In a second step, participants were asked to select from a set of blocks with characteristics written on them. They were asked to choose the ones they thought were most important for AAL technologies. There were also blank blocks and pens available, so they could also write their own characteristics if they missed some. Figure 3.9 shows the blocks with characteristics available for the task. Like the first one, this task was planned to be performed in groups.

Task 3: Reflecting on positive or negative Associations for AAL technology

For this tasks, participants were again asked to be working in groups of three people. There were three A4-sized cards presented, which represented how much the participants liked a certain technology. A green card had 'has a positive effect on me' written on it, accompanied by a smiley; a yellow card had 'has a neutral effect on me' written on it and a red card had 'has a negative effect on me' written on it, again with a smiley. Additionally, there were 12 different cards in A5-size, which showed images of different AAL-products (there were: a fall detection sensor, an assistance-robot, a

„Das braucht die ideale Lösung“

Was muss ein Assistenzsystem mitbringen?

- **Schritt 1:** Bitte wählen Sie eine Kategorie aus, die für Sie im Bezug auf Alltagshilfsmittel am relevantesten ist

Gesundheit

Soziale Interaktion

Sicherheit

Smart Home

- **Schritt 2:** Suchen Sie aus den verfügbaren „Bausteinen“ die für Sie wichtigsten heraus und ordnen Sie sie beliebig an
- **Schritt 3:** Gemeinsame Besprechung der Zusammenstellungen

Naomi Karner | Oktober 2024
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Figure 3.8: Instructions for Task 2 of the Workshop.



Figure 3.9: Interactive Task 2 of the Workshop: Participates were asked to choose from the presented characteristic-blocks.

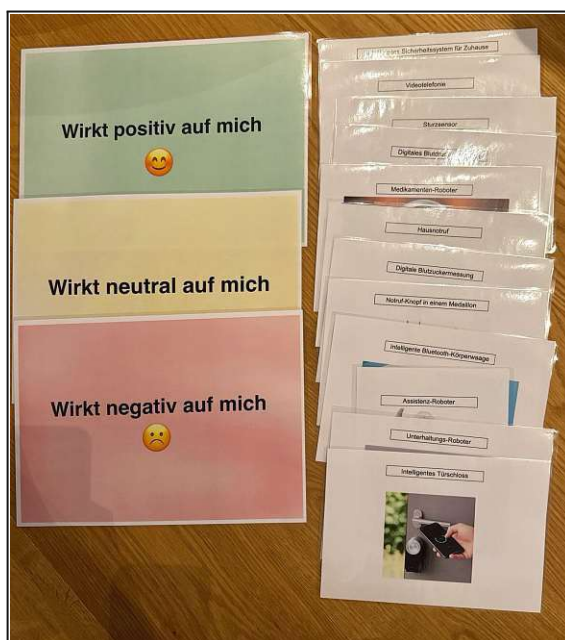


Figure 3.10: Interactive Task 3 of the Workshop: 3 cards 'has a positive effect on me', 'has a negative effect on me', 'has a neutral effect on me' and some example-cards that were supposed to be sorted into the categories.

blood-sugar measurement system, an emergency call system, a blood-pressure measuring device, an intelligent door lock, a medication-robot, an entertainment robot, an intelligent bluetooth body scale, a smart home security system, video calling and an emergency button integrated in a medallion-necklace). Figure 3.10 shows the prepared materials for this task. The participants were asked to assign each technology-card to one of the three cards representing how much they liked the technology, followed by a discussion about the results.

Task 4: Discussing new Ideas

The last task was mainly planned as a discussion task, as it was the last one and could be adjusted to how much time was left for the workshop. Here, the participants were supposed to be asked about their experience with the introduction of AAL technologies in general and how they liked the idea of other seniors presenting the technology to them. However, during the workshop, there was no time left to perform this task with the participants.

For the **eighth and last agenda item**, the workshop is concluded and the questionnaires are handed out. The **questionnaire** includes the following questions:

- General information about the participants: Age and gender

- Affinity for technology: Self-assessment of the participants regarding their affinity for technology (and an optional explanation)
- Digital assistance tools in the participants daily life: Question whether the participants use digital assistance tools in their daily life (and if yes, which ones) and if they would like to use more (and if yes - which ones, if no - why not)
- Feedback on the workshop: How participants liked it in general (on a smiley-scale) and what they liked in particular; General notes on the workshop

3.4.4 Conduct of the Workshop

The Workshop took place in a senior residence in Vienna. There were four participants present. Initially, seven participants registered for the workshop, but three had to cancel last minute. The room and contents were prepared onsite, this took about one hour. The workshop itself was held in German and took around 90 minutes. The workshop was held in a seminar room in the residence. The participants knew the room from several events, so it was a place they should feel comfortable with. A welcoming and snack table was provided, as well as some thank-you-packages with sweets. The resources for the tasks were placed in the room and the printed versions of the formalities were brought as well. Figure 3.11 shows some images of the setup. The room was equipped with a projector and screen to show the power point presentation, as well as a big table and chairs and some more resources like a flip-chart in case they were needed. Figure 3.12 shows the room where the workshop took place.

3.4.5 Documentation and Evaluation

The workshop was documented with hand-written notes, audio recording and pictures. For the hand-written notes taken during the workshop, a 'quick notes form' was prepared beforehand, together with an agenda (check)list - shown in Figure 3.13.

After the workshop, detailed notes were taken with help of the audio-file. Key-insights were identified inductively based on aspects that were collected and learned during the previously conducted methods - for example results that corresponded with the evaluated interview-result-categories. They were highlighted in color and completed with the quick notes and the pictures taken during the workshop. Findings from the workshops were compared and are presented in the following chapter.

3. METHODOLOGY

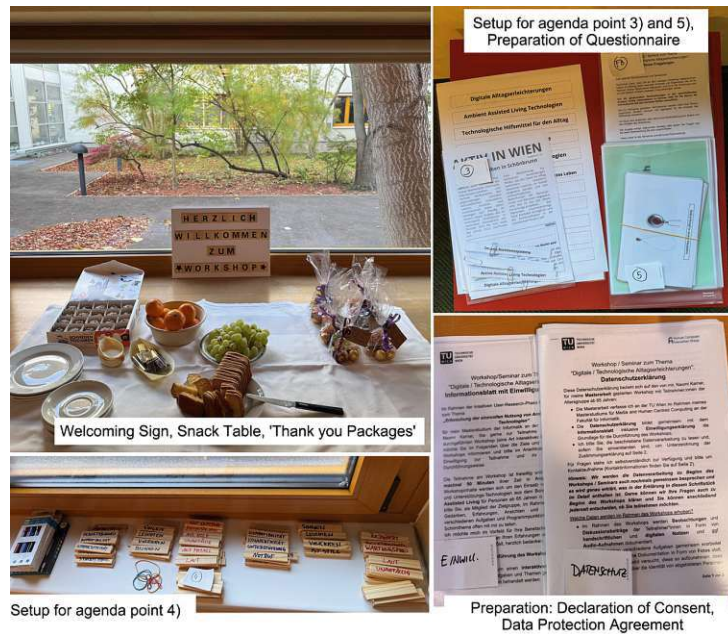


Figure 3.11: Pictures from the prepared welcoming and snack table and the prepared resources for the different tasks in the workshop room.



Workshop Room Preparation: table and chairs, flip-chart, projector & screen, prepared resources for the tasks

Figure 3.12: Picture from the prepared workshop room including a big table, projector and screen showing the presentation, and other resources.

AAL Workshop - Agenda & Time Management

Date: _____
 Start - Time: _____
 End - Time: _____
 # Participants: _____

#	Description	Assets	Min.	Notes
0	Set Up (internally, beforehand - without participants) → Preparation of questionnaires & consent forms → Preparation of gadgets	all assets (setup)	5-10	see checklist
1	Introduction → Vorstellung der Projektleitung → Vorstellung der Forschung → Kurze Präsentation des Programms & Ziels des Workshops (Exkurs: Was ist ein Workshop?) → Fragen vorab? → Hinweise: Fragen jederzeit möglich, Diskussion erwünscht, Abbruch jederzeit möglich → Kein Produkt wird entwickelt	→ Präsentati (Beamer/Leir) → Dokument		
2	Information about the Topic → AAL - Was ist das? → Beispiele zu dem Thema	→ Präsentati (Beamer/Leir)		
3	Namensgebung → in ca 2er Gruppen → Zeitungen als Kontext → Erklärung → Lieblings-Bezeichnung (oder neue) einfügen	→ Präsentati (Beamer/Leir) → Zeitung → Begriffe zu → Stifte		
4	Ideale Technologie finden → in 2 Gruppen aufgeteilt → Vorstellung der Materialien & des Ziels (2-3') → Durchführung des Experiments (7-10') → Gemeinsame Diskussion über das Ergebnis (5')	→ Präsentati (Beamer/Leir) → Bausteine		
5	Positive / negative Association → Zuordnung der Begriff-Kärtchen zu positiv / negativ / neutral → nach jedem Begriff: kurze Diskussion	→ Präsentati (Beamer/Leir) → Schilder p neutral → Schilder n		
6	Ideen → Hat schon jemand den Showroom getestet? → Idee eines AAL Clubs?	→ Präsentati (Beamer/Leir)		
9	Wrap Up, Questions, Closing → Zeit für Fragen → Feedback? → Ausgabe Feedback Bögen (Hinweis: anonym) → DANKE	→ Präsentati (Beamer/Leir) → Feedback		
10	Cake & Talks (informal) → not part of the workshop, as a 'thank you' → time for more questions	→ Goodies (Dankeschön-)		

QUICK NOTES

#	Description	Notes / Dokumentation
0	Set Up	
1	Introduction	
2	Information about the Topic	
3	Namensgebung	

Figure 3.13: Prepared sheet for the hand-written quicknotes to be taken during the workshop



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The approved original version of this thesis is available in print at TU Wien Bibliothek.

Findings

4.1 Findings from Research Phase I

4.1.1 Categorization of AAL products

Seven different ways to categorize, classify, group or describe AAL technologies and products were evaluated in a literature research. The identified and evaluated approaches were: AAL as 'clusters of activities' [5], the 'categorization of health-enabling services' [27], 'AAL functionalities' [8], 'Areas and types of services' for AAL [51], 'categories of support for AAL' [11], 'key facets of the AAL concept' [30] and the TAALXONOMY-project [18]. The approaches are described in detail in Section 2.2. As explained in Section 3.2, they were structured and analyzed visually in a mind map, using colors to mark relating areas of purpose. To assign the different items to specific areas or categories, it was always considered: Which purpose do the mentioned services or technologies or products serve? For example - do they serve someone's health, care, safety or social life? In a first step, the items were assigned broadly, just to evaluate which ones could be connected. Afterwards, names for the areas were chosen. A total of seven **areas of purpose** were identified. Table 4.1 shows the identified areas and how they are described. Figure 4.1 shows the mind map with the color coding of the categories, assigning the aspects evaluated in literature research to the defined areas. Aspects from each literature source contributed individually to the specific areas as also illustrated in the mindmap in Figure 4.1:

- Looking at the area '**HEALTH**', all of the seven examined sources contributed to this area: one aspect from Vimarlund et al. [51], two aspects from Belbachir et al. [5], four aspects from Ludwig et al. [27], one aspect from Braun et al. [8], one aspect from Calvaresi et al. [11], three aspects from O'Grady et al. [30] and two aspects from the TAALXONOMY [17] were assigned.

- Aspects from five sources were assigned to the area '**(HOME -) CARE**': one aspect from Belbachir et al. [5], one aspect from Ludwig et al. [27], one aspect from Braun et al. [8], two aspects from Calvaresi et al. [11] and one aspect from the TAALXONOMY [17] contributed to this area.
- There were six sources that contributed to the established area '**SOCIAL LIFE**': two aspects from Vimarlund et al. [51], one aspect from Belbachir et al. [5], one aspect from Ludwig et al. [27], one aspect from Calvaresi et al. [11], one aspect from O'Grady et al. [30] and one aspect from the TAALXONOMY [17] were assigned to this area.
- For the area '**SAFETY**', also aspects from six sources were assigned: one aspect from Belbachir et al. [5], one aspect from Ludwig et al. [27], three aspects from Braun et al. [8], three aspects from Calvaresi et al. [11], three aspects from O'Grady et al. [30] and one aspect from the TAALXONOMY [17].
- Four sources contributed to the identified area '**LEISURE TIME**': one aspect from Vimarlund et al. [51], one aspect from Ludwig et al. [27], one aspect from O'Grady et al. [30] and one aspect from the TAALXONOMY [17] were considered.
- Aspects from two sources were assigned to the area '**HOME & ENVIRONMENT**': one aspect from Braun et al. [8] and one aspect from the TAALXONOMY [17] were considered.
- There were five sources that contributed to the area '**SERVICES**': three aspects from Vimarlund et al. [51], three aspects from Ludwig et al. [27], three aspects from Calvaresi et al. [11], three aspects from O'Grady et al. [30] and three aspects from the TAALXONOMY [17] were assigned to the area.

The TAALXONOMY was the only source that contributed to all identified areas, while the area 'HEALTH' was the only one every source contributed to. Six sources each contributed to the areas 'SOCIAL LIFE' and 'SAFETY'. Followed by the area '(HOME-) CARE', where five sources contributed to, as well as to the area 'SERVICES'. Four sources contributed to the area 'LEISURE TIME', while only two sources contributed to the area 'SERVICES'. Especially in the areas 'HEALTH', 'SERVICES' and 'SAFETY', multiple aspects per source were assigned to the area.

Sometimes it was not possible to identify only one, but two or three relating areas of purpose. For those items, more than one color and area was associated. Therefore, some

IDENTIFICATION of 'AREAS of PURPOSE for AAL'	
Area of Purpose:	AAL technologies, services, products & platforms assigned to this area are ...
'HEALTH'	... necessary to prevent, detect & treat health issues.
'(HOME -) CARE'	... necessary to provide care & therapeutic interventions and comfort at home.
'SOCIAL LIFE'	... necessary to archive a fulfilled social life & prevent loneliness.
'SAFETY'	... necessary to provide safety at home and outside.
'LEISURE TIME'	... necessary to fulfill needs and desires regarding leisure time activities.
'HOME & ENVIRONMENT'	... necessary to address energy usage and environmental issues at home and outside.
'SERVICES'	... necessary to access information services, tasks, ordering services, education and more.

Table 4.1: Overview of the identified Areas of Purpose and a description of which aspects were included

areas were identified as overlapping (connected both ways) - also shown in the lower part of Figure 4.1:

- 'Health' and 'Social Life'
- 'Health' and '(Home) - Care'
- 'Health' and 'Safety'
- 'Health' and 'Services'
- '(Home) - Care' and 'Safety'
- '(Home) - Care' and 'Home & Environment'
- 'Social Life' and 'Services'
- 'Social Life' and 'Leisure Time'

4. FINDINGS

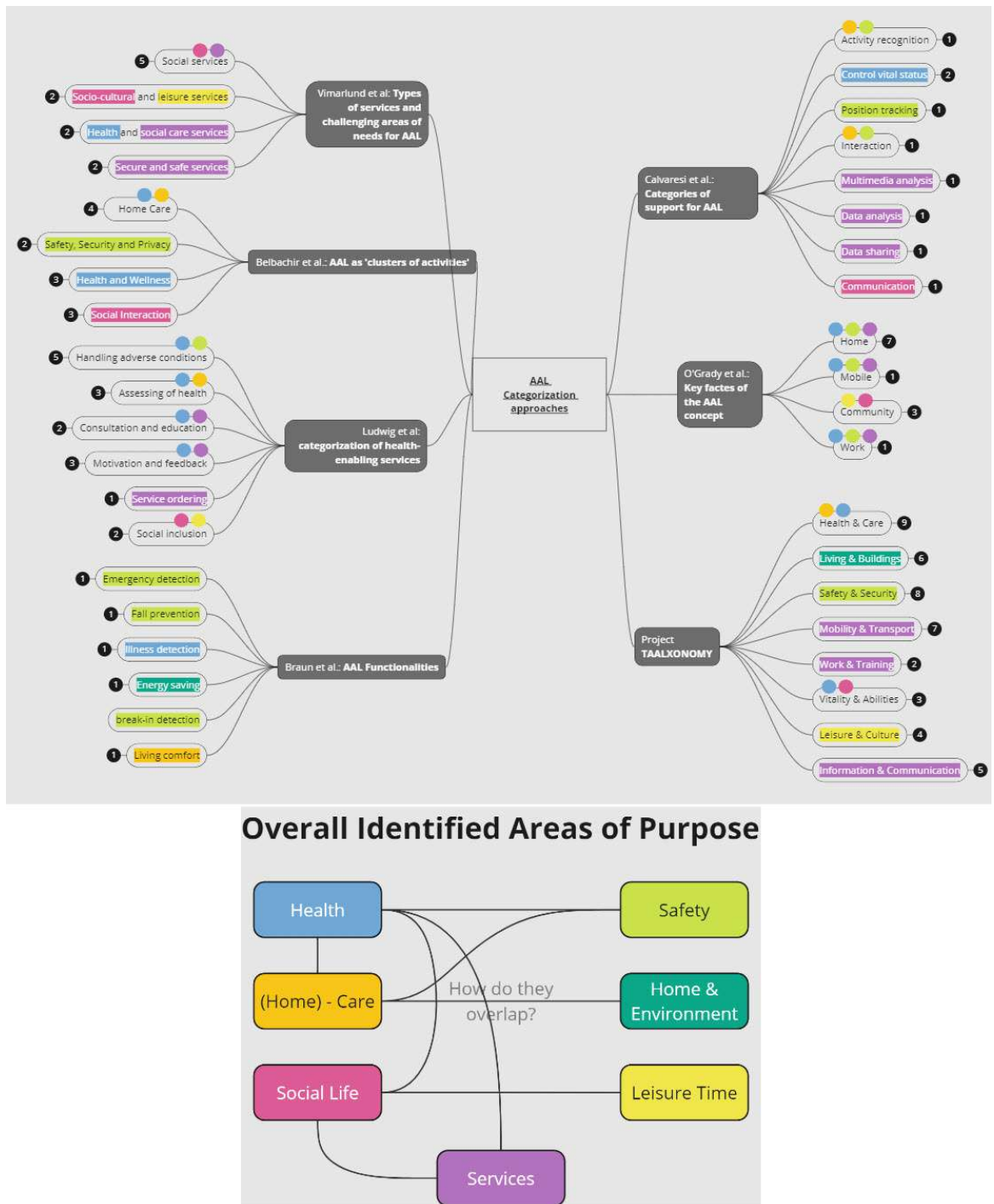


Figure 4.1: Analysis of different category-approaches for AAL from [5], [27], [8], [11], [30], [17] - analyzed with a color-concept highlighting the different areas of purpose.

Take-Aways from Literature Research for the Interviews

From literature research and the first engagement with the topic, the following aspects were take-aways for the following interviews and the establishment of the interview guide:

- **Aspects regarding the (in literature considered critical) situation in nursing care in Austria:** How do the experts generally think the nursing care situation develops in Austria? How are their experiences with applying technology to create relief for nursing care personnel? What is necessary to promote the use of technologies in the care of older people?
- **The Market for AAL:** There are different opinions in literature and considered by market evaluations, including some sources indicating there has been no clear breakthrough and others explaining there is a constant development across the globe. How do experts think the market is developing at the moment? How can and should the international competition in the AAL market be taken into consideration and what has to be thought of when evaluating AAL products, also regarding development countries, legal aspects and selection criteria?
- **Naming of AAL products:** There are different approaches to name AAL technologies - Which naming would the experts prefer, how are their experiences with the target group around introducing AAL products? What could serve as a vehicle to promote AAL products?
- **AAL Categories:** Different aspects have been taken into consideration for the evaluation of AAL categories. Sources in literature often lay their focus on specific areas while others are more left out. Which categories would experts consider the most important ones - also related to the needs of the target group?

The listed aspects were considered for the interview guide and discussed with the experts.

4.1.2 Interviews

Interview-Results

This section presents the most important outcomes from the three expert interviews that were conducted. The first expert, also referred to as Expert I, is an experienced qualified nurse in Austria. The second expert, Expert II, is the CEO of company that develops AAL products and the third expert, Expert III, is a project manager in the healthcare sector who is responsible for digitalization projects.

Category 1 - Nursing Care in general:

Expert II and III addressed the **problematic shortage of personnel in the caregiving profession**. Expert II, an expert in developing AAL products, also mentioned that, since the COVID-19 crisis, there have been resignations and career shifts. Furthermore,

he noted that regarding the caregiving situation, 80% of the elderly population live in private households and are cared for there. Expert I, a qualified nurse, pointed out that while there are skilled workers who will soon complete their training, they will then have the freedom to choose positions that suit them and select roles they find appealing.

All three experts mentioned the **need of increased attractiveness and innovation in caregiving professions**. Expert I specifically highlighted young people, for whom the profession is currently too unattractive. Expert II remarked that, from his experience, the thinking about digitalization and innovation in caregiving is still too limited. He mentioned digital care documentation as an example, explaining that it is necessary to think beyond simply digitizing existing practices. According to the expert, there is much more potential impact if we adopt a more innovative approach.

Regarding **opportunities** of using technology in caregiving, Expert III, an expert in digitalization projects, stated that, from her experience, there is a certain openness within the administration of residence homes. However, cost savings ultimately need to be achieved. She also highlighted, that the people who will finally work with these tools are the caregivers. Expert II mentioned that there are manufacturing companies that directly target caregivers and are successful in doing so. Additionally, the expert believes that there are caregivers who appreciate the presence of systems that support them (regardless of the specific technology used). He also noted that the openness toward new technologies has increased since COVID-19:

'Was man schon seit Corona auch gemerkt hat, ist, dass die Offenheit für neue Technologie größer ist, das heißt, dass einfach das Bewusstsein stärker vorhanden ist, ja, neue Technologie kann unterstützen, weil man einfach zu COVID Zeiten gesehen hat, dass zum Beispiel Skype, oder was auch immer, irgendwelche einfachen Kommunikationsmöglichkeiten, enorme Benefits haben, dadurch ist jetzt schon eine größere Offenheit vorhanden, das heißt das hat sich schon extrem gewandelt.'

(en: 'What has also been noticeable since COVID-19 is that openness to new technology has increased, meaning that awareness has grown about how new technology can indeed be supportive. During COVID times, for example, tools like Skype, or any simple communication options, were shown to have enormous benefits. This has led to a significant greater openness now, indicating a considerable shift in attitude.')

(Quote by Expert II during his interview.)

He also noted, in relation to the political discussion on the need to recruit new caregivers, that technology must contribute alongside support programs. He went on to say that there are many products on the market that offer relief, but the caregiving sector is still in the early stages in this regard. Expert I sees an opportunity for nursing robots for long-term care facilities, as soon as this is possible. Because of the high costs, she sees a practical implementation in bigger establishments. Regarding smart home technology,

the expert sees a meaningful application in enabling people to remain at home longer with less intensive caregiving. In this context, she also mentioned fall sensors, highlighting that these solutions can reassure family members. The expert further explained, that technical aids will eventually become necessary in the future when staff is not available.

Regarding the **challenges** for applying AAL technologies in the field of caring for elderly, Expert II mentioned budget restrictions and focus on profit maximization as reasons why solutions are not bought even though there is openness for it. He also explains, that some manufacturers promise more than they can deliver, which casts the entire industry in a negative light as soon as someone makes a negative experience. The third expert mentioned, that the caregiving staff might not see the benefit of using those technologies, at least not as long as it isn't a mature product. The expert suggested the following reasons for this: caregiving staff may fear losing their jobs or being replaced, implementation might be perceived as too inconvenient, and malfunctions can lead to a generally negative view.

Category 2 - AAL in general:

Expert II said that he knew the **term 'AAL'** since 2010, but it is still a niche topic. Although it is a great world, it is barely known outside its 'bubble'. He explained that while everyone at AAL-focused conferences is familiar with it, beyond that, it is not very well known, and he is no longer entirely satisfied with the term. He also noted an issue for older people living at home: they often feel like they do not need the technology. Especially when Assistive Systems are presented as technology specifically for elderly, admitting the need is an issue. In this regard, he also mentioned the need to be cautious about stigmatization. He noted that the trend of self-monitoring and making everything measurable might lead to a shift in mindset within the generation. This could increase acceptance of such systems, if they offer benefits beyond emergency situations, like fall detection. If a system only proves useful in rare emergencies, such as a fall that might happen once every five years, it may not seem valuable enough. Regarding important **categories of AAL**, Expert I said that, in her view, safety is likely the top priority in AAL categories, closely followed by social interaction. She emphasized that a lack of social contact can lead to illness. For her, these two aspects are the most important.

Regarding the **market evolution of AAL**, Expert II said that he thinks it is very positive that the market is gradually coming to life, with new competitors entering the field. This growth, he explained, is boosting both demand and awareness, as the topic and how it can be of support is now widespread rather than the niche subject it was five years ago. The expert added that he believes the market will continue to evolve significantly, as currently, everything is being tested. He described this as an exploratory phase where different solutions are tried out. Eventually, he expects the market to condense around certain applications, with a clearer understanding of which solutions truly add value and which are more 'nice to have'.

Expert III noted regarding the **development of AAL products**, that numerous small startups are developing apps or products, though many are still quite underdeveloped.

She observed that there are too few people with real expertise in caregiving involved in these projects. Expert II also mentioned that, to be successful, it is essential to understand customer needs as thoroughly as possible. Without this understanding, there is a risk of developing products that do not truly meet the customer's requirements.

With regard to the **number of products available**, the Expert I mentioned that there are countless fall detection systems nowadays. Expert III observed, that in institutional care or the B2B sector, there is an overwhelming number of products, almost like mushrooms popping up everywhere. She suggested that, theoretically, a new product could be introduced every day if the scope were not narrowed. However, in home care, she believes there are far fewer accessible options. She gives fall detection watches and similar devices as an example. In institutional care, there seems to be something new to consider every day. Expert II noted that standalone solutions are also an issue in caregiving. Regarding their own products, he said that they follow an integrative approach, avoiding being just another standalone solution or the ultimate platform that fulfills all needs. Instead, when other platforms or systems exist, they integrate with them. He also mentioned the Matter standard ¹, expressing hope that it will establish itself to standardize smart home technology, as the current situation of incompatible systems is problematic.

Awareness of AAL: Expert II raised the question of why AAL has not gained broader acceptance and why it has received too little attention, mentioning insufficient marketing and information. He suggested that terms like 'assistive systems' or 'support systems', even though they are generic, are at least better understandable. In private households, AAL aligns more with the concept of smart home technology, though in caregiving, 'smart home' may not resonate as well and is sometimes met with resistance. Therefore, he believes terms like 'digital assistive systems' or 'digital support' might be more effective for reaching a receptive audience. Expert III noted that most people are familiar with organizations like Caritas or the Red Cross, but few are aware of other available products or aids beyond the solution from there. She pointed out that these solutions are rarely advertised and difficult to find. Even in medical supply stores, options are limited to items like mats and incontinence products, leaving other assistive tools largely unknown. Expert I noted that recommendations for certain products could indeed be beneficial. She suggested that the community nurses, who are now widely available, could play a role in this. Their purpose is to provide advice without being involved in sales, making them well-suited for offering recommendations.

The experts were also interviewed about their experiences with AAL products. Two experts mentioned something about the **design of AAL tools**. Expert II, when asked whether older people should use technologies that were not specifically designed for them, said that it must not become too complicated. Usability is key, and there is a difference in what each generation is used to and how operating concepts look like, this has to be considered. Regarding special smartphones for elderly, he pointed out to stigmatization -

¹*Matter Standard* for Smart Home: <https://matter-smarthome.de/>

elderly asking, why they get something special. However, he added that he was never a fan of various research projects that create, for example, 'Skype for older people', effectively pushing them into a niche:

'Okay, Skype für ältere Leute ist so quasi Abschieben in die Nische, du bist alt, du bekommst ein Skype für ältere Leute, warum verwendest du nicht einfach Skype? Also Beispiel jetzt.'

(en: 'Okay, Skype for older people is sort of pushing them into a niche: you're old, so you get a Skype for older people—why not just use Skype? Just as an example.')

(Quote of Expert II during his interview.)

He also shared a learning experience from testing functional prototypes that focused solely on functionality. These prototypes, lacking any design, were not perceived as actual products due to their lack of seriousness and polish. Expert III noted issues with systems like a fall detection system integrated in the floor, which was initially seen as beneficial due to its discreet design. However, the high costs and challenges associated with installation, such as needing to renovate and concerns about future technological updates, make it problematic. She added that the system had frequent false alarms - like when a dog was present - causing frustration for residents, caregivers, and others involved.

Experts I and III shared about the **application and usage of AAL technologies**. Expert I expressed skepticism about using certain technologies, like fall sensors, in care facilities. She noted that numerous fall sensors in one facility can be overwhelming, while a simpler solution, like bed exit bars, provide the same function without overly burdening staff. She emphasized that while many of the technologies presented are impressive and valuable, she often questions whether the high cost is justified, as she has not seen a clear benefit that would make her willing to invest heavily in them. However, she is very supportive of using these technologies at home, where they can offer real benefits, such as reminders for medication after home care staff prepared it. She shared that, in her experience, caregivers are generally not opposed to new technologies as long as they see value in them and the tools do not complicate their work. Proper implementation is key. She believes that once the technology is recognized as practical and simple, it will not face much resistance. Expert III highlighted that the need for specific types of care varies greatly, and in areas like fall detection within AAL systems, committing to one provider can make buyers feel locked in. Each provider has its own unique system also regarding installation in an elder's room, making it difficult to switch later. She emphasized that a single negative experience with a product can make users hesitant to try new systems due to the long-term costs involved in changing technologies. This applies to apps as well, as changing systems often requires new integrations and interfaces, making it necessary to start all over again.

Expert II explained that **understanding AAL products** is challenging, as they are generally quite complex. Their own product, for instance, is complex and requires

explanation, and as they add more functionalities to provide broader support, the system naturally becomes more complicated. He does not see complexity itself as a problem but believes that appropriate training programs are essential. He contrasted this with simpler systems, like sensor mats, which are easy to understand (step on them), and they trigger an alarm. However, he does not view simplicity alone as a sign of quality. The more technology involved, the more complex the system becomes, so effective training concepts are necessary.

The experts talked about **key criteria for selecting AAL products**. Expert I underlined that the most important consideration for her is whether a product is truly useful and fulfills its purpose. She explained that she first evaluates price-performance and if another product accomplishes the same thing at a lower cost without recurring expenses, that's a key factor. Then, she considers functionality, checking if the product does what it is supposed to. Ease of use is also important, if a product is complicated, people tend to avoid it, even if it could save time in the long run. The setup process matters as well; ideally, a product should be simple to install without needing extensive support. Above all, the product must deliver on its promises, which means it has to be tested to make this sure. Expert II emphasized that the price is often the top criterion, with a tendency to go for the cheapest option. He views this approach critically - not because their own product may be more expensive but because he thinks it is the wrong approach. He also noted that if a lower level of accuracy suits a particular use case, then a lower-cost option may be acceptable if the price-to-performance ratio aligns with expectations. However, he frequently observes that people select products based solely on price, only to end up dissatisfied because the product does not meet their expectations. He talked about the importance of a critical approach in selection, though it can be challenging because one would have to test and compare all options. Additionally, data protection is important, especially for camera-based systems, which often face lower acceptance from data protection officers. While some countries use cameras when no alternative exists, a general shift in thinking is underway. He also highlighted the need for educating stakeholders, as many do not fully understand how these systems work and often lack the interest to do so, which would help them make better-informed decisions. Expert III talked about the importance of evaluating the background of any company or individual presenting a product, explaining one cannot rely on references. She stated that she checks whether they have real experience in caregiving or if they are newcomers with financial backing but limited knowledge in the field:

'Aber eigentlich mittlerweile würde ich mir echt anschauen: Was ist der Hintergrund der der Firma beziehungsweise der Personen, die, die da die das aufgebaut haben, die das entwickelt haben.'

(en: 'But nowadays, I would really look at the background of the company or the people who built and developed it.')

(Quote of expert III during her interview.)

Before even considering a product, she recommended understanding the developers'

perspective on the caregiving challenges and needs. She also mentioned that she would ask for a contact at one of the references. Cost considerations are another significant factor, not just initial costs but also ongoing and variable costs. She highlighted the importance of conducting a needs analysis with caregivers and administrators. She also discussed the flexibility of AAL products. For example, AAL robots face practical challenges, such as navigating fire doors or accessing rooms where patients are bedridden. While robots might be beneficial for delivering items like meals, the logistics of room access often limit their effectiveness. She concluded that investing in such technologies requires careful consideration of real-world usage and constraints, as well as potential long-term costs and practical implications in facility design.

The experts also discussed **stakeholders in the AAL field**. Expert I explained that decisions about introducing new technology or systems in a care facility typically involve management, including administration, nursing services, and the executive team. They collectively assess whether a product aligns with the facility's needs and environment and ensure proper implementation if approved. She also noted the challenge of enthusiasm versus reality. Sometimes, she becomes very excited about a new idea or product, only to later realize it doesn't live up to initial expectations.

Expert II identified the main stakeholders involved in adopting new technologies in care settings from his point of view, which include facility management, nursing management, residential area supervisors, and individual caregivers working directly with residents. He emphasized that if any part of this chain is left out of the process, skepticism arises, making acceptance more difficult. He also mentioned the importance of involving the technical team, even if the product does not require IT support, to keep them informed and address any concerns. Additionally he mentioned higher management and relevant authorities, such as resident representation bodies. Expert II also noted that from his experience, relatives are less involved. Occasionally, family members express wishes, such as wanting a system they have seen used in another resident's room for their own relative. While this is understandable, he observed that the decision-making and push for these systems typically rest with the caregiving staff rather than with family members. He went on explaining that his company's focus lies primarily on staff, as they are the most critical factor for system acceptance during implementation. Residents generally view new systems positively, but it is essential that the care facility provides clear explanations to ensure everyone understands what the system does.

Expert III explained that caregivers and care managers must be on board first, as they effectively present and 'sell' the product to the residents or patients. Convincing the caregivers also helps in gaining the acceptance of the people receiving care. However, she emphasized that family members are often the ultimate decision-makers, as they influence, or even control, decisions for their loved ones in care. Families may also have legal authority, such as a power of attorney or a living will, over the care recipient's choices. The expert suggested that through informational events, where caregivers, rather than executives or manufacturers, explain the product benefits, are essential to gain trust. She noted that effective communication could be even more valuable than the

product itself, as family members, especially in private or self-paying sectors, often base their acceptance on trust and clear communication over product specifications. When considering future generations, Expert I acknowledged that they will likely have higher expectations and will demand more from such technology, possibly wanting more engagement and functionality.

On the area how to successfully **introduce AAL systems**, the experts discussed the following aspects. Expert II shared that they have learned a lot about implementing AAL products over the years. Initially, they provided brief 15-minute training sessions, assuming the system was mostly self-explanatory. However, they have since shifted to multiple two-hour training sessions, allowing more time for questions and ensuring that all involved parties fully understand the system. This approach has proven very effective in increasing acceptance. He noted that if not all staff members can be reached, misunderstandings can arise, with some caregivers questioning the purpose of the device, which can lead to rumors and reduce acceptance. He further shared his thoughts on introducing AAL products in private households. He believes that for older individuals, personal contact is essential for effective communication. However, a video explanation directed at family members could be effective, allowing them to learn and introduce the system's purpose to their loved ones. He highlighted that it is crucial to take the time to speak directly with stakeholders and explain what the technology does and does not do to increase acceptance. Expert III told about her experience with attempting to introduce an AAL product in a rehabilitation facility. Despite her efforts to engage the nursing team, including a kickoff meeting with a representative from the company, the product was never adopted. Although the initial team was almost entirely present at these sessions, they did not use it, often citing a lack of suitable patients. She noted that the product was seen as unfavorable by the team, who rejected it from the start. The Plug and Play aspect of the technology, intended as an advantage for easy setup, instead caused concerns over how to integrate it into individual rooms, assign it correctly, and manage settings—raising questions of who would oversee this ongoing maintenance. This responsibility gap created further hesitation, as errors in configuration could introduce risks, making it crucial to assign clear oversight.

Legal aspects around AAL were also discussed with the experts. Expert II argued that a legal guideline for care homes and hospitals to adopt new technologies is necessary, to push innovation more strongly. He believes that data protection is adequately covered, especially with upcoming regulations like the AI Act², which aligns well with their practices. However, he acknowledged that the AI Act could deter smaller companies, particularly regarding high-risk systems for medical products, where stricter classifications could feel counterproductive, though regulation is understandable. He proposed discussing how technology could impact staffing ratios, not to reduce caregivers but to improve care quality given the current shortage. He suggested benefits for facilities operating at minimum staffing levels when they adopt technologies. He also highlighted the need for unified regulations across Austria's nine states regarding staffing ratios, pointing out

²AI Act - The EU Artificial Intelligence Act <https://artificialintelligenceact.eu/de/>

disparities, such as Vienna having significantly more staff than Lower Austria. Expert III expressed frustration over the lack of regulation for AAL in Austria. She highlighted that this lack of clear regulations has posed challenges for her, as there is no foundational framework or set of use cases to reference. The process has been slow, with regulations being vague. She also said the GDPR³, which is relevant in this context, is extremely unclear.

Category 3 - Human-Technology Relationship:

Expert I believes that, in the future, it will not be hard to implement AAL technologies because upcoming generations, including her own, are already used to using technology in daily life. She noted that today's 65-year-olds, who are still living at home, have a different relationship with technology than previous generations. By the time these individuals enter care settings, they will likely expect the integration of technology to be 'state of the art'. She observed that interests and activities in senior care are evolving, as newer generations of elderly individuals bring different cultural experiences, like listening to rock music. Unlike past activities centered on crafting or traditional hobbies, future care environments will need to adapt. She expects this shift will naturally create a positive relationship with technology, making things like smart home systems and digital assistants standard in senior care.

Expert II pointed out, that in care facilities, residents rarely build a personal connection with the system because they do not actively use it. Even caregivers do not typically engage with the platform directly; for them, it is a box that either triggers an alarm or does not, so their interaction is minimal. However, for those who manage and adjust the settings, having a user-friendly, low-barrier system is essential. Caregivers benefit from flexibility in how they use the systems, allowing them to adapt the technology to different needs and times. He told about one customer, who established a relationship to her fall detection sensor, because it meant a feeling of safety for her, but he indicated they rarely receive those information. The expert also shared an example of a care facility where a sensor was even given a name. Expert II explained that during product development, they engaged industrial designers to critically examine every aspect from scratch. This included conducting interviews with caregivers to understand their needs and the factors influencing acceptance of new technologies. The designers also familiarized themselves with the architecture of care facilities to create a sensor that would integrate harmoniously into the environment, in order to avoid that the device is perceived as disruptive.

Expert III argued that a positive association and trust needed for acceptance can only be established through caregivers, who work directly with the ones in need of care and have established relationships with them and their families. If a trusted caregiver explains the benefits, residents and families are more likely to accept and appreciate the product, seeing it as legitimate and helpful. She contrasted this with the impression left if an unfamiliar, unexplained device is placed in a room, which could lead to suspicion, like 'Big Brother is watching'. Instead, if caregivers introduce and explain how the device can

³ *GDPR* - General Data Protection Regulation: <https://gdpr.eu/>

provide security and support, it is far more likely to be trusted and accepted. Essentially, caregivers are the ones who truly 'sell' the product by conveying its value and purpose.

Category 4 - Promotion of AAL products:

In the last interview part, the experts were asked to share their thoughts on (new) ways to promote AAL technologies. Expert II talked about the importance of integrating AAL technology into caregiver training programs in general. Although there are some efforts to include technology in the curriculum, it remains limited and superficial. Some institutions have begun using showrooms to introduce trainees to AAL systems, but these practices are not widespread. He believes that a basic understanding of new technologies should be a core part of caregiving education so that, upon entering the workforce, caregivers expect and advocate for these tools. He envisions raising awareness, so that caregivers and family members actively request technology in care settings. For the curriculum itself, he explains that it is less about specific systems and more about introducing a general awareness of available technologies and their applications. The goal is to teach caregivers not only about existing tools but also how to evaluate new solutions and identify the areas where technology can benefit caregiving, giving them the skills to make informed decisions.

Lastly, the experts were asked for their feedback on an '**AAL Club Concept Idea**'. This was described as a concept, where members of the target group, being older individuals, act as experts in the AAL field. They are then introducing the technology to other members of the target group, promoting solutions, answering questions and supporting with the selection and installation of new solutions. The experts reacted positively to that idea. Expert I supported the idea, comparing it to the way people trust recommendations from family members or friends, like a relative who swears by a specific brand of vitamins. She noted that this kind of personalized endorsement can be very effective and can significantly boost acceptance. Expert II stated that a comprehensive approach is necessary to reach all seniors and their families. With about 80% of seniors living at home and 20% in care facilities, these groups require completely different methods of engagement. He emphasized that a range of strategies will be needed to effectively address the diverse needs of each setting. Expert III shared that she once wanted to do something like that idea. They had attempted to create a 'buddy' system, but finding suitable participants was difficult. They also set up a fully equipped demonstration apartment, designed to spark interest among residents in a senior residence by allowing them to test living in a high-tech, modern space for a few weeks. However, despite an open house event specifically for staff - where kitchen staff showed more interest than caregivers - no residents expressed a desire to try it. The model apartment was fully modernized, with high-end kitchen and living room amenities, yet it remained unappealing to residents. One issue was the limited space; the apartment lacked adequate storage, such as a closet, making it impractical for everyday needs like storing clothes, which likely deterred interest further.

Take-Aways from the interviews for Research Phase II

The following findings from the interviews were especially considered during the design of the workshop concept:

- **Terminology and Acceptance:** 'AAL' remains a niche topic and may benefit from a more user-friendly terminology. Some older people hesitate to adopt assistive systems if they feel singled out by the technology.
- **Awareness of AAL - Marketing and Familiarity:** AAL awareness is limited, partly due to insufficient marketing. More accessible terms, like 'digital assistive systems', could enhance understanding.
- **'AAL Club Concept':** Experts reacted positively to the concept of an 'AAL club' where older individuals help introduce technology to peers. Expert I compared it to trusted recommendations from family or friends. Expert III shared that a similar attempt to engage residents with a modernized test apartment was unsuccessful due to impractical design and limited interest among residents.
- **Human-Technology-Relationship and User Interaction:** User interactions with AAL systems are limited, and caregivers generally see them as tools that either work or do not. A few residents develop personal connections to AAL devices if they provide a sense of security.

4.2 Findings from Research Phase II - Workshop

The results from the workshop-method divide in two parts: Firstly, the results from the practical workshop for the target group of participants aged 65 or higher are explained. Secondly, a general workshop-concept, which was derived from the tested workshop, is presented in this section. This concept could be used and implemented for other workshops on different topics, where the user-centred point of view wants to be evaluated without simply asking direct questions about it.

4.2.1 Practical Implementation of the Workshop: Results

The workshop was conducted with four participants from the target group. The participants were between 85 and 93 years old and there were two female and two male participants.

Insights from the Introduction- and Information-Phase

One participant mentioned, that she uses as many technological tools as possible. She has a smart watch, that she uses everyday, carries her smart phone with her and uses it for various things, such as video-calls with her grandson.

Regarding fall-detection, the participants mentioned, that they know some solutions. They knew, that a solution, where the detection system is integrated in the floor, is used in another apartment in the senior house they live in. They were discussing, if that was dangerous and what would happen if nobody fell, but just a chair was moved around - would there be an alarm then? Another participant declined and explained, that the system only alarms when someone is falling to the ground. Two participants underlined, that they thought a fall-detection-watch was the best solution due to the flexibility, because they are moving around a lot.

Energy-usage was also discussed by the participants. One participant told about how he as an option to turn off power in his kitchen at once (except for the fridge), and that this is very helping. One participant mentioned, that she simply turns all power off sometimes.

Results from Task 1 - A Name for AAL Technologies

The participants were pleased to read the fictional newspaper article that was provided for the first task. They then evaluated the provided snippets and discussed which one to take. One participant mentioned:

'Englisch ist schonmal schlecht'
(en: 'English is already bad')
(Quote by one participant during task 1.)

Language was discussed in general, it was mentioned, that in the participant's age russian language was learned rather than english when they were younger. In the end, two participants selected *'Technologische Hilfsmittel für den Alltag'* (en: 'Technological aids for everyday life') from the provided suggestions. Another participant mentioned, that it would be good to have a description consisting of one single word, for example like the German term 'handy' (en: 'mobile phone') describes a mobile phone in german with just one word. This participant decided to choose *'Automatische Hilfsmittel für den Alltag'* (en: 'Automatic aids for everyday life ') as a final result. The fourth participant wrote down his own solution: *'Technische Hilfsmittel für den Alltag'* (en: 'Technical aids for everyday life '). It was also mentioned, that the ideal name depends on who should be addressed with the advertisement. Figure 4.2 shows images of the work of the participants for this task.

Results from Task 2

For the second task, the participants were asked to think about the aids that were discussed and look at the provided characteristic-blocks. They were asked to choose those, that were important for them regarding the discussed technologies. Figures 4.3 and 4.4 show images of the final results of all 4 participants:



Figure 4.2: Results from the first task.

- The first participant selected the following characteristics: *'Vernetzbarkeit'*, *'Ästhetik +'*, *'Bedienbarkeit'*, *'Sicherheit'*, *'Bequemlichkeit'*, *'Blinken'* (en: 'Connectability', 'Aesthetics +', 'Usability', 'Security', 'Convenience', 'Flashing')
- The second participant chose *'hell'*, *'einfach'*, *'aus Holz'*, *'seniorengerecht'*, *'leise'*, *'summen'*, *'vibrieren'*, *'piepsen'*, *'leuchten'* (en: 'bright', 'simple', 'made of wood', 'suitable for seniors', 'quiet', 'humming', 'vibrating', 'beeping', 'lighting'). This participant questioned, if it was even possible to make the discussed items out of wood. In the end, he chose it. This participant also mentioned, that he still hears very good, in contrast to others at his age.
- The third participant chose the following blocks: *'gut sichtbar'*, *'aufladbar'*, *'läuten'*, *'leuchten'*, *'wartungsfrei'* (en: 'highly visible', 'rechargeable', 'ring', 'lighting', 'maintenance-free'). This participant explained, that she wishes those assistance tools did everything (like ringing and lighting) and also mentioned it is important that they are maintenance-free.
- The fourth participant decided to choose some areas of application and arranged them according to how he prioritizes them for the discussed assistance tools. The result is visible in Figure 4.4 on the right. The most important ones were *'Notruf'*, *'Hilfe'*, *'Kontakte'*, *'Sicherheit'*, *'Unterstützung'*, *'Assistenz'*, *'Konnektivität'*, *'Bedienbarkeit'* (en: 'Emergency Call', 'Help', 'Contacts', 'Security', 'Support', 'Assistance', 'Connectivity', 'Accessibility'). After a small gap, the others were listed: *'Kommunikation'*, *'Bequemlichkeit'*, *'Kompatibilität'*, *'Vernetzbarkeit'*, *'Ästhetik*

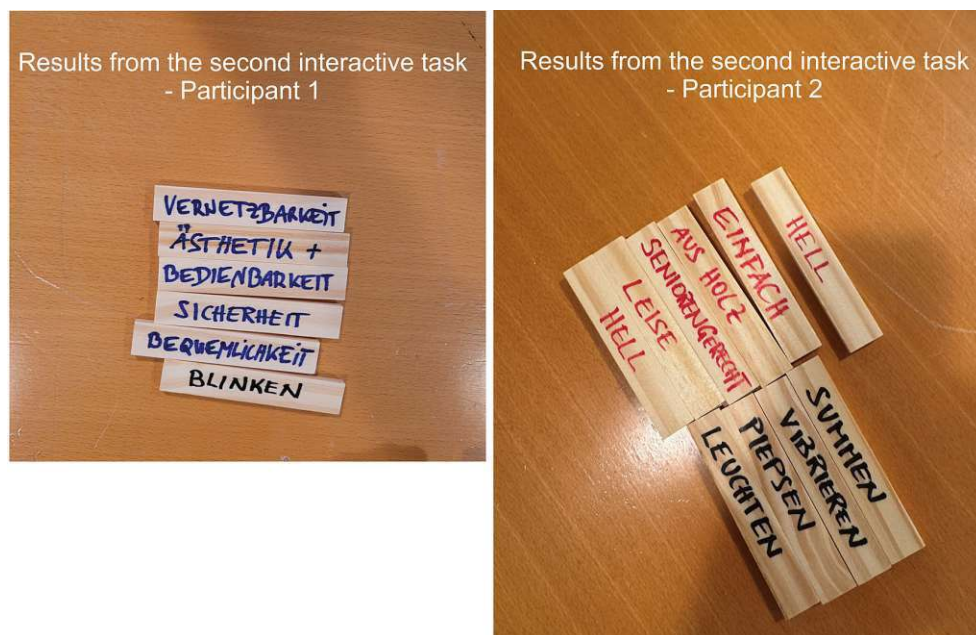


Figure 4.3: Images show the results from participant 1 and 2 for the second task in the workshop.

+, 'ansprechendes Design', 'Statussymbol', 'Unterhaltung' (en: 'communication', 'convenience', 'Compatibility', 'Connectivity', 'Aesthetics +', 'Attractive design', 'Status Symbol', 'Entertainment')

It was also mentioned, that it would be interesting to ask how much people would be willing to pay for assistive solutions in order to compare their answers.

Results from Task 3

The participants were asked to have a look at the example-cards and decide whether the shown examples seemed to be positive, negative or neutral to them. Some results are shown on the images in figures 4.5 and 4.6.

One participant assigned a smart door lock and an emergency button hidden in a necklace as 'positive'. The blood-sugar measurement device, an emergency calling system and the blood pressure measurement tool were seen as 'neutral'. The smart body scale, the medication robot, the assistive robot and the entertainment-robot were all seen negatively. The participant showed no interest in those technologies. There was another participant, who associated the two robots positively. When she was asked why she chose them, she answered that they smiled so nicely. Another participant did not assign any examples. He explained, that those tools do not seem positive or negative to him, he would like to distinguish whether they are useful or not, otherwise he thinks neutral of all of them. The last participant assigned an installed fall-detection system for ones home with the negative

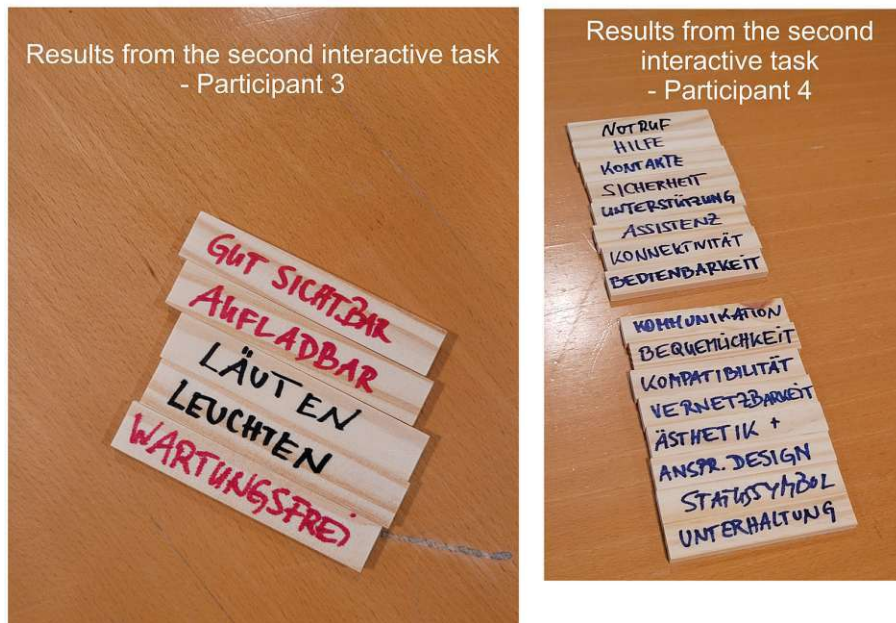


Figure 4.4: Images show the results from participant 3 and 4 for the second task in the workshop.

association. As he is moving around a lot, this would not be helping him. Videocalls and smart safety-systems were assigned with the neutral card by this participant.

One participant mentioned, that there are more modern tools for blood sugar-measurement, than the one printed on the example-card for the experiment.

General Remarks and Questionnaire Results

There were different views on the usage of phones. Two participants mentioned, that they do not want to carry their phone everywhere. They do not want to be reachable all the time. Another participant urged the other to do take the phone everywhere, because this is what it is supposed to be for. One participant also mentioned, that the workshop seemed to have an psychological point of view or evaluate technologies from that point of view. Another participant mentioned, that companies who develop AAL technologies should be interested in the workshops outcomes.

Due to the limited time, only two participants were able to fill out the questionnaire. Some of the answers given on the questionnaires were: On a scale from 1 (not good) to 5 (very good), the participants were asked to rate how well they cope with technology. A participant ticked 3 here and gave 'habit, experience' as an explanation. The second participant ticked 4 and stated that he quickly recognized structures and functions. Both participants indicated that they use a smartphone. One participant also uses a tablet, the other additionally uses a bracelet to measure activity and digital blood pressure

4. FINDINGS



Figure 4.5: Results from the third task of the workshop - Group 1.



Figure 4.6: Results from the third task of the workshop - Group 2.

monitors. Asked if they would like to use more technology in their daily life, only one participant ticked 'yes' and wrote 'getting help' when asked about the application area. The other participant ticked 'no' and explained that he wants to avoid dependencies. They ticked the happiest and the second-happiest smiley when asked how much they liked the workshop. According to the questionnaires, one participant liked the professional design and the other liked '*that the leader was able to talk to the participants*' (translated to English). Further comments were: '*admirable and loving details*' and '*I think the practical orientation is very good - goes to the institute's address*' (translated to English).

Take-Aways for the Workshop-Concept

From the practical conduction of the designed workshop, the following aspects were considered for the final workshop concept (which is presented in the next section):

- The right (for the target / participant group fitting) language, communication and attitude are very important. The workshop leader should be aware of them and make a plan on how to execute the workshop considering those aspects.
- For the third task, another 'mood-board' called 'useful' should be added.
- Information-sheet, agreement for the workshop and acceptance of privacy matters should be included on one page, rather than various different sheets because this caused some confusion for the participants in the conducted workshop.
- Some tasks were designed to be done in groups - participants rather did them alone.

4.2.2 Workshop Concept

The content of the conceptualized and conducted workshop was transferred into a general workshop concept. The concept can be followed to conduct a workshop with a specific target group, to gather insights on technical solutions without directly asking about them and without the testing of specific technologies. The general goals for the proposed workshop (what it can be used for) are:

- To gather insights on how the target group thinks about a technological field or service, without asking direct questions about it.
- To evaluate how the target group feels about the discussed technologies or tools, while creating a comfortable environment to share thoughts or worries.
- To use tangibles, examples and interactive tasks, to find an introduction to the topic.
- To let participants select characteristics or aspects they consider important for a certain technology or service, to get to know their preferences and find a way for participants to open up about their needs and also broaden their horizon.

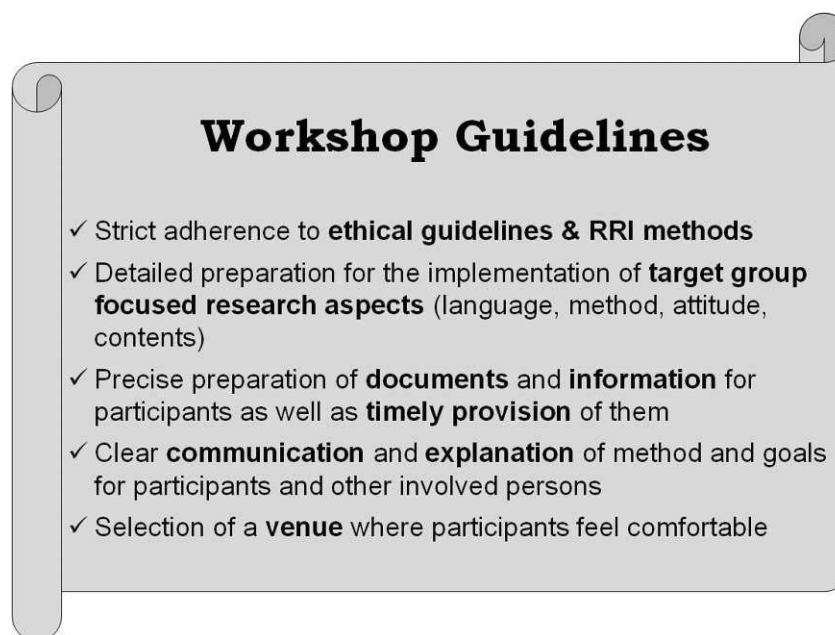


Figure 4.7: Proposed guidelines for a workshop with the target group.

The concept consists of two parts: Part 1 - Guidelines, Part 2 - Content. The two parts are described in the following sections.

Workshop Concept Part I: Guidelines

From research and the collected experience from the conducted workshop, a list of guidelines for the proposed workshop concept was established. Figure 4.7 illustrates the guidelines for a workshop with the target group:

- **Ethical guidelines and methods for Responsible Research and Innovation (RRI)** should be researched beforehand (specifically for the addressed target group) and followed strictly.
- The workshop guide / leader should **be aware of the participant group relating their age, needs and priorities**. The method and contents should be prepared accordingly - regarding the tasks, but also regarding the used language (use of language and volume while speaking). For example if physical tasks are required, it has to be considered during the preparation if the participants are able to do them. The participants should not only be able to take part, they should also feel comfortable doing so. Checking in with the participants during the workshop is also recommended - to get feedback if they understand everything and feel comfortable. The workshop leader's attitude towards the participants has to be considered - it has to be respectful and attentive.

- All relating **documents** that may be necessary (for example consent form including data privacy statement, as well as the questionnaire) should be prepared beforehand. All forms, that have to be filled out in advance to agree with the workshop-participation, should be handed-out to the participants beforehand, so they have enough time to go through them and drop out if they are not interested or do not agree with the terms. At least one document with information about the method, goals and workshop leader should be provided. It should also contain information about data collection and processing, as well as a declaration of consent for the method. It is recommended to include everything in one document to avoid confusions about multiple consent forms.
- Before, during and after the workshop, **clear communication and explanation** are recommended - towards participants but also other involved persons.
- Lastly, a **venue** where the participants feel comfortable should be selected.

Workshop Concept Part 2: Content

The second part contains the workshop-contents according to the designed concept. The general **Workshop-Agenda** for a workshop with a duration of about 60 to 90 minutes includes the following program:

- **Introduction & formal tasks:** Welcoming statements followed by an introduction and explanation of formalities (such as signing the forms and explaining the general rules of the workshop). (five to ten minutes)
- The introduction is followed by some **theoretical information** about the discussed topic of the workshop. This ensures, that participants know what the topic is about and have the opportunity to ask general questions. When choosing a presentation method (e.g. presentation slides, flip-charts, pin-boards), it should be considered which form of presentation works best for the participant group. For example, for elderly, a digital presentation on slides is a good choice. (five to ten minutes)
- The main part consists of three **interactive tasks** where the participants get something to do (about ten minutes per task - it is recommendable to prepare some additional questions or mini-tasks in case there is time left)
- It is recommended to prepare some **questionnaires** for the participants, which can be filled out voluntary and anonymously after the workshop. Some time should be planned for this. (five minutes)
- When it's time to wrap-up, the workshop is concluded and handing out some thank-you presents might be pleasant. There should also be time for final questions. (five minutes)

The total duration of the workshop should not exceed the time participants were initially asked to spare.

In the following paragraphs, the proposed interactive tasks for the workshop are described. In total, there are three tasks which should be performed by the participants.

Concept for Participant-Task 1: Finding user-friendly terms for examined technologies:

With the first task, one can evaluate user-friendly terms or names for the examined technologies or tools. Alternatively, it can be evaluated if existing names are appealing to the participants or if they would feel more comfortable with a different term. To do that, a real-life scenario is created: Participants get handed out a fictional newspaper-article with a title and some text. Title and text are not relevant for the experiment, but they could be related to the topic of the workshop or specifically chosen for the target group. Additionally, a fictional advertisement is included on the newspaper-page. The advertisement should be related to the examined topic, field or technology. In the scenario explained during the workshop, the participants are asked to select a name for the discussed technology or field, which they would find appealing and understandable when they read the newspaper article. They are for example asked: *'Which title would catch your eye, so you are interested to find out more about the technology?'*. They can choose their own or select one of the provided suggestions. That way, participants are asked to find a good, user-friendly and for them understandable term for the discussed field or technology. Figure 4.8 shows an example of how the newspaper-article ('step 1') and the provided snippets for the title ('step 2') could look like. Figure 4.9 describes the task for the participants, including suggestions for questions that can be asked in the following discussion to gather more insights on the users' thoughts during the task.

Concept for Participant-Task 2: Selection of important characteristics for the examined technologies

With this task, one can find out which characteristics and aspects the participants value with regard to the examined topic or technology. The participants get handed out some (wooden) blocks, where characteristics are written on them. There is no limit on how many blocks can be provided and what is written on them. Characteristics could include aspects the participants might consider important, such as: 'reliable', 'consistent', 'modern', 'suitable for seniors', 'suitable for kids' or also 'loud', 'silent', 'present', 'in the background'. But also things such as: 'blinking', 'alarming', 'vibrating', 'singing' or materials such as 'made of wood', 'made of metal', 'made of glass' can be included - according to what one wants to find out. The participants can be asked to simply select the blocks they find important, or also arrange them in a certain order (regarding their priority) or build little sculptures with them or arrange images, to also use the shape and connection between the blocks to represent something. Figure 4.10 visualizes the task, possible implementations and lists questions that can be asked during the discussion following the task.

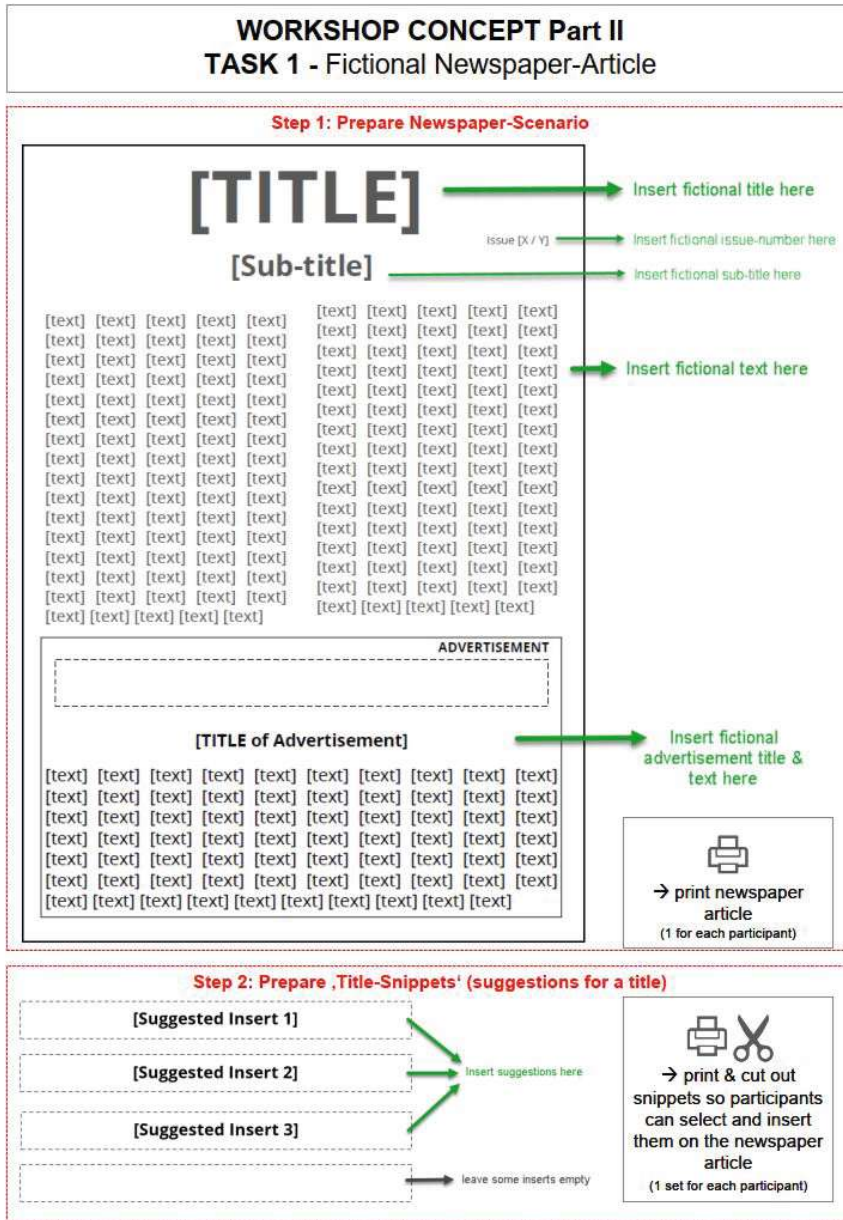


Figure 4.8: Instructions to prepare task 1 of the workshop.

WORKSHOP CONCEPT Part II

TASK 1 - Fictional Newspaper-Article

Task for Participants: Select a title-name for the advertisement or choose a new one

[TITLE]

[Sub-title] Issue IX / YI

[text] [text] [text] [text] [text] [text]

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ADVERTISEMENT

Selected Title

[TITLE of Advertisement]

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Participants select a title / name (or choose a new one) and insert it into to newspaper article

Questions to ask during the following discussion:

- How did you choose the title?
- Are some of the titles confusing for you and if yes, why?
- Which options did you miss?
- What aspects make a title / name for a technology / service interesting for you?
- ...

Figure 4.9: Description of the tasks for participants (task 1).

Concept for Participant-Task 3: Assigning technology-examples to mood-boards

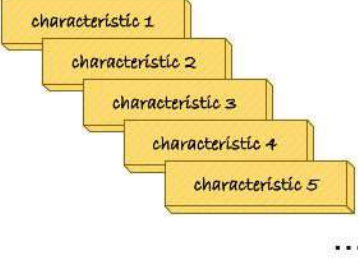
With the third task, it is possible to get direct feedback on given examples for the discussed technology, field or service. Figure 4.11 shows how it can be prepared: four cards to represent associations to the examples are prepared - one for things that 'have a positive effect' or 'have a positive effect' on the participant, one for 'seems useful' and one for 'seems neutral' to the participants. Additionally, smaller cards with descriptions and images of examples (that can be images of tools or technologies, images of scenes or graphs) should be printed out. As those cards should be moved around and assigned to the 'mood-cards', it is recommendable to laminate all cards for this task. Lastly, Figure 4.12 illustrates as an example how the participants can use the 'mood-cards' to assign examples to them. Additionally, questions to ask during the following discussion are given.



WORKSHOP CONCEPT Part II

TASK 2 – Selection of important Characteristics

Preparation:




Wooden Blocks
(as many as necessary)

+ ,characteristics' written on them
(depending on the examined topic,
e.g. 'loud', 'silent', 'made of wood',
'blinking', 'alarming' ...)

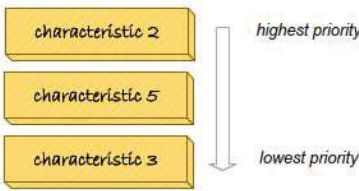
+ provide some **empty blocks & pens**
so participants can write down their
own as well

Task for Participants: Choose relevant blocks and arrange them as you want – for example:

Option 1:
(just the) selection of relevant blocks




Option 2:
arrangement of relevant blocks according to priority



→ let participants also find they own ways to arrange the provided blocks (no limit to creativity) and discuss the results afterwards

Option 3:
selection of relevant blocks and building of a sculpture / arrangement of an image



Questions to ask during the following discussion:

- Why did you choose the block(s)?
- What was your way of arranging them?
- How are the items on the block connected – is that also visible in your arrangement?
- Is there anything you were unable to represent with the provided blocks and method?
- ...

Figure 4.10: Instructions to prepare the task and description of the tasks for participants (task 2).


WORKSHOP CONCEPT Part II
TASK 3 – Assigning examples to mood-boards

Step 1: Prepare ‚Mood-Boards‘

Has a positive effect on me	Seems useful to me
Seems neutral to me	Has a negative effect on me


Step 2: Prepare Cards with Examples

Example Title 1




Example Image 1

Example Title 2



Example Image 2

Example Title 3



Example Image 3

→ print mood boards (at least format A4),
example-cards (at least format A5)
→ lamination recommended
(at least 1 set for 2 participants)

Figure 4.11: Instructions to prepare task 3 of the workshop.

WORKSHOP CONCEPT Part II
TASK 3 – Assigning examples to mood-boards

Task for Participants: Assign the example cards to the mood-boards

Questions to ask during the following discussion:

- How did you assign the examples?
- Did you know what all of the examples were?
- Have you used the examples / ever seen them in real-life?
- Do you have any experiences with the examples?
- Why did they have a certain effect on you?
- Are there controversial examples?
- Which aspect is most important – how useful it is, that it has a positive effect, that it has no negative effect ...
- ...

Figure 4.12: Description of the tasks for participants (task 3).

Questionnaire

A questionnaire should be prepared to collect background information about the group of participants. The questionnaire should be filled out anonymously and collect at least the following information about the participants: age, gender, personal experiences with the topic and feedback on the workshop. The questionnaire should be handed out in the end. Enough time to fill the questionnaire out should be planned, because participants might not return the questionnaire afterwards if they take it with them (and the information cannot be collected).

4.3 Recap on the Findings

The presented findings included an AAL categorization approach, that presents 'Areas of Purpose' for AAL technologies, services and products. Within each area, technologies were assigned that serve a certain purpose, for example someones health. The presented areas were: 'Health', 'Safety', '(Home-) Care', 'Home and Environment', 'Leisure Time', 'Social Interaction' and 'Services'. The findings from the three expert interviews were grouped by the following interview-categories: Nursing Care in general, AAL in general, Human-Technology Relationship and the Promotion of AAL products. For each category, several sub-categories were presented with the relating findings from the interviews. For the second research phase, findings from the workshop with the target group were presented. Lastly a general workshop-concept was derived from it and explained.

Discussion

5.1 Discussing the Research Questions

5.1.1 Main Research Question

Which aspects might make the selection, installation and use of AAL technologies more meaningful and comfortable for elderly users?

The results of the expert interviews show that innovative approaches, such as the idea of an 'AAL Club', could serve as a vehicle for **promoting AAL technologies**. This concept involves members of the target group in the selection, deployment, usage, and support process of AAL products, equipping them with the tools to assist other older individuals in integrating AAL technologies as support systems in their daily lives. The experts' opinions revealed that it is possible to take this approach even further: community nurses could play an independent role in raising awareness of AAL products and building trust in them as part of their work. Generally, caregivers play a crucial role in the entire process of establishing AAL systems in practical contexts, accompanying the selection, installation and use of technologies with elderly who trust them. It is therefore important to establish knowledge about AAL technologies among caregiving staff and integrate these aspects in their education programs. Another important aspect regarding the promotion of AAL products is a **reconsideration of the term 'AAL'** itself when addressing the target group. Specifically in Austria, with German as the main language, an English term is unpractical. Additionally, the term should describe the underlying concept better. Suggestions for new terms are 'Technological Assistive Systems for Daily Life' or similar ideas.

For a **successful and meaningful establishment of AAL technologies**, it is essential that the products serve a clear purpose and work as promised. This became clear in

the interviews and the workshop. To ensure this in advance when selecting products, a thorough evaluation of manufacturers and developers can be essential. Flexibility and integration-possibilities have to be considered, too. Stigmatization regarding technologies specifically designed for elderly should be considered - where possible, it should be considered to use 'normal' products instead. A necessity to consider these aspects also aligns with aspects mentioned in literature by Petrie, who outlines limitations and issues about research and design that is performed specifically for older users by younger researchers [33]. The users' needs should be evaluated and heard, specifically regarding usefulness, costs, dependency, reliability and practicability of products. This aligns with what Calvaresi et al. write about the necessity to understand a user's demands and his relationship to the technology [11]. Conducting research with elderly and broaden the researchers and the elders horizon can be crucial to access new fields and find new ways to improve the design and development of AAL technologies. Here, a good basis for communication and the ability to talk to the target group and understand what they are trying to tell is essential.

5.1.2 Sub Research Question 1

How could AAL technologies be categorized?

Various different approaches to classify, categorize, group and discuss AAL technologies have been analyzed. In a self-conducted content comparison of the various approaches, the following seven categories or areas were established: 'health', 'safety', '(home) care', 'leisure time', 'social services', 'services' and 'home & environment'. Figure 5.1 shows the identified areas once more. These areas refer to the purpose that technologies, services, and products serve in each area. For example, the 'health' category should include all technologies aimed at maintaining, supporting, and monitoring physical health, as well as preventing it from illnesses. Some areas are overlapping, these overlaps show that there are services that could be assigned to more than one area. In the Figure 5.1 one can see, that the area 'health' has the most overlaps to other areas - for example to care regarding caregiving and therapeutic tasks, which are also connected to ones physical health. On the other hand 'health' is also connected to 'social life', this also correlates with expert's opinion regarding the importance to fight loneliness and isolation of elderly, indicating that it is connected to the physical health as well.

5.1.3 Sub Research Question 2

What is a concept for a workshop, that interactively involves the target group to gain insight in the meaningful use of AAL?

A concept for an interactive workshop with the target group was designed with the aim of gathering the elders insights on AAL solutions without directly inquiring about the

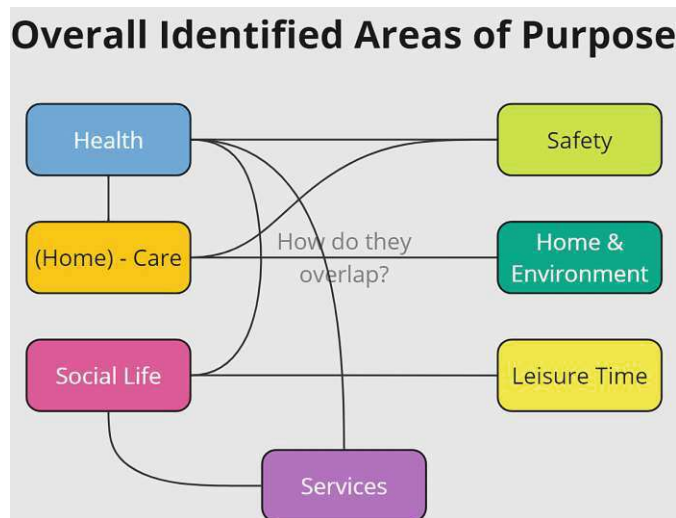


Figure 5.1: The seven defined AAL categories and how they overlap.

technologies or testing them. The concept consists of two parts for a workshop that has the following main goals:

- Understand how the target group perceives a technological field or service without direct questioning.
- Assess the target group's feelings about certain tools, in a supportive environment.
- Use tangible items, examples, and interactive tasks to introduce the topic and motivate participants to share their thoughts, suggestions and possible worries.
- Allow participants to select key characteristics of a technology or service to better understand their needs and preferences.

The workshop features a first part with a general workshop guideline, making sure ethical and user-specific aspects are considered for the research. For the second part, a workshop agenda with three specific tasks that can be adapted for a certain technology or field is presented. The workshop concept can be used for user-centred evaluation of any technological solution to gather valuable insights from the user group and engage in open, pressure-free discussions. Regarding the evaluation of AAL solutions, it was observed that participants readily shared their views on all aspects once they felt free to express themselves without limitations, such as whether a particular solution already existed as a product.

Since the workshop relies heavily on the workshop leader's interaction with participants - communicating, explaining, answering and asking questions, listening, showing interest and responding to feedback - it is suited for use with a small user group. This poses a limitation: for broader evaluations, multiple smaller workshops would be necessary. It

is a qualitative method, where the analysis results in numerous individual insights that must be applied appropriately in context.

5.1.4 Sub Research Question 3

What aspects might be considered to create positive engagement with technologies in elderly people's daily lives?

Building or supporting a positive relationship between AAL technologies and their users is challenging due to the many influencing factors. The conducted workshop revealed that the evaluation of which technologies are spontaneously viewed as positive is highly individual and varies from person to person. Notably, participants emphasized the usability and meaningfulness of a product—positive associations were closely tied to the product's perceived usefulness in this context.

In selecting key characteristics for AAL products, the workshop showed that preferences varied widely and were aligned with the participants' individual needs. For example, one participant with particularly good hearing preferred features that kept the product quiet (like 'humming'), while another participant chose notification options that made the product attention-grabbing in various ways (for example ringing, flashing). The approaches participants used to select features also differed greatly. These insights highlight the value of evaluating people's relationships with technology using a method that allows for highly individualized and creative results, broadening both the researchers and the participants horizons.

Conversations with experts on practical experiences highlighted the key role of caregiving in fostering a positive relationship with technology. A trusting relationship with technology can be developed if caregivers support both care recipients and their families in using the technology, helping to build confidence. This trust and an associated sense of security can contribute to a positive relationship with AAL technologies. Additionally, generational change may naturally shift attitudes towards technology, as individuals who have grown up with and worked with technology reach an age where they require care themselves.

5.2 Reflections on Implications of this Work

Reflecting on the conducted methods, the research on related work and the results collected during the research, some reflections on implications of this research based on the gathered knowledge are presented in this section.

The research field of AAL is highly comprehensive, as so many technologies, platforms, services and more are encompassed by that area. This only makes it harder for the target group to understand what 'Ambient Assisted Living' really is about - it simply cannot be described with a single word or example. Therefore, reconsidering the term itself seems very important, as people might be struggling with that term, especially

in German-speaking countries like Austria. Using a term people understand instantly might open their mind for the topic. Regarding the development of AAL technologies, potential stigmatization was mentioned in the interviews. Interestingly, one workshop-participant chose the characteristic 'seniorengerecht' (en: 'suitable for seniors') as an important aspect for AAL technologies. It seems, that this participant was not offended by something specifically designed for seniors. This shows how individual these aspects can be perceived by the users.

On categorizing the comprehensive Field of 'AAL'

After a comprehensive literature review on the topic of AAL and an evaluation of various sources, it appears that AAL technologies are often categorized and classified or written about individually in literature, aligning with the angle and background of each source. However, the focus frequently seems to center on a specific area, which was also visible in the distribution of assigned aspects within the methodology implemented for sub-research question 1 (AAL categorization approach). The TAALXONOMY-Table [17] was the only source that contributed - almost evenly - to every area that was identified during the evaluation of categories. This source, however, is relatively complex and highly detailed, having been developed specifically for the classification of AAL products. From a user perspective, it might be necessary to establish a categorization of products that is simple, clear, and easy to understand. One could imagine a scenario where someone enters a shop and requests a product from a certain category. Ideally, there would be immediate clarity about what the customer or user is looking for. Within this thesis, categorization based on 'areas of purpose' was proposed as a way to incorporate a user-oriented perspective. It would be interesting to further evaluate whether the proposed categorization is specific enough and whether its practical applicability is both feasible and meaningful.

On applying the Workshop Concept

Building on the reflections regarding categorization, it would be interesting to implement the presented workshop concept for a detailed evaluation of the categorization with the user group. The proposed concept for the first interactive workshop task could be implemented in such a way that each selected category name is examined and evaluated in more detail. The name of a technology or category can be important, as it may influence the relationship with the technology and its usage. In the second and third interactive tasks presented in the concept, participants could be asked, in different modalities, to assign and select technologies and products based on their understanding of the category names. Initially, textual descriptions could be used, followed by examples in the form of images to introduce an additional perspective. This could help evaluate the practical applicability and user understanding of the categorization.

In general, the proposed workshop concept could be utilized to collaboratively evaluate various technologies or approaches with a user group. The three tasks should support the establishment of a foundation for a conversation with the participant group with the help of tangibles and examples.

On the Necessity and Opportunities of establishing innovative Research Approaches in the Field of AAL

The results from the performed research indicated that there is a need for innovative research methods in the field of AAL in order to make the topic generally more accessible for the target group. The experts did mention the need to promote AAL on different levels to increase the demand for and simplify the access to AAL technologies. Also the idea to train and establish members of the target groups as 'experts' or 'buddies', as one expert called them, could improve the access for the target group, thus challenges have been mentioned. Now for example looking at the success of a radio station for elderly explained by Reuter et al. [38], it could be beneficial to combine those approaches: it would be interesting to educate radio presenters who are also part of an older age group on the topic of AAL. They could then explain AAL to their audience and help clear up uncertainties and alleviate fears. It could also be valuable to try to establish an online blog for and with elderly, like explained by Monserrat et al. [12]. Blog entries about AAL could be integrated from time to time, alongside other topics. Like that, a community could develop, where members of the target group exchange about AAL and other areas. This could be especially beneficial, because a certain level of trust could be established amongst members of the online community. Obviously this would exclude users who do not have access to online platforms, but here it could be interesting to also invite family members to contribute and inform themselves in order to transfer the information to their relatives. As caregivers seem to play an important role in establishing trust to newer technologies, inviting professional caregivers somehow as 'guest bloggers' or 'guest radio presenters' could also bring a benefit in these scenarios. These concepts could be implemented in various ways and through channels the target group feels comfortable with - for example TV shows or events in senior homes.

Given the aging society and the escalating care crisis, there is undoubtedly an opportunity to provide relief through digital technologies. The individual requirements, the many diverse stakeholders involved, and the varying application settings in this field present challenges that necessitate careful selection and accessibility of AAL products. Overall, I am indicating there should be no hesitations on the research and development of innovative approaches to make AAL technologies more accessible. With other words - let us be creative, seek the conversation with (potential) users, involve them in the research and also in the promotion and distribution of AAL technologies. Certainly, this is no simple task; effort is required to bring these initiatives and innovative approaches to life. Additionally, there are numerous aspects to consider regarding organization and ethics. But technologies that are not perceived as useful, do not offer clear added value for stakeholders, or are not considered user-friendly have little chance of achieving sustainable, long-term, and effective use in practice - therefore, in my opinion, the effort is well worth it and will undoubtedly pay off in light of the population's development and the evolving care situation.

5.3 Future Work and Limitations

Reflecting on the research done within this thesis and the outcomes, some limitations and implications for future work have been identified. The expert interviews, the development, and the implementation of the workshop provided valuable results and insights. However, the small participant groups represent a limitation. Conducting the research methods with larger participant groups could further deepen the results and help establish the explored research methods within the investigated field. As the AAL field is a big one and the technologies can have a positive impact in many different areas, a more specific research for detailed areas and categories is considerable.

Setting- and User-Specific Research: This work provides a general overview of AAL without focusing on specific types of care. Further detailed research could examine different care models (such as inpatient care, outpatient care and 24-hour assistance) individually, focusing on the implementation and optimized and meaningful use of AAL systems in each setting. The different requirements in various care settings were also mentioned in the expert interviews. Also the individual requirements for specific users became clear during the workshop and should be explored in greater detail.

Country-specific Adaptations have not been addressed within this work, but it is notable that the needs, regulations and possibilities might be different in other countries than Austria. At least, a comprehensive view across EU countries and an evaluation of the researched aspects in this context would be worth considering. Since the GDPR applies across these countries, product use is at least comparable from a data protection perspective. However, differing care models in various countries would add an additional layer of complexity to a cross-national approach.

Further Interviews and Workshops: The conceptualized workshop could be conducted for all evaluated AAL categories with a specific focus, aiming to gain detailed insights into user perspectives and to compare results across different categories. Also regarding the interviews, it could be interesting to talk to experts specifically for each of the presented category, for example as a preparation for the workshops to integrate the outcomes from the interviews in the designed tasks.

Reconsideration of the Term 'AAL': At least when addressing the target group, another term might work better. Possible new versions of the term should be evaluated further among the stakeholders.



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CHAPTER 6

Conclusion

With an aging population, fewer people of working age, and an escalating care crisis resulting in a shortage of skilled caregivers, there is a need for new solutions to ease the burden and ensure adequate care provision. Since its introduction in 2004, the term AAL (Ambient Assisted Living) has evolved and now encompasses a range of platforms, services, technologies, digital solutions, and products aimed at enabling independent and self-determined aging. AAL products are intended to support caregivers, providing relief. Care concepts increasingly emphasize home care, and the use of technological aids is becoming more prevalent. The market is growing rapidly. A huge number of products is now available, which makes the selection, integration, and use complex and often overwhelming from a user's perspective.

In this thesis, the focus was placed on the user group, aiming to evaluate which aspects could make the selection, installation, and use of AAL products more practical from a user perspective and how this can be achieved, applying expert interviews and an interactive workshop as central methods.

Innovative approaches, such as an 'AAL Club' introducing elderly as experts, could effectively serve as a vehicle to promote AAL technologies by engaging the target group in selection, deployment, and support processes, also according to experts. However, there can be challenges to find seniors who are willing to take that role. Caregivers play a crucial role, making it essential to integrate AAL knowledge into their training. Results from expert interviews and a workshop with the target group also showed, that the term 'AAL' should be reconsidered for clearer communication, especially in non-English-speaking countries like Austria. For successful adoption, products must fulfill clear purposes and meet users' needs in practicality, reliability, and affordability. Engaging directly with the elderly in open discussions and actively involving them in the research, can help to broaden understanding and improve AAL design, development and distribution.

Based on literature research followed by a comparison and analysis of the results with the help of color-codes, a categorization of AAL products was developed. It included organizing AAL by purpose-based areas depending on the specific benefits a service should provide to a user. These areas were identified as 'health', 'safety', '(home) care', 'leisure time', 'social services', 'services' and 'home & environment' with some overlapping aspects. 'Health', in particular, often takes center stage and has many connections to other areas.

An interactive workshop concept was developed and tested to gather insights from seniors on AAL solutions without directly discussing or testing specific technologies. The workshop aimed to understand perceptions, to assess feelings, to use interactive tasks, and to let participants identify important features. The concept consisted of two parts: general guidelines and a customizable agenda for a practical workshop. Best suited for small groups, it relied on the workshop leader's engagement to create open discussions and collects qualitative insights that need contextual application.

Building positive relationships between AAL technologies and users is complex, with preferences varying widely based on individual needs, as shown in the workshop. Usability and meaningfulness strongly influenced positive perceptions. Expert discussions highlighted the caregiver's role in fostering trust in technology, benefiting both recipients and families. Generational shifts may also gradually improve acceptance.

Reflecting on the research and findings of this thesis, some directions for future work emerge. Given the broad scope of AAL, further targeted studies in specific areas and categories could be valuable. Setting-specific research could focus on distinct care models, to optimize the implementation of AAL systems within each. Country-specific adaptations could also be interesting to see which products are used and how their usage is optimized. Additional workshops and interviews targeting each of the proposed AAL areas could be relevant to dive deeper into each area and evaluate and compare specific needs and aspects. Lastly, reconsidering the term 'AAL' could be beneficial, and new terminology should be evaluated with stakeholders for better resonance with target audiences. The small participant groups in the conducted methods represent a limitation. Future work could involve conducting studies with larger participant groups to further deepen the results.

Taking a step back and reflecting on the discussed starting points to integrate AAL technology in elder's daily lives, it is possible, that the proposed concept to select target group members as expert users might also work for other fields to promote the, from a users point of view, meaningful usage of technology. The integration of key stakeholders to establish trust and make them part of the process might also be a way to strengthen the meaningful use of various technologies. The proposed workshop can be a method to find a platform for open communication, exchange and fruitful work together with the target group in order to achieve mutual success.

APPENDIX **A**

Expert Interview Resources

A.1 Declaration of consent

Expert*inneninterview: Informationsblatt mit Einwilligungserklärung

Im Rahmen der explorativen User-Research-Phase für meine Masterarbeit zum Thema

„Exploring the meaningful use of Ambient Assisted Living Technologies - Evaluation of user-centred approaches for and with elderly“

für mein Masterstudium Media and Human-Centered Computing an der TU Wien habe ich, Naomi Karner, Sie zur Teilnahme an einem von mir durchgeführten Expert*inneninterview eingeladen. Ich möchte Sie im Folgenden über die Ziele und Vorgehensweisen des Interviews informieren und bitte im Anschluss um Ihre schriftliche Einwilligung zu dem Interview und zu der beschriebenen Durchführungsweise.

Die Teilnahme am Interview ist freiwillig und wird in etwa 45 bis maximal 60 Minuten Ihrer Zeit in Anspruch nehmen. Das Gesprächsthema wird sich um den Einsatz von Produkten und Technologien aus dem Bereich **Ambient / Active Assisted Living für ältere und betreuungsbedürftige Personen in Österreich** drehen. Ich bitte Sie, als Expert*in des Bereichs Pflege und/oder Digitalisierung, im Rahmen des Interviews Ihre Erfahrungen, Ansichten und Meinungen zu den verschiedenen Gesprächspunkten unter dem genannten Schirmthema mit mir zu teilen.

Ich möchte mich im Vorfeld für Ihre Bereitschaft, das Interview durchzuführen und mich an Ihren Erfahrungen und Ansichten teilhaben zu lassen, sowie für Ihre Zeit, herzlich bedanken.

Informationen zur Durchführung des Interviews:

- Es handelt sich bei dem Interview um ein leitfadengeführtes Interview, durch welches ich anhand eines von mir definierten Leitfadens mit verschiedenen Themenpunkten führen werde.
- Zu den grob definierten Themenbereichen habe ich Fragen vorbereitet, die mich in diesem Bezug interessieren würden; das Interview kann und soll sich aber auch entsprechend der besprochenen Inhalte weiterentwickeln.
- Sie können während des Interviews vollkommen frei agieren und sprechen, Ihre ehrliche Meinung ist mir besonders wichtig.
- Bitte teilen Sie mir im Rahmen der Einverständniserklärung auf der letzten Seite mit, ob ich im Rahmen der Masterarbeit und der Analyse des Interviews Ihren Namen und Ihren beruflichen Hintergrund nennen darf, oder ob Sie eine vollkommen anonyme Verarbeitung Ihrer Daten wünschen. Die Verarbeitung umfasst die Nennung Ihres Namens und Ihrer beruflichen Position und Arbeitsstelle im Rahmen der Masterarbeit. Diese Hintergrundinformationen zu Ihrer Person und beruflichen Laufbahn sind für die Interviewanalyse und Recherche im Rahmen meiner Masterarbeit interessant, selbstverständlich anonymisiere ich aber alle Daten, die sich auf Ihre Person beziehen,

wenn Sie dies wünschen bzw. wenn dies im Rahmen Ihrer beruflichen Position erforderlich ist.

- Das Gespräch wird je nach organisatorischen Möglichkeiten online über die Plattform MS Teams oder persönlich stattfinden.
- Ich würde das Gespräch gerne aufzeichnen, um im Nachhinein besser darüber reflektieren zu können und alle besprochenen Inhalte und Informationen bestmöglich für meine Masterarbeit evaluieren und verwenden zu können:
 - Im Falle eines digitalen Online-Interviews ist die Aufzeichnung mit Hilfe der MS Teams-Aufnahmefunktion (Bild & Ton) sowie zusätzlich eines Audio-Aufnahmegeräts geplant.
 - Im Falle eines Interviews in Persona ist die Aufzeichnung mithilfe von einem Audio-Aufnahmegerät geplant.
- Sie können die Aufzeichnung jederzeit unterbrechen.
- Sie können das Interview jederzeit abbrechen, wenn Sie das wünschen.
- Ich werde die gewonnenen Daten gemäß Ihrer Präferenz und jederzeit vertraulich behandeln und nur für die Recherche und Verarbeitung im Rahmen meiner Masterarbeit verwenden.
- Sie können mich bzw. die Betreuerin der Masterarbeit, Projektass.in Dipl.-Ing.in Janis Lena Meißner, PhD, jederzeit unter den unten angegebenen E-Mail Adressen oder Telefonnummern kontaktieren, wenn Sie Fragen oder Anmerkungen haben.

Auf der nächsten Seite finden Sie die Einverständniserklärung zur Teilnahme an dem Interview. Ich bitte Sie, mir diese wenn möglich vorab unterzeichnet zu retournieren, oder alternativ zu Beginn des Interviews zu unterzeichnen.

Für weitere Fragen stehen folgende Personen zur Verfügung:

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Herzlichen Dank im Vorfeld und freundliche Grüße
Naomi Karner

EINVERSTÄNDNISERKLÄRUNG

Name (in Blockbuchstaben):

Ich habe alle auf Seite 1 und 2 beschriebenen Punkte gelesen, verstanden und **stimme dem Interview zu**. JA NEIN

Ich stimme zu, dass das Interview mit **Audio- und gegebenenfalls Videoaufnahme aufgezeichnet** wird. JA NEIN

Ich bitte um **anonyme Verarbeitung** meiner Daten (Name, Name meiner Arbeitsstelle und weitere personenbezogene Informationen). JA NEIN

Datum

Unterschrift der Interviewleiterin

Unterschrift der Interviewpartnerin /
des Interviewpartners

A.2 Privacy Policy

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The approved original version of this thesis is available in print at TU Wien Bibliothek.

Expert*inneninterview: Datenschutzerklärung

Diese Datenschutzerklärung bezieht sich auf das von mir, Naomi Karner, für meine Masterarbeit geplante Expert*inneninterview. Die Datenschutzerklärung bildet gemeinsam mit dem Informationsblatt inklusive Einwilligungserklärung die Grundlage für die Durchführung des Expert*inneninterviews. Ich bitte um Prüfung der beschriebenen Datenverarbeitung und um Unterzeichnung der Zustimmungserklärung auf Seite 2. Für Fragen stehe ich selbstverständlich zur Verfügung und bitte um Kontaktaufnahme (Kontaktinformationen finden Sie auf Seite 2).

Welche Daten werden im Rahmen des Expert*inneninterviews erhoben?

- Es werden die sprachlichen **Inhalte des Gesprächs** erhoben.
- Das gesamte Interview-Gespräch wird mit **Audio- und ggf. Bildaufnahmen** aufgezeichnet.
- Während des Gesprächs werden gegebenenfalls handschriftliche oder digitale **Gesprächsnotizen** durch die Interviewerin angefertigt.
- Von dem Gespräch wird ein Transkript angefertigt.

Wie werden die erhobenen Daten verwendet?

- Die Inhalte und Ergebnisse des Gesprächs werden für die **User-Research-Erkenntnisse der Masterarbeit** zum Thema „*Exploring the meaningful use of Ambient Assisted Living Technologies - Evaluation of user-centred approaches for and with elderly*“ verwendet und im Rahmen dieser Arbeit **analysiert und präsentiert**.
- Die Audio- und ggf. Bildaufnahmen werden ebenfalls zur Unterstützung der **inhaltlichen Analyse des Gesprächs im Rahmen der Masterarbeit** herangezogen.
- Die Audio- und ggf. Bildaufnahmen werden **nicht** veröffentlicht (weder im Rahmen der Masterarbeit, noch anderwärtig) und nur von der Verfasserin zur Unterstützung bei der Analyse verwendet.
- Die Audioaufnahmen werden zur Anfertigung eines Transkripts herangezogen. Das Transkript wird zur **Analyse des Gesprächs** verwendet und später als **Anlage** der fertiggestellten Masterarbeit beigelegt.
- Die Verarbeitung der Daten erfolgt auf Wunsch der Interviewpartnerin / des Interviewpartners ausschließlich anonym – die Präferenz bzgl. der Anonymität wird im Rahmen der Einwilligungserklärung erfragt. Dem Wunsch wird selbstverständlich im Rahmen sämtlicher Verarbeitungen innerhalb des angefertigten Transkripts, der Masterarbeit selbst sowie etwaiger veröffentlichter Notiz- & Gesprächs-Auszüge jederzeit Folge geleistet. Als anonymisierte bzw. pseudonymisierte Verarbeitung wird so definiert, dass zu keiner Zeit auf die interviewte Person rückgeschlossen werden kann (z.B. die Anonymisierung / Pseudonymisierung des Namens und der Arbeitsposition).

Für weitere Fragen stehen folgende Personen zur Verfügung:

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ZUSTIMMUNG ZUR DATENVERARBEITUNG:

Name (in Blockbuchstaben):

Mit meiner Unterschrift erkläre ich mich mit der beschriebenen Datenverarbeitung einverstanden.

Datum

Unterschrift der Interviewpartnerin / des
Interviewpartners

A.3 Analysis Grid / Matrix

This section includes the following appendices:

- Description of the categories in the analysis matrices
- Analysis Matrix of the Interview with Expert 1
- Analysis Matrix of the Interview with Expert 2
- Analysis Matrix of the Interview with Expert 3

T	K	UK	Beschreibung
1.0			Einleitung
	1.1		Begrüßung + Dank, Einverständniserklärung
	1.2		Vorstellung der Interviewpartner
	1.3		Darstellung des Themas der Masterarbeit
	1.4		Darstellung des Interview-Grundes / -Hintergrundes
	1.5		Zusicherung von Anonymität (wenn gewünscht)
2.0			Pflege & Betreuung älterer Menschen
	2.1		Aktuelle Situation in Österreich
		2.1.1	Allgemein
		2.1.2	Digitalisierung in der Pflege aktuell bzw. Motivation für Personal durch Einsatz digitaler Technologien
		2.1.3	Personalknappheit
	2.2		Chancen & Herausforderungen
		2.2.1	Chancen Allgemein
		2.2.2	Chancen in der Pflege Zuhause
		2.2.3	Herausforderungen
3.0			Ambient / Active Assisted Living
	3.1		Begriff allgemein: Priorität, Veränderung in den letzten Jahren
		3.1.1	Begriff "AAL" - alt vs neu?
		3.1.2	Markt von AAL
			3.1.2.1 Allgemein
			3.1.2.2 Produktentwicklung
			3.1.2.3 Anzahl von Produkten
		3.1.3	Bekanntheit von AAL
	3.2		Kategorieneingrenzung
	3.3		Allg. Erfahrungen mit AAL Produkten
		3.3.1	Design von AAL Produkten
		3.3.2	Einsatz AAL Produkte
		3.3.3	Verständlichkeit der Produkte
	3.4		Auswahl / Einführung /Nutzung von AAL Produkten
		3.4.1	Kriterien für die Auswahl
		3.4.2	Stakeholder bei der Auswahl / Einführung von AAL Produkten
			3.4.2.1 Allgemein
			3.4.2.2 Angehörige
			3.4.2.3 Berührungspunkte zu den "zu Pflegenden"
		3.4.3	Onboarding & Support
			3.4.3.1 Im Pflegesetting
			3.4.3.2 Zuhause
	3.5		Gesetzliche Grundlagen / Rechtl. Situation
		3.5.1	Einsatz der Technologien
		3.5.2	Entwicklung / Vertrieb von Technologien
4.0			Beziehung Mensch-Technologie
	4.1		Erfahrungen
	4.2		Chancen
5.0			AAL-Promotion: Neue Ideen und Ansätze
	5.1		"AAL Club Idee" / Forum Basis, Train the Trainer, Community Nurses verteilen die Info ...
	5.2		Eigene Ideen
6.0			Abschluss

Legende:

T = Thema
K = Kategorie
UK = Unterkategorie

T	K	UK	ERGEBNISSE <i>Zitate aus den Transkripten, zugeordnet zu den entsprechenden Kategorien & Unterkategorien in der Analysematrix</i>
			Expert 1 (qualified nurse)
2.0			
	2.1.1	<p>Also ich glaube jetzt nicht nur die Pflege, glaub generell, sind wir an einem Wendepunkt, ja kann das jetzt wirklich gut sagen, meine zweite Tochter, ähm, die ist jetzt grad auf der FH Wiener Neustadt obwohl ich gesagt hab, sie darf das niemals tun und Gesundheits- zum Krankenpflege und siw wird jetzt fertig und wir merken es auch bei den Praktikanten, Studenten, die jetzt zu uns kommen, Gott sei Dank, die sind viel selbstbewusster.</p> <p>Die sagen ganz einfach das ist mein Wert, das kann ich oder das möchte ich erlernen. Ich möchte 30 Stunden arbeiten, weil das kann ich mir leisten ja, Punkt, ich weiß meine Kompetenzen. Sein des, das kann ich nicht. Ich bin bereit, es zu lernen, ich mach meinen Job ordentlich, aber ja und auf das glaube ich haben wir alle uns noch nicht eingestellt oder, oder oder nicht schnell genug eingestellt, auf das das Selbstbewusstsein in der Pflege und dann hast du Diskrepanzen mit die langjährigen Pflegemitarbeiter, ich red jetzt eigentlich von Diplom. Diplom weil dort hat es sich wirklich extrem geändert.</p> <p>Und die verstehen das einfach nicht ja, und des os nu immer so, die dissen einfach die Studenten, anstatt dass sie die willkommen heißen, alle ja und sagen Himmels willen, roter Teppich und Gott sei Dank bitte macht Praktikum ist es dann trotzdem immer noch so im Team ja dass es einfach nicht geschätzt wird und die haben Angst, glaub ich und sind nicht aufgeklärt und das is ja ewig der Prozess ne und ähm.</p>	
	2.1.2	<p>Ja, ich stimme, dir da durchaus zu, nur denke ich am dass wir da zu wenig ähm ähm, intensiv lastig sind, weißt spannend ist für die jungen Leitungen, sämtliche intensiv Bereiche IMCUs, Überwachungsbereiche. OP ich glaube ich nicht so, aber teilweise, Anästhesie und so, kommt auf alles, das sie und so und das können wir heute schwer bieten also das ist dann schon ähm ja, genau und du hast halt dann wirklich da ist ja dann wirklich ähm, die technische Assistenz die es da brauchst, gell ich, ich kann mit ihnen, wie man eh viel angesprochen, mal drüber wie was wann wo und da Erhebungen gemacht und und sonst gell und aber ich ich äh, ich find ich finde immer die die Sachen eigentlich toll größtenteils und beim näheren hinschauen frage ich mich immer, wo ist jetzt denn die Erleichterung ich hab das das Ding ja wo ich sag Boah des hob ich irgendwo noch nicht gesehen oder oder oder mitbekommen, vielleicht gibt es es ja.</p> <p>Ja, ich mein, wenn man jetzt nur Sturzsensoren, also in unzähliger Zahl ja gibt es das ja mittlerweile ja, aber du bist du am Herzen.</p>	
	2.1.3	<p>ich hab mir jetzt sagen lassen die Studiengänge san ja wirklich voll da werden jedes Jahr 80 zum Beispiel in Wiener Neustadt werden 80 fertig ist ja eigentlich viel ja ähm.</p> <p>aber die lassen sich halt einfach nichts gefallen, die können, sich aussuchen, wo sie hingehen, weißt du, die können sagen sollen, okay, da gefällt mir nicht ich wechsel wieder und deswegen müssen wir viel attraktiver</p> <p>viel attraktiver werden und umdenken insgesamt des des fehlt für mich einfach das Umdenken, das is aber total schwierig, ich versuch es immer so ah den Geschäftsführerinnen und Geschäftsführer irgendwie so mitzuteilen.</p> <p>Aber die haben das glaube ich, noch immer im Hinterkopf drinnen dieses, dass der Pflegeberuf, ich mein so ist es nicht, das ist einfacher Beruf, und das kriegt total schwer raus, aus den Leute weiß es nicht ist komisch.</p> <p>Komisch, ich versuchte sie mir komisch manchmal vor wie eine Missionarin aber das geht ganz schwer und was ist also witzig ist?</p> <p>Ah, jeder kann Pflege, also mir ist es so wenn jetzt Gespräch mit dem Geschäftsführer so der sagt zu mir nicht böse, aber in vollster Überzeugung ja, ich hab auch einmal, ein halbes Jahr im Krankenhaus in der Pflege mitgearbeitet als Praktikum. ich kenn mich schon aus und und, und und des des us bis heute ja, weiß ich net.</p> <p>Keine Ahnung, ich glaub das Ganze Konglomerat ist der Wahnsinn und andererseits möchten sie wieder eine Befähigung oder oder oder Gesetzesnovelle was jetzt wieder im Laufen ist, hergeben, wo Pflegepersonen total fit sein müssen. Müssen wirklich fit sein müssen, wenn ihr dann mal irgendwo bin, dass sie am gewisse Chargen Medikamente verordnen, ja und da muss ich fit sein, also das ist so ganz schwer, ich glaub, das Geheimnis ist einfach du musst in dem Haus so interessant sein und die Arbeit muss so angenehm sein vom Dienstplan her, Freizeit einhalten Bla bla bla, arbeitsplatzgestaltung Kollegen, einfach das Team, das äh. Es Geld nicht nur im Vordergrund steht und ich denk in den Rehas und unserer Langzeitpflegeeinrichtungen. Können wir auf keinen Fall auf ganz junge Leut zählen, weil die wollen was sehen. Wir sollten sich wirklich orientieren, so ob keine Ahnung, die ersten Kinder weißt du zwischen 30 und 40 oder so jetzt also, das glaube ich sollte mal andenken, dass man das so irgendwie hinkriegen, aber ja wirklich gezielt Werbung machen Machen auf diese Gruppe weißt du zwischen ja oder ist vielleicht noch zu jung, Zwischen 40 und 40 und 55 des is glaub i gut.</p>	
	2.2.1	<p>[Einsatz auf der Pflegestation] Wird schwierig, ja, also wir haben ja damals damit dem [Anm. Geschäftsführer, Name wird nicht genannt] wirklich diskutiert und und waren alle total dafür und und haben da wegen Pflegeroboter geschaut, aber die sind einfach nicht so weit ja, die die ja also da wär ich ja total dabei, ich muss ganz ehrlich sagen ich würde mich lieber von einem Roboter pflegen lassen, der das hundertprozentig kann. Also wenn man da soweit ist, ich glaub, ist das für die Langzeiteinrichtungen ganz sicher.</p> <p>[Einsatz von Rovotern in der Pflege] Ja, ja ja also wenn man so ganz einfach ginge, das hamma damals aber eh esprochen und das fände ich jetzt schon hilfreich ja, weil in der Reha muss man ganz ehrlich so kommen immer mehr sehr, sehr, sehr alte Menschen. Das ist wirklich jetzt auffällig. die ned dement san aber gewisse Schwierigkeiten kommen sie sichorientieren, das ist einfach normal auch noch nach eine Woche und da gewisse Schwierigkeit haben immer dort also eben auch vielleicht Unsicherheit trotz Gehstock oder reziproken Geshtörung, aber immer also, das wärja total einfach ja, weil das das gibts ja, das muss doch irgendwer. [Anm.: Begleitroboter ist gemeint] 20 Bettenhaus macht das keinen Sinn, ja, das ist schon klar, aber wenn das bissi größer ist. Dann wird es wahrscheinlich für auch mit den Kosten nicht dafür stehen, aber grad so größeres Pflegeheim.</p> <p>Diese Smart Home Lösungen und und und ich finde wenn das dazu beiträgt, dass ein Mensch länger zu Hause bleiben kann, ja zu Hause und vielleicht nur einmal am Tag Unterstützung durch die Hauskrankenpflege braucht beziehungsweise die Angehörigen einmal vorbeikommen und die restliche Zeit sind die Angehörigen ruhig, weil sie einfach wissen, mein Angehöriger ist gut unterstützt oder was auch immer da bin ich total dabei ich find des, da sollte man reinpowern, weil das macht wirklich Sinn.</p> <p>Smart Home Reminder, dass ich die Tabletten nehm, keine Ahnung Smart Home, dass ich regelmäßig trink, dass ich aufs Klo geh, bei leichte Demenzen, dass der Herd mir sagt ich muss in abdrehen, wurscht, alles ja oder oder ich hab wirklich überall Sensoren, dass wenn ich stürz. Das Hilfe kommt ja. Ja, vor allem sinnvoll, total sinnvoll.</p> <p>Mhm ja oder man strukturiert das komplette Gesundheitssystem so um, da haben wir auch schon Gespräche geführt, weißt nicht ob du da dabei warst, strukturiert so um, dass man quasi das Zuhause in die Einrichtung holt. Das heißt ich brauch unheimlich wenig Personal, nur frag ich mich halt wer ja, irgendwann müssen wir das eh machen, weil wenn Personal nicht da ist ja, muss ma dorthin gehen so wie es in andere Länder ist, ja da sind es die Angehörigen, bei uns irgendwelche technischen Hilfsmitteln. Ja, wir uns wahrscheinlich eh nicht erspart bleiben irgendwann einmal wenn es so weitergeht.</p>	
	2.2		

	2.2.2	
	2.2.3	
3.0		
	3.1.1	
3.1	3.1.2.1	<p>Ja, ich mein, wenn man jetzt nur Sturzsensoren, also in unzähliger Zahl ja gibt es das ja mittlerweile ja, aber du bist du am Herzen. Gibt es hier in in, in, in, in gibt ja brauche das hier nicht zu investieren mit beschäftigt, ja gibt es einen Unmengen ja, ich bin immer also ich glaub das ist schon mehrmals gesagt.</p> <p>Ja genau, aber hast du nicht den Eindruck, dass jetzt dass jetzt bissle Stillstand ist oder bilde mir das sein?</p>
	3.1.2.2	
	3.1.2.3	<p>[Empfehlungen für gewisse Produkte erforderlich?] Genau ja stimmt ja stimmt, da könnten wir aber diese Community Nurse die es jetzt überall gibt ansetzen, ne? Weil die sind ja dazu da, dass sie beraten eigentlich, ohne dass sie was verkaufen. Genau genau genau ja, richtig ja stimmt stimmt ja, es ist ja sehr spannendes Thema, wirklich spannend und der ich finde wirklich spannend wurde Entwicklung als dann wirklich noch hingehet, gell</p>
	3.1.3	

3.2	<p>Ja, ja, okay, ja, Mhm also, ich glaub das Sicherheit schon an ziemlich erster Stelle steht, würde ich meinen ja und gleich dahinter soziale Interaktion, weil ah man wird einfach krank, wenn man keine sozialen Kontakte hat und ja und dann potenziert sich das ganze und ich glaub die zwei Sachen sind für mich eigentlich am wichtigsten irgendwo.</p>
3.3.1	
3.3.2	<p>ich bin noch immer in die Einrichtungen diese skeptisch, gell weißt du? Weil unzählige Sturzsensoren in einer Einrichtung ist okay, immer ein Bettfluchtbügel erfüllt einfach das gleiche und nervt die Mitarbeiter nicht zu Tode ja. Es ist sicher anderes System auch total gut, ja, also ich will ja nicht sagen keine Ahnung, ja alles was uns vorgestellt worden ist, ist ja nicht schlecht, das ist ja sehr positiv, ist ja toll so eine tolle Produkte, nur frag ich mich halt immer der Preis dieser Visierung ja, äh ja im Ich weiß es nicht. Ich hab, jetzt keinen Mehrwert festgestellt, dass das so toll ist, dass ich das jetzt auszahlen würde, sag ich amal. Aber zu Hause auf alle Fälle also zuhause bin ich total dabei, wirklich also du findest ich denke mal, das ist toll, weil da kann ich wirklich alles einsetzen, alles was mir Verfügung steht ja, weil das einfach wirklich toll da kann ich einen reminder zum Tabletten äh, wenn er einmal in der Woche Hauskrankenpflege kommt mir das vor richtet, keine Ahnung.</p> <p>Genau genau genau, aber meiner Erfahrung nach san san Pflegepersonen eigentlich net dagegen ja, sie wehren sich immer nur dann, wenn es, wenn sie es als sinnlos erachten, also da ist ganz wichtig eben, dass das Produkt funktioniert, dass es die Arbeit nicht verkompliziert, sonst wird es nicht angewendet. Ja und dass es gut implementiert wird. Aber ich denke schon, dass sie es verwenden ja, weil es ist immer so. Wie, wenn du selber davon überzeugt bist, präsentierst es ja ganz anders, ja und ich würd jetzt nicht sagen, dass es nur ablehnende Haltung gibt, wenn es gibt, immer Pflegepersonen, ja ohh ja, aber ich mein allein ich mit der elektronischen Dokumentation vor Jahren also da haben wir teilweise was mitgemacht, das war Wahnsinn ja, aber es haben im Endeffekt alle gemacht, dann Punkt. Das war ja vor Jahren wie weiß ich net? eine Landung am Mond ja also wirklich ja ja und aber mittlerweile kann man sich gar nicht mehr anders vorstellen. Ja, und niemand sagt was ja und das wird, wenn das, wenn das erkannt wird, dass das praktikabel ist, dass das einfach ist, dann ist denke ich sicher auch keine Barriere..</p> <p>[Fortschritt ist etwas gutes aber muss zusammappen doch sinnvoll sein?] Ja, das stimmt ja, ich habs ja, das ist a interessant, weil grad in Wien ist ja nochmal anders wie am Land so aber es ist halt schon ziemlich normal, dass die alle mit einem Laptop einziehen, gell und streamen und den Fernsehen ned brauchen ja jetzt schon, oder? Genau ganz genau das ist der Punkt ja genau genau, ja, oder im Burgenland, wo am Schluss dann haben wir WLAN gehabt, aber wo dann am Schluss die eingezogen sind und dann gesagt haben was ihr habt kein WLAN, also es beginnt.</p>
3.3.3	
3.4.1	<p>Ja, ja ja also für mich immer das Wichtigste ob es Sinn macht ja, weil ähm also erstmal muss ich mir dann auch schon anschauen Preis Leistung, wenn ihr anderes Produkt ist, was ja genau das gleiche erfüllt äh weiß ich nicht weniger kosten, keine laufenden Kosten verursacht. Das ist erste, wenn das auf alle Fälle und danach die Funktion, ob das wirklich Sinn macht, ob es das tut, was es tun soll, sag ma so ja, weil oft sind das ist ein bisschen ja und vielleicht Bedienbarkeit, das ist ja ganz wichtig, einfachste Bedienbarkeit, Wurst, ob extern, extern überhaupt ja, aber intern also also wenn das ist ganz wichtig, weil alles was kompliziert ist. Das nimmt man dann nicht, das will man nicht, das macht man net, ja, das macht einen Mehraufwand, auch wenn es vielleicht am Ende weniger Arbeit verursacht, aber diese Hürde nimmt kaum wer und ja und diese Dinge würde ich schon schauen, ja, also so ganz banal gesagt, ist es brauchbar? ja.</p> <p>[Installation / Aufbau - wie einfach geht der?] Genau genau ja Mhm genau ja steck ich es nur an und funktioniert unter Anführungszeichen oder weiß ich nicht, hab ich einen furchtbar aufwändigen Installationsvorgang und muss 15 mal den Support anrufen, und und und Ja also diese Dinge. und am aller aller wichtigsten ist einfach: erfüllt es das was es verspricht und dann sind wir wieder dort ich muss es mir anschauen, ich muss es testen und brauch ich ja.</p>
3.4.2.1	<p>Die Leitung findet, dass wir immer Verwaltung, Pflegedienst, Wurst wir immer beide gemeinsam Geschäftsführung haben. Finden wir das sinnvoll finden das OK können Sie sich vorstellen, dass das in die Einrichtung passt? Dann gehört das gescheit implementiert und das hängt einfach vor diesen Menschen. ab denke mal also ich glaub net das von der Basis der Pflegekraft, ja kann wahrscheinlich auch passieren, ja, das ist doch die habe auf der Tagung irgendwas Tolles gesehen, die bringt es mit , das passiert natürlich auch Ach ja natürlich, aber ich glaub Entscheidung liegt dann immer wo anders na</p> <p>Ja, in genau in die Apartment sind Residenz können sie eigentlich machen, was sie wollen. Also nicht wirklich alles, das ist ja ja immer was nicht, aber grundsätzlich ja und tun sie ja auch?</p> <p>Absolut ja, es ist ja auch schwierig, weil ich kenn das von mir ich bin auch dann von irgendwas wahnsinnig begeistert. Warum aich immer, manchmal denk ich mir warum bin ich jetzt eigentlich so begeistert gewesen? Und dann eigentlich? das Resultat ist net so positiv oft. dass es dann ned hält was es vorher verspricht ja ja.</p>
3.4.2.2	

3.4	3.4.2	<p>Ich hab die Erfahrung gemacht also abgelehnt hat jetzt also Ablehnung hab ich überhaupt nie mitgekriegt ja, es ist halt so, dass den meisten komplett egal is es ist ihnen einfach egal, so wie du gesagt hast, jetzt von den Bewohnerinnen oder von den Pflegebedürftigen hier, Unterstützung bitte, das ist einfach egal, das wird erklärt und dann sagst du da da das Kastl hängt dort oben und blinkt halt und das macht das und das und ja, is gut passt schon mehr, wenn dies vielleicht was ma gehabt haben am ähm, was haben wir da gehabt Wenn du ähm, ähm an Bewegungsmelder zum Beispiel total was Banales, Licht, ja, weil da immer die Angst da ist in der Nacht. Ich finde die Nachttischlampen nicht und muss aufs Klo gehen zum Beispiel und es ist finster ich habe Angst, dass ich falle, voll banal, okay, das wird gefeiert, ja. Aber ob da irgendwo was hängt, manche merken sich, warum und wieso? Den meisten ist es egal, und dann gibt es noch die ganz speziellen, die wollen das bis ins kleinste Kleinste Detail erklärt Wissen und interessieren sie aber ich würd sagen das ist der geringste Anteil. Das ganze ich glaub den meisten ist es weiß nicht einfach egal ja wirklich wirklich egal. das ist so die Weisheit des Alters glaube ich, irgendwann muss damit du dir das so jetzt nicht alles so Ernst nimmst. nicht alles merkst oder sowas möglicherweise. Ich glaub halt, das kommt dann weniger also auf Akzeptanz jetzt von von den Pflege Bedürftigen, sondern das immer in der Akzeptanz ist</p> <p>[wie wird das mit den Digital Natives?] Genau und dann kommen die das einfordern dann wahrscheinlich.</p>
	3.4.3.1	
	3.4.3.2	
3.5	3.5.1	
	3.5.2	
4.0		
	4.1	<p>Ich glaub, das ist zukünftig überhaupt nicht schwierig ist ich glaube, dass das zukünftig eingefordert wird weil ähm, die zukünftigen Bewohner, das bin ja dann eigentlich schon fast ich, ja unter Anführungszeichen oder vielleicht jetzt die was jetzt keine Ahnung, ich arbeite jetzt noch 10 Jahre, aber die die jetzt schon 65 sind die sind Zuhause sind, die Generation ist ja schon komplett anders und bis die Technologien wirklich..</p> <p>Mir kommt vor da ist jetzt ein bisschen ein Stillstand, da wird es wahrscheinlich wieder eine Aktivierung geben und ich denk bis dann wird es wirklich absolut State of the Art ist, dass du das hast ja, glaube ich ist ja die Akzeptanz groß, weil wir ja alle mit dem zu tun haben. Permanentest ja, wir können ja in der Arbeitswelt gar nicht bestehen ohne das, also auseinandersetzen mit Technologien aller Art und ich denk deswegen ist die Akzeptanz dann automatisch gegeben, weil du, man muss jetzt nur im Langzeitpflegebereich ist es ja total spannend</p> <p>da von der von der Beschäftigung Senioren-Betreuungs -Aufgaben her, da hast immer früher das gleiche gehabt, weißt du basteln, Kochen, backen, stricken, die Männer haben irgendwas umgehämmert.</p> <p>Dann hast Bolker keine Ahnung, ja und und oder so ja, aber jetzt ganz am Schluss ist mir echt aufgefallen, dass jetzt eigentlich schon andere Leut kommen, weißt du, die hören die Rolling Stones</p> <p>Das verändert sich einfach, weil weil quasi die die neuen alten anders sind. Ja, genau deswegen glaube ich geht es, denke es geht automatisch Mhm [Nachfrage: dass man eine positive Beziehung aufbaut?] Ja ja, genau bei uns ist jetzt total normal.. Du weißt ich nicht Alexa, keine Ahnung, oder oder mein Türschloss, ja ja, ja, das ich mit dem Handy aufmach oder was du oder mit dem Fingerprint keine Ahnung, irgendwas so Teile vom Smart Home heut ja also, das ist ja ganz normal ja.</p>
	4.2	
5.0		

5.1	<p>Das ist eine gute Idee, weil das ist, vergleichbar mit die weiß ich nicht Schwester von der Tante, von der weiß ich nicht Großnichte nimmt immer die Vitamintabletten y und die tun ihr so gut und die heißen so und so, und sind von der Firma und ähm, ja die sind sie, dann weißt du, und das darf nicht eine andere Firma sein? Firma sein ich glaub das is gut funktioniert Genau nein, eine gute Idee finde ich gut ja, weil die Akzeptanz steigt extrem damit.</p>
5.2	

T	K	UK	ERGEBNISSE <i>Zitate aus den Transkripten, zugeordnet zu den entsprechenden Kategorien & Unterkategorien in der Analysematrix</i>
			Expert 2 (AAL development - CEO)
2.0			
2.1	2.1.1	<p>Ja also bei der Pflege merk man, dass die Pflegekrise sich enorm zuspitzt. Das heißt es gab früher die Statistiken, bis - wie viele Fachkräfte bis 2030 fehlen etc., die gibt es jetzt noch immer, aber das Problem ist jetzt schon immanent, das heißt man bemerkt wirklich jetzt schon in der Pflege, dass die Leute einfach fehlen, dass Stationen komplett geschlossen sind, weil einfach nicht genügend Personal vorhanden ist und dass einfach die Institutionen händierend nach neuem Personal suchen.</p> <p>Das merkt man quasi ganz extrem seit Corona, in der Phase war es natürlich noch extremer, seit Corona haben glaube ich auch sehr viel Pflegekräfte beschlossen zu kündigen, Job zu wechseln und einfach die Pflege zu verlassen, was ich wirklich sehr gut nachvollziehen kann.</p>	
	2.1.2	<p>Ja natürlich, wobei, was mich zum Beispiel sehr erschrocken hat, ich war, ich glaub das was vor COVID noch, am Pflegekongress, und da wurde quasi die Digitalisierung und neue Technologien in der Pflege, irgendwie immer wieder war quasi das Haupt Topic und was sie eigentlich damals gemeint haben war quasi nur die elektronische Pflegedoku: Weg vom Papier hin zu dem und das war quasi die gesamte Innovation, die in der Pflege gesehen wurde, dass Digitalisierung und bringen kann, Das ist natürlich viel zu klein gedacht, weil das also Assistenz Systeme im Raum, quasi die im Raum oder wo auch immer unterstützen können. Das sind natürlich nochmal ganz, ganz andere, Größen, Wirkung oder Breitenwirkung möglich, im Vergleich wenn man nur an die Digitalisierung der vorhandenen Sachen denkt, ist einfach nicht innovativ genug.</p>	
	2.1.3	<p>Ein Riesenproblem. Hab letzstens eine Statistik gelesen, zwischen 2018 und 2030 fehlen 11 Millionen Pflegekräfte in der EU</p>	
2.2	2.2.1	<p>Was man schon seit Corona auch gemerkt hat, ist, dass die Offenheit für neue Technologie größer ist, das heißt, dass einfach das Bewußtsein stärker vorhanden ist, ja neu Technologie kann unterstützen, weil man einfach zu COVID Zeiten gesehen hat, dass zum Beispiel Skype, oder was auch immer, irgendwelche einfachen Kommunikationsmöglichkeiten, enorme Benefits haben dadurch ist jetzt schon eine größere Offenheit vorhanden, das heißt das hat sich schon extrem gewandelt.</p> <p>[...] Das was mich aber in dieser ganzen Diskussionen immer wahnsinnig macht, ist, dass einfach auf, also auf politischem Level quasi immer nur diskutiert wird von wo kommen denn den neuen Pflegekräfte? Kommen Sie aus Venezuela, kommen Sie aus Rumänien, ist jetzt schon abgeschöpft, dann gehen wir halt woanders hin, setzen Förderprogramme auf, dass wir die Leute herholen und so, das ist alles schön und gut is alles wichtig, aber über Technologie spricht man nicht.</p> <p>Das ist was, was mir total fehlt, was ich eigentlich jedes Mal betone, dass Technologie auch seinen Beitrag leisten muss, aber das ist bisher noch nicht angekommen.</p> <p>Unabhängig von unserem Produkt... also ich glaub generell Technologie ist mittlerweile so vielseitig und jetzt auch wenn man auf künstliche Intelligenz einschränkt, selbst da gibt es so viele Produkte am Markt, die enorme Erleichterung bieten.</p> <p>Nur was mir spontan einfällt, ist quasi die Pflegedokumentation, die einfach per Spracherkennung nur noch sagst, was du getan hast. Die KI erkennt das in deiner Muttersprache quasi, digitalisiert das, übersetzt das etc. und dokumentiert das also gibt es schon noch viele Chancen. Was schon ist, wir stehen ganz am Anfang.</p> <p>Das ist generell in der Pflegebranche quasi wird sich noch so viel verändern durch Technologie, weil es ist jetzt gerade der Beginn, jetzt gerade beginnen die Pflege einmal nachzudenken, welche Technologien kann ich denn einführen oder erkennen überhaupt den Bedarf, dass sie überhaupt den Bedarf haben, für so etwas dass sie sagen ok, ich muss mich umschauen und das haben wir auch gesehen, dass jetzt die ersten Ausschreibungen schon langsam starten, weil die in diese Richtung nämlich auch abzielen, das ist schon ein klares, klares Indiz dafür, würde ich sagen, dass es in die richtige Richtung geht endlich.</p> <p>Aber, dass da halt schon langsam das Bewusstsein dafür geschaffen wurde.</p> <p>Natürlich. Und Technologie, wird nicht ersetzen, sondern wird unterstützen und die Unterstützung wird dringend benötigt werden.</p> <p>Wir sehen jetzt schon, dass manche Pflegeheime die Technologie einführen, um wieder attraktiver zu sein.</p> <p>für Pflegekräfte, weil sie sich einfach abheben möchten und sagen wir sind innovativ, wir möchten quasi hier ein Paradebeispiel an Technologie-Unterstützung für unseres eigenes Personal bieten, damit sie einfach wieder etwas mehr entspannt sind und anders an die Sache herangehen können und deswegen wollen wir einfach attraktiv sein als Arbeitgeber und deswegen führen sie neue Technologien ein und mit Erfolg also sie können dann einfach alle offenen Stellen besetzen und können wieder die Station wieder aufmachen.</p> <p>[Frage: Werden Pflegekräfte angesprochen?] Ja, definitiv. Also wir wissen von mindestens zwei, drei Organisation, die genau diese Strategie verfolgen und die anscheinend sehr erfolgreich sind damit.</p> <p>[Frage: ... positive Haltung von Personal ggf Einsatz von digitalen Technologien?] Ja, aber ich glaub Fokus liegt jetzt nicht wirklich auf der Technologie selbst, sondern einfach nur das sagen Boah, da gibt es Systeme, die unterstützen mich ja und ich brauch ohnehin jede Unterstützung, weil ich weiß ja ohnehin nicht wo vorne und hinten ist, ja, das heißt, das gibt es auf jeden Fall.</p>	
	2.2.2	<p>Also wir haben uns da schon alles angeschaut im Laufe der Zeit.</p> <p>Wir haben auch schon in privat Haushalten Stationen getätigt, 24 Stunden Betreuung ist auch ein Thema, dem uns schon gewidmet haben, wo wir schon auch Mehrwerte sehen definitiv, derzeit müssen wir sagen, dass unsere Lösung schon quasi für Pflege quasi stationäre Pflege bzw. Krankenhaus optimiert ist.</p> <p>Wir gehen jetzt immer weiter Richtung betreutes Wohnen eben 24 Stunden Betreuung, aber da sehen wir schon noch ein Bedarf quasi, dass wir einfach mehr Nutzen zur Verfügung stellen müssen um dort wirklich einen Mehrwert bieten zu können.</p> <p>Ja richtig, mehr Funktionalitäten die halt maßgeschneidert sind. Derzeit sind unsere Produkte halt wirklich optimiert auf den Einsatz in der Pflege und da quasi gehen wir in die Breite, aber jetzt eben für Privathaushalte zum Beispiel wäre der Nutzen aber noch zu gering kann, obgleich wir hier natürlich wissen, dass 80% der älteren Bevölkerung, also im Privathaushalten wohnt und auch dort gepflegt werden.</p>	
	2.2.3	<p>Teilweise ist es aber quasi schon Offenheit, die irgendwie ja man ist offen dafür, aber man kauft es trotzdem nicht weil budgetäre Knappheit natürlich noch immer da ist, weil natürlich auch einfach der Fokus schon drauf liegt quasi die Bewohnerin und Patienten bestmöglich zu versorgen oder teilweise auch natürlich ja, Gewinnmaximierung im Vordergrund steht.</p> <p>[Background - welche Pflegeform ist gemeint?]</p> <p>Also das im Zuhause schließe ich komplett aus, weil da hab ich einfach keine Erfahrung sonst quasi Kurzzeitpflege, Langzeitpflege würde ich beides hier hier sehen, dass da natürlich eine Langzeitpflege hier wirkt das Problem noch größer natürlich langfristig die Stationen gesperrt sind und die Betten nicht vorhanden sind, quasi Personal einfach noch weniger zurecht kommt als quasi im Krankenhaus, ja.</p> <p>Teilweise auch ein Problem quasi, also am Markt sieht, dass die Hersteller einfach das Blaue vom Himmel versprechen und dann nur einen Bruchteil halten können oder möchten. Der Punkt ist ja, jeder macht so seine Erfahrungen. Wir haben am Anfang wahrscheinlich auch viel mehr versprochen.</p> <p>Einfach weil wir ein bisschen das Feedback abwarten wollten, wir sind da schon jetzt mittlerweile sehr sehr realistisch und unser Ziel ist es so offen und ehrlich zu kommunizieren, weil alles andere macht keinen Sinn, weil selbst wenn man das Blaue vom Himmel verspricht, früher oder später kommt der Kunde sowieso drauf, und ist dann unglücklich und das merken wir halt, das der Mitbewerb hier eine andere Strategie fährt und wirklich viele Versprechungen macht, die dann nicht halten können.</p> <p>Also ich denke da wirklich, es gibt Mitbewerber, die versprechen eine hundertprozentige Erkennungsrate, wo ich ganz genau weiß, das ist technologisch auch nicht möglich, dass wird es nie geben und das ist halt das Problem, wo dann die Kunden sich drauf verlassen, dann passiert irgendwas, dass es dann irgendwann nicht erkannt wird, dann natürlich hat quasi die gesamte Branche ein schlechtes Bild und heißt's naja gut das haben mir andere schon versprochen und ich glaube dieser Branche glaube ich gar nichts mehr. Das ist natürlich schon eine Herausforderung..</p>	
3.0			

3.1	3.1.1	<p>Ah ich glaube Active, der der modernere ist, wobei ich ganz ehrlich diesen AAL Begriff, also ich kenne den seit 2010, es ist einfach ein Nischenthema. Also es ist für mich immer so diese AAL Welt ist großartig, aber es ist eine eigene Bubble ja und diese Bubble kennt außerhalb dieser Welt niemand, das heißt wenn man auf eine Konferenz geht und es um AAL geht, dann fühlt sich jeder quasi zugehörig, jeder Weise um es geht, kaum gehe ich quasi einen Schritt raus, hat ein noch nie jemand gehört, also generell bin ich mit dem Begriff gar nicht mehr zufrieden</p> <p>[englischer Begriff in AT?] Und ein Problem ist auch, wenn du sagst ältere Generation und die Leute zu Hause wohnen, da ist es natürlich quasi, das ich brauche es nicht, weil mir geht es ja noch gut, ich bin 95, aber meine 93 jährige Nachbarin die würds voll brauchen.</p> <p>Das ist auch etwas, das wir sehr oft gehört haben, halt auch quasi das Eingestehen, gerade wenn du es auch so framest, dass du sagst ja es ist ein Assistenzsystem, das ist quasi Technologie für ältere Leute. nein, ich bin nicht alt, also das ist schon was da muss man sehr vorsichtig sein, weil das einfach stigmatisierend ist, da kommst du meistens dann eher, dass die Enkelkinder oder die Kinder sagen „mah Mama, Oma, du brauchst das, und nicht die Leute selber, das heißt wenn man aber, da muss man schon denken kann, dass jetzt gerade für ältere Leute, die zu Hause wohnen, die ganzen Fitness-Tracker und die ganzen Wearables, Und einfach dieser Trend quasi, sich selbst zu messen und jederzeit alles zu messen und messbar zu machen, ich glaub, dass schon, dass dann ein Umdenken in der Generation, auch zukünftig auch stattfinden wird, dass dann die Akzeptanz für solche Systeme, die natürlich einen Nutzen haben müssen und nicht nur quasi kennen im Notfall, wenn jemand gestürzt ist, weil ich stürze eh nicht und dann passiert vielleicht einmal in 5 Jahren, aber sonst hat das System keinen Nutzen für mich, das ist dann glaub ich einfach zu wenig.</p>
	3.1.2.1	<p>Also was wir gemerkt haben, ist dass sich in den letzten 2, 3 Jahren sehr viel getan hat, gerade in unserem engen, speziellen Bereich, da sehe ich es natürlich ganz besonders.</p> <p>Da gibt es ahm plötzlich Mitbewerber, die es früher nicht gab, was für uns die ganze Sache sehr spannend macht. Was wird gesehen, das ist das was ich vorher auch gemeint hab, mit, dass sehr viel versprochen wird, die stehen meistens relativ früh noch. Als Unternehmens Leben quasi sind 3 Jahre alt etc, machen halt ihre ersten Erfahrungen und machen die Fehler, die wir auch gemacht haben vor 7, 8 Jahren, das ist ganz natürlich und ganz normal aber merkt schon, dass plötzlich wirklich also einerseits dadurch, dass mehr Produkte auf den Markt kommen, führt natürlich auch dazu, dass die Nachfrage plötzlich steigt, weil einfach plötzlich das Bewusstsein noch stärker da ist und ja, wir laufen auch schon seit vielen Jahren herum und klopfen an die Türen an und sagen hey hier gibt es was cooles, wenn das jetzt quasi 5 andere auch noch machen und das wird natürlich plötzlich eine viel größere Zielgruppe, die das betrifft, die sich plötzlich nach so etwas umsieht.</p> <p>Das heißt, wir sehen das eigentlich als extrem positiv an, dass da einfach der Markt schon langsam belebt wird und in Schwung kommt, es einfach auch Mitbewerber gibt, dass das einfach auch dazu führt, dass die Nachfrage und das Bewusstsein plötzlich größer ist, weil es plötzlich immer und überall Thema ist und nicht mehr so ein Nischenthema ist wie vielleicht noch vor 5 Jahren war, sondern dass es halt wirklich schon langsam wirklich ganz, ganz langsam in der Breite ankommt, dass das ein Thema ist und dass es da einfach auch mehr gibt, wo wir unterstützen können.</p> <p>Aber ich glaub, dass sich da auch der Markt noch sehr stark entwickeln wird, also eben jetzt wird einmal alles probiert.</p> <p>Ich glaube schon, dass quasi jetzt einmal diese Exploration Phase ist, wo man einfach unterschiedliche Sachen ausprobiert und dann wird es schon irgendwie nicht zusammen kondensieren, und man wird sagen okay, diese Sachen in diesen Anwendungsgebieten machen tatsächlich wirklich Sinn und die machen halt eher weniger Sinn und sind eher nice to have.</p>
	3.1.2.2	<p>Was wir gesehen haben in unserem Bereich ist gerade Benelux sehr sehr stark, vor allem Belgien, da gibt es doch eine Vielzahl an Unternehmen, die plötzlich ähnliche Sachen machen wie wir. Also plötzlich, eh schon länger. Amerika jedenfalls auch.</p> <p>Und sonst vereinzelt in den Ländern immer wieder aber jetzt nicht so, dass man sagt, es gibt so einen klaren, klaren Trend. Aber wie gesagt, Belgien, da gibt es schon erstaunlich viele Anbieter für ähnliche Lösungen.</p> <p>[sind amerikanische Produkte in Europa einsetzbar?] Ja vor allem Datenschutz, vom Datenschutz glaube ich selbst allein da gehen die Welten so auseinander, dass ich wenn glaub, dass dann europäische Produkte nach Amerika gehen und nicht andersherum. Weil auch das Interesse gar nicht da ist, der amerikanische Markt ist so riesig.</p> <p>[Gewissenhaftigkeit bei der Entwicklung] Ich würde sagen unterschiedlich. Also es wird welche geben natürlich Hersteller, die das sehr gewissenhaft machen, andere denen das voll egal ist. Das kommt halt immer drauf an, wie das Unternehmen getrieben ist, ob's jetzt technologisch getrieben ist oder and Enduser zentriert getrieben ist. Von dem her glaube ich ist alles eine sehr sehr breite Palette. Was ich allerdings glaube, ist, wenn mans nicht macht, wird man nicht erfolgreich sein. Das heißt von dem her glaube ich schon, dass das ein sehr wesentlicher Schritt ist, quasi wirklich die Kundenbedürfnisse so weit als möglich zu verstehen weil man sonst einfach quasi am Kunden vobreientwickelt.</p>
	3.1.2.3	<p>Das ist bissl das Problem, ja... die Insellösungen sind in er Pflege natürlich auch ein Problem. Deswegen verfolgen wir einen integrativen Ansatz, das heißt, dass wir nicht sagen, unsere Lösung ist x-te Lösung und wir sind genau The one and only Plattform, die alles erfüllt, sondern wenn es andere Plattformen oder was auch immer gibt, dann integrieren wir uns in die, weil wir das einfach gesehen, haben auch das Schwesternrufsystem, wir integrieren uns da einfach, wir integrieren uns ins Licht Ruf System, das man einfach direkt den Workflow abbilden kann, den die Pflegekräfte ohnehin gewohnt sind, wir boxen jetzt nicht unsere App quasi mit Muss durch, weil das natürlich dazu führen würde, dann muss man die Leute wieder mit Handys ausstatten, dann müssen sie wieder die extra App installieren nur für das Eine, sondern wir integrieren uns einfach in die bestehende Infrastruktur, weil wir sagen das macht natürlich am meisten Sinn.</p> <p>[...] Natürlich wobei da gibt's auch den Matter Standard, der sich jetzt hoffentlich durchsetzen wird um Smart Home einmal zu standardisieren, weil der Wildwuchs ist ja da auch ein Graus.</p>
	3.1.3	<p>Die Frage ist halt eher, warum ist AAL in den großen Breitengraden noch nicht angekommen und warum es zu wenig Aufmerksamkeit gab, also quasi zu wenig Marketing, zu wenig Information.</p> <p>Assistenzsysteme glaub ich oder Unterstützungssysteme, das sind ja solche Sachen, die sind halt sehr generisch, aber die sind zumindest verständlich.</p> <p>Smart Home, in Richtung Smart Home gehts vor allem in Privathaushalten, können wir ja auch sagen es ist Teil des Smart Homes [...] gehört irgendwie dazu ja, wobei in der Pflege glaube ich ist Smartphone jetzt auch nicht so ein Begriff, beziehungsweise ist eher ja mit Abwehralung verbunden als mit Offenheit, drum glaube ich, dass so digitale Assistenzsysteme, digitale Unterstützung, dass das eher die richtigeren oder die besseren Wörter sind um hier quasi Gehör zu finden.</p>
3.2		
3.3	3.3.1	<p>[fühlt sich die ältere Generation mehr integriert da jüngere zB auch Smart watches haben] Es darf halt nicht zu kompliziert werden. Also von der Bedienbarkeit, das ist natürlich auch ein Unterschied, was jede Generation gewohnt ist, wie die Bedienkonzepte ablaufen und ja das muss natürlich berücksichtigt werden.</p> <p>Aber ja also, ich meine, ich war nie ein Fan davon, es gab ja diverse Forschungsprojekte wo man sagt okay Okay, Skype für ältere Leute ist so quasi abschieben in die Nische, du bist alt du bekommst ein Skype für ältere Leute, warum verwendest du nicht einfach Skype. Also Beispiel jetzt.</p> <p>[eigene Smartphones etc für Senioren?] Ja das ist schon schwierig stimmt schom. Und auch wieder die Stigmatisierung, warum krieg ich was anderes, was Spezielles?</p> <p>Ich mein das war vielleicht ganz zu Beginn wie wir damit gestartet haben, war für uns ein Learning, weil wir quasi wirklich mal einen funktionalen Prototypen im Pflegeheim installiert hatten. Ohne hübsches Gehäuse, ohne allem, mit allen Kabeln, Wirr war etc. - das ist uns relativ schnell um die Ohren geflogen.</p> <p>Aus verständlichen Gründen. Für die Funktionalität war's gut, wir haben die Algorithmen entwickeln können, war alles super, aber es hat schon sehr stark gezeigt, quasi dass es halt einfach nicht als Produkt wahrgenommen wird, sondern quasi als irgendein Kastls, was halt da hängt, aber nix kann. Es hat als einfach nicht die Seriosität gehabt, wie es halt so wirklich ein Produkt hat mit Design etc. ...</p>
	3.3.2	
	3.3.3	<p>Also das ist schwierig, generell sehr komplex. auch unser Produkt ist erklärungsbedürftig und sehr komplex.</p> <p>Uns es wird nicht einfacher, es wird komplexer je mehr Funktionalitäten wir anbieten also was wir natürlich machen möchten, ist quasi, dass wir möglichst breit unterstützen.</p> <p>Dass wir einfach möglichst viele Unterstützungsmöglichkeiten in den Sensor hineinpacken, mit jeder Möglichkeit wird das System natürlich komplexer.</p> <p>Ich glaube, dass jetzt die Komplexität per se jetzt nicht das Problem ist, man muss halt nur entsprechende Trainingskonzepte dann dafür erarbeiten. Also ich würde jetzt nicht sagen, dass eine einfache System ich hängt hin und das alarmiert dann, also einfaches System ist, zum Beispiel die Sensormatte, die lege ich hin und die steige ich drauf und dann alarmiert sie. Das ist jetzt wenig komplex und leicht verständlich.</p> <p>Ist es deswegen gut? würde ich jetzt auch nicht so sehen. also es ist ja natürlich und je mehr Technik involviert ist umso komplexer wirts, man benötigt halt die entsprechenden Schulungskonzepte dazu.</p>

3.4	3.4.1	<p>Das heißeste Kriterium ist der Preis, das ist ganz klar, Billigstbieter-Prinzip egal ob es eine Kamera ist oder nicht, ich nehme das billigste. Diese Denkweise ist natürlich schon sehr kritisch zu sehen. Nicht weil unser Produkt vielleicht bisschen höher preisig ist, sondern einfach, weil es der falsche Weg ist.</p> <p>Also ja, es gibt auch billige Radar Sensoren zum Beispiel, die wirklich günstig sind, gibts um 70€ auf Amazon mit ihren Einschränkungen halt, die sie haben. Und wenn einfach jedem bewusst ist ok, ich mein es ist ja vollkommen ok, wenn ich sage für diesen Use Case, quasi brauch ich nicht so eine hohe Genauigkeit, sondern ich möchte einfach möglichst viel abdecken, und mir reicht wenn das System zu keine Ahnung 70% oder was auch immer genau funktioniert für den Preis Preis-Leistung passt für mich, dann ist ja auch ok, das Problem ist nur, dass ich es oft halt sehe, ist, dass auch wirklich der Preis ausschlaggebend ist und dass dann zu dem Produkt gegriffen wird und dann aber die Leute unglücklich sind, weil es dann doch nicht so funktioniert, wie sie sich erhofft hätten, das heißt da dann einfach quasi das Kritische zu hinterfragen, wobei das natürlich extrem schwierig ist weil in Wahrheit müsstest du natürlich alle Produkte quasi testen, anschauen, vergleichbar machen irgendwie und ja also, das Preis, thema Datenschutz ist auch ein Kriterium, das eigentlich ständig aktuell ist und brennt, also dass die Sachen wirklich datenschutzkonform sind und das kommt natürlich immer wieder unter, wo natürlich Kamera-basierte Systeme es immer schwieriger haben, weil einfach die Akzeptanz geringer wird beziehungsweise halt dann irgendein Datenschutzbeauftragter zum Glück doch sagt na Kamera ist jetzt nicht die beste Wahl, ja so in anderen Ländern sehen wir natürlich, dass Kameras eingesetzt werden, wenn es nichts anderes gibt, gut ist irgendwie nachvollziehbar wenn ich keine Alternative hab, dann ist das vielleicht das geringste Übel das kann durchaus sein, aber da merken wir schon generell, dass da ein Umdenken stattfindet Wobei ich mein Aufklärung ist halt auch wirklich wichtig also auch mit diversen Stakeholdern immer in Gesprächen sind und halt einfach einfach nicht verstanden wird wie die Systeme funktionieren und auch gar nicht das Interesse daran besteht das wirklich zu verstehen, das man es einfach besser beurteilen kann.</p>
	3.4.2.1	<p>Die Haupt Stakeholder sind also einerseits Pflegeheime, das sind Heimleitung, Pflegedienstleitung, Wohnbereichsleitung, aber auch wirklich bis zur Pflegekraft die am Bett steht, was wir schon gesehen haben, ist egal während dieser Kette quasi nicht ins Boot geholt wird, ist immer sehr skeptisch und schwer zu überzeugen.</p> <p>Techniker natürlich, das heißt die IT Abteilung, auch wenn wir jetzt keine Ansprüche an die IT haben, sie einfach mitzunehmen aufzuklären, dann natürlich in Gruppen nach oben gehend natürlich auch Managementebene und ansonsten natürlich auch Behörden im Sinne von Bewohnervertretung, Volksanwaltschaft et cetera.</p>
	3.4.2.2	<p>Wenig, wenig. Also was wir schon hin und wieder mitbekommen, ist, dass sind hin und wieder Wünsche von Angehörigen gibt, dass quasi diverse Systeme irgendwie gesehen werden - im Nachbarzimmer gibt es das, warum hat meine Oma das nicht?</p> <p>Was vollkommen nachvollziehbar ist, aber bislang ist mein Eindruck, dass eigentlich die Auswahl dieser Systeme oder generell das voranzutreiben der Pflege obliegt und weniger den Angehörigen.</p>
	3.4.2	<p>Also wir fokussieren hauptsächlich auf die Mitarbeiter, weil wir auch gesehen haben, die Akzeptanz bei der Einführung des Systems am kritischsten sind die Mitarbeiter, die Bewohner*innen sehen das eigentlich sehr positiv immer, da ist natürlich auch wichtig, dass das Pflegeheim dementsprechend aufklärt aufklärt was denn da eigentlich passiert.</p> <p>Also das ist ein Schritt, den wir bewusst nicht machen, auch nicht machen können, weil wir natürlich einfach die Technologie zur Verfügung stellen und wir können mit den Bewohner einzeln aufklären, sondern wir klären natürlich das Pflegeheim dementsprechend auf und das sind natürlich die Bewohner und das muss natürlich vertraglich dann auch richtig alles verankert werden etc..</p> <p>Das heißt von dem was natürlich auch das Feedback zum Beispiel habe ich kann mich erinnern von einer Bewohnerin, die einfach gemeint hat sie ist so glücklich, dass sie das System hat weil, sie hat mir dann erzählt, wir haben dann ein bisschen länger gesprochen, ist schon paar Jahre her, sie hat gemeint sie hat immer Angst gehabt, nicht zu stürzen, sondern auf dem Boden zu liegen und nicht gefunden zu werden.</p> <p>Das heißt sie hat dann wirklich jeden Toilettengang dreimal hinterfragt und hat sich gedacht, ok ich geh nicht jetzt ich geh in einer halben Stunde, wirklich, die Tätigkeiten, die Aktivitäten minimiert.</p> <p>Und nachdem das System installiert wurde, hat sie sich viel sicherer gefühlt, weil sie gewusst hat, sollte ich stürzen, dann werde ich unmittelbar gefunden ist, das heißt ich brauch keine Angst mehr haben und dadurch ist ihre Kraft quasi wieder mehr geworden, ihre Muskeln sind trainierter geworden, weil sie viel aktiver war und plötzlich war das natürlich alles extrem positiv für sie und sie hat quasi wieder herumgesehen in ihrem Zimmer, was sie so früher nicht gemacht haben und das ist natürlich extrem schön zu sehen, dass man einen immensen Impact quasi auf die Lebensqualität von den Bewohnerinnen haben kann, und das ist natürlich wirklich toll.</p> <p>[...] Genau ja, das meinte ich eben so mit den Bewohnern sie stürts meistens nicht und sind eh gewohnt, dass da ich viel herum hängt und dann ists halt eins mehr. [...] Zuhause ist es sicher was anderes, natürlich. Ich mein im Krankenhaus ist es glaub ich noch extremer, weil da gibt es ja noch mehr</p>
	3.4.2.3	<p>Ja da haben wir auch sehr viel gelernt in den letzten Jahren. Zu Beginn haben wir so Einschulungen gemacht von unserem System, das es selbsterklärend ist unter Anführungszeichen, 15 Minuten und das passt, mittlerweile sind wir dazu übergegangen, dass wir mehrfach 2 Stunden Blöcke machen für die Einschulung um sich auch ein Fragen zu stellen und einfach wirklich sich die Zeit zu nehmen und möglichst nah dran zu sein an allen beteiligten Personen und haben gesehen, dass das schon sehr, sehr hilfreich ist, und dass man da natürlich einfach auch die Akzeptanz ganz massiv erhöhen kann durch diesen Schritt.</p> <p>[...] genau, das ist das Problem, wenn man nicht alle erreicht und dann kommen welche von der Pflege und sagen - Was macht das Kastl da? Das ist komisch, sieht auch komisch aus und dann ist gleich der Raum für irgendwelche Gerüchte voll da.</p>
	3.4.3	<p>Kommt drauf an, kommt drauf an. Also ich glaub für die älteren Leute selber ist ein persönlicher Kontakt unersetzlich, aber was schon funktionieren könnte ist, dass man mittels Video etc die Angehörigen erreicht.</p> <p>Und die dann quasi das dann den Liebsten selbst erklären, also ich glaube, das könnte ganz gut funktionieren, aber sonst - man muss sich die Zeit nehmen und einfach mit den Leuten sprechen und einfach erklären was es macht, was es nicht kann, weil sonst glaub ich ist die Akzeptanz schwierig, wobei man auch sagen muss da gibts eh einige Studien glaube ich dazu, dass ältere Leute selbst eh nicht die Technologien installieren oder einführen, sondern dass es immer die Angehörigen sind und da ist es dann schon so ein Gefühl, weil ja mein Enkel hat gesagt ich muss das haben, also habe ich hinterfragt gar nicht, weil der sagt ich muss das und der hat mich die ganze Zeit gedrängt, also habe ich es weil im schlimmsten Fall muss ich sonst ins Heim oder irgend sowas, also ich glaube, dass es da schon natürlich auch viel Vertrauen innerhalb der Familie gibt, wenn der das sagt dann mach ich das halt...</p>
3.5	3.5.1	<p>Also ich glaub es bräuchte ganz dringend eine gesetzliche Vorgabe, nämlich, dass Pflegeheim und Krankenhaus neue Technologien einsetzen müssen. Also da wirklich den Drang oder das Puschen zu Innovationen etwas stärker forciert wird.</p> <p>Sonst datenschutztechnisch, glaube ich, sind wir ganz gut ausgerüstet auch mit dem AI Act jetzt jetzt kommt glaube ich gibt es einige Vorgaben, die jetzt aus unserer Sicht ok sind, weil s uns jetzt quasi nur am Rande streift, das heißt ja wir müssen uns natürlich beschäftigen.</p> <p>Wir beschäftigen wir beschäftigen uns auch proaktiv damit, weil wir sagen, wir wollen einfach mehr machen als was das ist das gesetzliche Minimum ist.</p> <p>Dass es hinderlich, ist glaub ich nicht mehr.</p> <p>Ich bin mir nicht sicher ich glaub beim AI Ac, dass das vielleicht viele kleinere abschrecken könnte wegen Medizin Produkt, also die Medizinprodukte die sind natürlich schon plötzlich Hochrisiko Systeme sogar das heißt dann da kann schon natürlich sein, dass das eher kontraproduktiv ist, obgleich es natürlich irgendwie nachvollziehbar ist, dass man da irgendeine Form der Regulierung machen möchte oder muss damit das Ganze nicht ausufer, sonst bei den gesetzlichen Vorgaben ist was meiner Meinung nach schon mal diskutiert gehört, wär quasi wie Technologie auf den Pflegeschlüssel wirken kann.</p> <p>Jetzt nicht mit dem Ziel noch weniger Pflegekräfte quasi zu haben, aber mit dem Ziel also immer aus meiner Sicht es gibt ohnehin zu wenig Pflegekräfte, es kratzen eh alle am Pflegeschlüssel kannst ganz unten, aber trotzdem beim Pflegeschlüssel das irgendwie Technologie da einfließen lassen zu können.</p> <p>Dass einfach die Qualität der Pflege dadurch höher wird.</p> <p>Dass man da irgendwelche Anreize schafft, dass einfach quasi wenn man am Minimum ist, aber Technologie einsetzt, dass man da irgendwelche Vorteile halt bekommt.</p> <p>[...] Oder eine Vorgabe, richtig, dass man quasi wenn man den Mindestpflegeschlüssel hat dann aber nur wenn du Technologie ... [...] genau weil das würde eigentlich schon auch zu dem dazu gehören, wo der Pflegeschlüssel jetzt eigentlich angesiedelt ist, weil noch runtergehen geht einfach nicht, ja selbst schon ganz, ganz dramatisch müssen sich einfach oben gehen und natürlich, was wünschenswert wäre, wäre eine Vereinheitlichung in den neun Bundesländern. [...] Auch Pflegeheime im Vergleich Niederösterreich / Wien, ich glaub Wien hat, ich müsst jetzt lügen, doppelt so viel Personal als Niederösterreich. Oder Faktor 1,7, ist schon brutal ja. [...] Ich mein so groß ist Österreich jetzt nicht, dass wir sagen könnte, Föderalismus, dass jedes Bundesland sein eigenes Süppchen kochen muss..</p>
	3.5.2	
4.0		
	4.1	<p>Für Privathaushalte... Also ja, im Pflegebereich muss natürlich quasi schon über die Pflegekräfte funktionieren.</p> <p>Also ahm die Beziehung also, was ich gesehen hab, quasi, dass die Bewohnerinnen eher selten eine Beziehung aufbauen zu dem System weil sie es auch nicht verwenden. Selbst die Pflegekräfte ähm die bis gerade nicht verwenden, im Sinne von, dass sind nicht auf der Plattform einsteigen und die Einstellungen der Einstellungen ändern etc für die ist es ja auch ein Kästchen, das alarmiert oder eben nicht, das heißt da gibt's wenig Berührungspunkte. Für die Personen, die dann natürlich die Plattform verwenden und dann wirklich aktiv auch den Sensor, die Einstellungen ändern etc da ist es natürlich was anderes. Da ist natürlich ganz, ganz wichtig, dass es möglichst niederschwellig ist möglichst simpel ist und dass auch eigentlich die Pflegekräfte möglichst viel Wahlfreiheiten haben, dass sie selbst entscheiden können, wofür sie den Sensor zu welchem Zeitpunkt wie einsetzen.</p> <p>[Mhm aber es ist eigentlich ganz spannend, weil so du das jetzt sagst klingt es für mich danach, dass man bestenfalls eigentlich, wenn man das Produkt kaum bemerkt und das einen unterstützt, ohne, dass es ein ohne dass es so präsent ist, dann hat man eigentlich kaum eine Beziehung oder negative dazu, wenn man eine hat, dann muss man sich aber auch mehr damit beschäftigen oder hat man mehr damit zu tun.</p> <p>Das ist immer die Frage, was will man eigentlich? Genau, ja. Also Beziehung halt eben die eine Dame, die mir das erzählt hat, die definitiv eine Beziehung mit ihrem Sensor aufgebaut, weil er ihr einfach ein Sicherheitsgefühl vermittelt, das ist natürlich dann quasi wieder etwas was sehr selten an uns herangetragen wird, nur wenn man vor Ort ist quasi bekommt man es mit sonst schauen wir so tief nicht hinein und können auch nicht hineinschauen.</p> <p>Das hatten wir aber auch schon! In einem Pflegeheim, wo der Sensor einen Namen hatte..</p>

4.2	<p>Also das haben wir uns quasi bei der Produktneuentwicklung haben uns das angeschaut. Insofern, dass wir das Industriedesigner quasi hatten, die quasi From Scratch alles hinterfragt haben, auch Interviews mit Pflegekräften geführt haben, um einfach quasi die Bedürfnisse zu verstehen und auch quasi der Akzeptanz zu verstehen, sich da auch in die Architektur von Pflegeheimen ein bisschen eingesehen haben, einfach so ein Stimmungsbild zu generieren, dass natürlich der Sensor so optimal integriert ist und jetzt nicht irgendwie als störend wahrgenommen wird</p>
5.0	
5.1	<p>Ich glaube es braucht alles, also es ist einfach, wenn du von der Welt sprichst quasi möchtest du natürlich alle möglichen Senioren erreichen, bzw. auch die Angehörigen davon, das sind natürlich im Privathaushalt, sind 80% und 20% sind in der Pflege. Das heißt die sind vollkommen anders zu adressieren. Ich glaub, dass es alles brauchen wird.</p>
5.2	<p>Was uns ein sehr großes Anliegen ist, dass es einfach auch in der Ausbildung in der Pflege verankert wird. Weil ich weiß vom Curriculum quasi, dass da ja es gibt, erste Bestrebungen da ein bisschen was zu ändern, hineinzubringen, aber es ist noch immer sehr wenig und oberflächlich teilweise.</p> <p>Zu Beispiel es gibt Institutionen, die haben schon seit vielen Jahren in einem Showroom quasi wo sie alle Auszubildenden durchschleusen, also es gibt schon solche Ansätze, aber die sind halt noch nicht weit verbreitet und gerade auch auf der Uni oder egal, welche Ausbildung jetzt Pflegekräfte machen, zum Beispiel für unseren Bereich, das muss einfach ein fixer Bestandteil sein.</p> <p>Dass es einfach neue Technologie, neue Technologien gibt, die einen massiven Impact haben können, und dass man sich einfach damit befasst und einfach ein Bewusstsein dafür hat wenn man dann quasi ausgebildet ist und zu seinem ersten Job hinkommt, dass man squasi sagt, hallo, wo ist denn das, das hab ich gelernt, es gibt so coole Sachen, die will ich haben uns dann natürlich auch generell das generelle Bewusstsein größer wird, daß das sind nicht nur die Pflegekräfte, das einfach einfordern von Ihrem Arbeitgeber, sondern natürlich auch Angehörige das einfordern vom Pflegeheim, wo die Liebsten betreut werden oder halt natürlich auch viel zu Hause installieren möchten, das heißt da ist einfach eine sehr breite Medienkampagne zusätzlich noch erforderlich bzw. einfach jeder Kanal quasi wird dringend benötigt, damit man einfach quasi das weit hinaustragen kann.</p> <p>[wer sollte diese Konzepte erstellen / entscheiden was unterrichtet wird?]</p> <p>Ich glaube, das ist gar nicht mal so wichtig, über die konkreten Inhalte, die präsentiert werden, also es geht jetzt nicht um System X oder System Y. Es geht einfach nur darum, dass überhaupt ein System präsentiert wird und dass man einfach das Bewusstsein schafft, es gibt unterschiedliche Lösungen. Suchts danach, beschäftigt euch damit ja also, ich würde das gar nicht so zentralisiert machen...</p> <p>[also eher die Anwendungsbereiche...] Genau, in dem Bereich quasi gibt's schon Systeme, wie zum Beispiel dieses oder jenes, damit es greifbar wird, aber auch in den Bereichen gibt's was ... also, wenn sie im Bereich gibt, dann gibt es in 2 Jahren dort was, wo es jetzt noch nichts gibt...</p> <p>Das ist von dem her sehe ich das jetzt nicht zu kritisch und wahrscheinlich ist sogar besser wenn jede Ausbildungsstätte unterschiedliche Ansätze hat, weil dann quasi das Wissen noch breiter wird, weil jeder einen anderen Fokus legt und dadurch dann einfach das noch facettenreicher werden kann [...] Richtig, genau, also, da kann man eben genau dieses Handwerk, oder diese Tools mitgeben</p> <p>Worauf muss ich achten, wenn ich es so ne so ne Lösung auswähle, oder in welchen Bereichen kann es einen Nutzen bringen?</p>

			<u>ERGEBNISSE</u>
			<i>Zitate aus den Transkripten, zugeordnet zu den entsprechenden Kategorien & Unterkategorien in der Analysematrix</i>
T	K	UK	
			Expert 3 (digitalization expert)
2.0			
2.1	2.1.1		
	2.1.2		
	2.1.3		Aus meiner Sicht muss man das machen, weil einfach zu wenig Pflegepersonal vorhanden ist, weil die Leute das einfach nicht mehr machen wollen und es einfach sehr unattraktiv ist, überhaupt der Beruf vor allem für junge Menschen. Und weil auch zu wenig Leute mittlerweile aus dem Ausland kommen.
2.2	2.2.1		<p>Meine Einschätzung ist allerdings, dass zwar die sagen wir die Verwaltung gerne oder offen wäre, für solche Technologien, aber der Mensch, der damit arbeiten muss, heißt die Pflegekraft. Meine Einschätzung ist allerdings, dass zwar die sagen wir die Verwaltung gerne oder offen wäre, für solche Technologien, aber der Mensch, der damit arbeiten muss, heißt die Pflegekraft. Also offen mein ich damit, dass sie nicht komplett sie müssten überzeugt werden vom Kosten-Nutzen also, da geht es einfach wirklich rein um Kosten-Nutzen, vielleicht die Gemeinnützigen noch, dass man den Beruf attraktivieren kann, dass man sagt OK, es ist eine körperliche Entlastung für Mitarbeiter, aber eigentlich schlussendlich muss es ein einn Kosten eine Kosteneinsparung sein, quasi auch danach im Endeffekt bei den Mitarbeiterkosten danach auch wieder sich niederschlägt.</p> <p>Was vielleicht am ehesten noch helfen kann, das ist jetzt nicht so eine eine wirklich so zu AAL wahrscheinlich zu zählen ist, ist halt wirklich so eine Transkription, dass sie weniger Verwaltungsaufwand haben, aber das ist jetzt nicht wirklich richtiges AAL Produkt ne. [Frage - digitale Pflegedokumentation gemeint?] Ja, genau. Weil das das wollen sie einfach nicht, weil sie jetzt auch die, das ist einfach was ich so im Gefühl hab, weil sie sich so schwer, ja mit der Sprache tun, weil es oftmals eben keine österreichischen Pflegedienstmitarbeiterinnen sind, sondern eher die vielleicht gut Deutsch können, aber einfach sich mit mit Schreiben schwer tun und dann gibt es vielleicht eine Person, die dann nachher alles transkribieren nachher muss, weil jetzt doch viel Verwaltungsaufwand in diesem vor allem im Pflegebereich hast. Und das ist, glaub ich was was, wo man, womit man am ehesten auch damit reinkommen kann einmal oder mit beginnen kann, dass man die Leute damit gegenüber sensibilisiert, aber sonst glaub ich ist es relativ schwer.</p>
	2.2.2		<p>Glaub dass sogar die AAL Technologien für eben für... dass die Pflegenden Angehörigen dafür offener sind als Pflegemitarbeiter. Aber die müssten einfacher zugänglich sein. Zum Beispiel Easy Cheesy auf Amazon zum Beispiel kaufen kannst, weil die Leute einfach schnell googlen, wenn sie verzweifelt sind.</p> <p>[bzgl Pflegemitarbeiter] Und glaub dass die die das System Kamera und glauben, dass du alles aufzeichnest und dass der Chef vor einer Übersicht dann nachher sitzt Die wollen auch noch alles wirklich alles alles mit der Hand, jeder einzelne Doku, jeder einzelne Patienten- Administration, Verwaltung alles wollen sie mit Zettel haben, weil sie Angst haben, dass sie das dann das jetzt quasi die Verwaltung das stoppt, wie lange sie brauchen. Das ist ur gestört. So können sagen, Sie haben den ganzen Tag, ich weiß nicht was gemacht.</p>
	2.2.3		Aber ich glaube, dass die Pflege, oder meine Erfahrung dass die Pflegemitarbeiter einfach den Nutzen davon nicht sehen, kannst es ihnen noch so erklären und noch so schmackhaft machen und hast du dir auch gemerkt mit diesen ganzen Testversionen oder sowas es nimmt dir keiner an, vor allem wenn du kein ausgereiftes Produkt hast, sobald der ein bisschen also, wenn sie es annehmen, sobald da ein bisschen irgendwo was hakt wird es komplett eingestellt dann nachher, also, das ist für sie dann irgendwie... teilweise, glaub ich ist es, dass sie Angst haben um ihren Job, dass sie meinen, dass sie dadurch ersetzt werden und teilweise ist es ihnen auch einfach zu mühsam, sich damit auseinanderzusetzen. Und wenn dann irgendwie eine ein ein ein Fehler auftritt oder einmal ein Falsches bei Stürzen eben zum Beispiel, bei Stürzen ein falscher Fehlalarm, dann wird das beim zweiten Fehlalarm nur mehr negativ gesehen.
3.0			

	3.1.1	
3.1	3.1.2.1	Und jeder kleine Start Up oder jede kleine weiß ich nicht irgendwer da, wo der Papa ein bisschen Geld zuschießt Na, macht irgendeine App oder irgendein ein Produkt Wo's aber teilweise halt wirklich noch ja schwierig ist. Und es sind einfach viel zu wenig Leute, die wirklich aus dem Bereich kommen, die sich damit beschäftigen eben wenn du es jetzt anschaust mit Cogvis, die sind ja, die wissen einfach, was der Need ist, aber wenn du dir das anschaust wir, wie haben die Schweizer geheißten die... [ein Produkt, CARU] Ja, ja, genau die die haben ja nichtmal irgendwie eine Ahnung, was wirklich der Pflegende benötigt.
	3.1.2.2	
	3.1.2.3	In der stationären Pflege oder im B2B Bereich gibt es ja massenhaft, da kannst du dich ja gar also aus meiner Sicht, das ist ja wie Schwammerl, dass du eigentlich dir denkst du könntest jeden Tag irgendeine neue Produktvorstellung machen, wenn du es jetzt nicht allzu sehr eingrenzt und jeder kann eine Natur raus und du hast überhaupt keine Möglichkeit mehr, ja also es gibt wahnsinnig viel finde ich ... In der häuslichen Pflege Gibt es aus meiner Sicht weniger, zumindestens weniger zugänglichere Also jetzt mal eine anschaust Sturz, Uhren, diese ganzen Sachen . Aber wenn du dir anschaust in der stationären Pflege, wir hätten ja jeden Tag uns irgendwas anschauen können.
	3.1.3	Die meisten kennen halt die Caritas oder das vom Roten Kreuz Aber dass es zum Beispiel abgesehen von der Uhr auch noch andere Produkte oder Hilfsmittel vorhanden sind, wissen einfach die wenigsten. Und wird auch einfach wenig beworben weil wo wo, wo soll es wo sollst nachschauen? Im Sanitätshaus gibt es ja eigentlich auch nicht wirklich ne, wenn ich vielleicht gibt es die Matte und die Inkontinenz und solche Sachen aber.
3.2		
3.3	3.3.1	Ja. Und zum Beispiel so wie dieser dieser SensFloor, wo man ja eigentlich uns gedacht hat OK, das sieht man nicht was mega viel kosten aber verursacht hat natürlich, vor allem wenn du umbauen musst und was ist wenn wenn da irgend eine Störung ist oder wenn sich die Technologie weiterentwickelt, dann reißt den ganzen Boden wieder auf. Aber wenn jetzt irgendwer weiß nicht einen Hund war ja, waren ja lauter Störungen, weil irgendein Hund da war, weil aufgewachsen worden ist. Es waren ja dauert Fehlalarme und dadurch verärgerst du sowohl die Bewohner oder die Pflege. Auch jeden einzelnen anderen also das ist halt.
	3.3.2	Und es hat wirklich sehr fachspezifisch ist wie viel Pflege du brauchst und und halt auch bei diesen ganzen Sturzsensoren ist ja auch das Thema, dass du also jetzt bei AAL im Allgemeinen, sobald du dich auf einen Anbieter eigentlich einschließt hast du als Käufer das Gefühl, dass du da bleib bleiben musst, weil jeder hat irgendwie sein eigenes System du kannst nicht wirklich wechseln. Wenn du mal überlegst wieviel ah, nee, gehma irgendwie zur Sturzsenorik zurück, find ich einfach am einfachsten. Die Schweizer haben eine Installation an der Decke mit einem Lan Kabel, und die braucht eine gewisse Deckenhöhe und muss das, wenn dann einziehen und wenn du das im Neubau machst, dann musst du es auch mitberücksichtigen, was ja okay ist, aber dann hast du es an der Decke. Cogvis zum Beispiel hast du das nicht in der Decke hast du das quasi an der Wand, da muss dann auch die überleg also im Endeffekt kannst du dann nachher nicht switchen wenn du jetzt sagst du hast die Sturzsenorik am Boden kannst du nicht von der Decke oder von der Wand das ist wieder in den Boden, also du musst dir einfach, wenn du sobald du einmal irgendeine eine negative Erfahrung gemacht hast bist du hier sehr sensitiv wieder ein neues Produkt einzuführen, weil es einfach langfristig extreme Kosten sind, wenn du dich dagegen entscheidest. Oder auch bei irgendwelchen Apps oder so allein die Umstellung, die Integration, die Schnittstellen, das dann wieder von vorne zu beginnen.
	3.3.3	

	3.4.1	<p>[wenn irgendjemand ein Produkt] Vorstellen möchte, das ist, das ist urchwer, wenn du dir anschaut die Referenzen, auf die finde ich überhaupt nicht verlassen. Jeder hat es mal ausprobiert. Aber eigentlich mittlerweile würde ich mir echt anschauen Was ist der Hintergrund der der Firma bzw der Personen, die, die da die das aufgebaut haben, die das entwickelt haben. Kommen die vielleicht sogar aus dem Bereich der Pflege oder sind das wirklich nur irgendwelche eben wie gesagt irgendwelche Bubis, die vom Papa ein Geld zugeschossen bekommen haben? Und wie tief sind die wirklich in dem Bereich Pflege auch schon drinnen, also ich würd mir bevor ich mir mal das Produkt einmal vorstellen lassen, würde wirklich einmal auch anhören so wie die Frage, die du auch jetzt gerade vorhin gestellt hast, wie sie die die Pflegesituation einschätzen, was ist das Problem der Pflege, was braucht die Pflege? Und dann erst das Produkt. Ja, genau, weil ich denke, wenn wenn sie einfach wirklich auch eben das Problem der Pflege erkannt haben und was sie wirklich brauchen ist, erst dann können Sie auch ein Produkt entwickeln. Auf das würde ich achten, also es wäre mein erster Schritt, dann natürlich schauen, wenn es gibt Referenzen - Cogvis hat mittlerweile ja schon sehr gute Referenzen, aber ja. Ich würde mir nicht nur, ich würde mir eine Referenz mit einem Kontaktreferent geben lassen. Mittlerweile ein Learning, weil so wie wir wir haben ja auch schon, wir sind auf sämtlichen Referenzlisten sicherlich auch schon gelistet, mit keiner einzigen erfolgreichen Einführung.</p> <p>Und was auch immer ein Thema ist, weils auch einfach leistbar sein muss, ist die, nicht die Initialkosten, sondern auch einfach wirklich mal die laufenden Kosten und die Variablen Kosten geben zu lassen.</p> <p>Und dass sie halt auch wirklich gesagt haben bei uns, dass und das haben wir ja auch, wir haben ja eine, [...] wir haben ja eine riesen Excel einmal gemacht Was so quasi Needs auch sind [...] Und was die Ängste sind und so hab ich das verstehen und die haben halt wirklich gesagt und da haben wir auch nachgefragt, wie viele Nachtgänge pro Nacht hat man eigentlich? Kann eine Sturzsensorik überhaupt diese Nachgänger, die Kontrollgänge ab abziehen? Und das war halt, da ist rauskommen, Nein. [Ihr habt wirklich eine komplette Bedarfsanalyse eigentlich mit dem Pflegepersonal gemacht] Ja, ja, Pflege und Verwaltung. Ja, es war ein bisschen, das war echt interessant und ich hab letztes mit Michi auch drüber gesprochen, weil sie jetzt auch eine Sturzsensorik einfach überlegt haben oder teilweise haben sie sie auch. Aber in vielen Bereichen haben sie nur eine Nacht Nachtschwester eigentlich pro Nachtschicht und da hat er hat gesagt aus seiner Sicht, die kann er sich nicht ersparen, die muss er sowieso haben. Das einzige was er halt kann er nicht einsparen, das ist einfach keine Kostenersparnis, das ist quasi maximal eine Entlastung. Wenn sagst du, willst du durch Pflegekräfte einsparen oder muss sie einsparen? Und du hast eh nur eine? [...]</p> <p>Und da haben wir dann auch über SensFloor gesprochen und das stimmt schon du kannst keinen SensFloor zum Beispiel verbauen oder ein AAL Produkt, was nie wieder rausbekommst, weil das sind so hohe Initialkosten, wo du überhaupt keine Referenzen wirklich hier hast oder studienwerte oder ich weiß nicht was, wenn du es in einem ganzen riesen Bereich neubaut oder auch Roboter wie schnell tut sich da was, was du zum Beispiel diese ganzen AAL Roboter hast? Ja auch, dass die immer mit diesen ganzen Türen. Dass dir ja, klar können sie Aufzug fahren. Aber wer lässt den den Roboter durch die Tür durch? Durch die Feuerschutztür zum Beispiel. [...] Genau und auch wenn du jetzt was im Neubau, die schon berücksichtigt, aber du legst ein Produkt fest und das sind so hohe Kosten, wenn das oder mit diesem Betten Transporter ist ja auch eigentlich eine coole Sache, aber da hast du das Thema, dass du wirklich alle Türen drauf auslegen musst. [...] Jetzt halt dann OK, Roboter jetzt nicht nur diese Transporter aber auch zum Beispiel Roboter, die so bringen oder oder? genau aber wie kommt der Roboter in das Zimmer? Von einer Person, die vielleicht jetzt nicht selbstständig gehen kann, ist eigentlich mehr bettlägerig, weil dann bräuchte man den Roboter eh nicht, aber die den Roboter zu nutzen, braucht zum zum Beispiel Du sagst hol und Bringdienst zum Essen Machen. Aber wie kommt der ins Zimmer rein?</p>
3.4	3.4.2.1	<p>Verwaltung ist sowieso, was ja, aber die kannst eigentlich relativ einfach mit Kosten-Nutzen im Endeffekt</p> <p>Also als erstes schon musst du wirklich die Pflege und die Pflege Leitung dann wirklich einmal ins Boot holen, die davon überzeugen, dass dieses Produkt auch wirklich ihnen helfen kann, weil sie verkaufen es dann eigentlich ja auch den Patienten oder dem Bewohner oder wie auch immer den zu pflegenden und wennst die wirklich davon überzeugt hast, überzeugen die dir die die zu Pflegenden, aber was man nicht vergessen darf, ist die Angehörigen weil die Steuern im Hintergrund im Endeffekt alles.</p> <p>Die Angehörigen? Definitiv aus meiner Sicht, weil die, die die reden, das den zu Pflegenden auch im Endeffekt ein oder aus und viele haben, ja auch eine Patientenverfügung über sie. Je nachdem, wie wenn du pflegebedürftig bist, bist ja meistens schon auch so weit, dass du vielleicht eine Vormundschaft hast oder sowas. Aber ich glaub wenn wenn man jetzt sagt OK ab sofort gibt es Überwachungs, du hast eine Sturzsensorik und für die ist das ein Videoüberwachungssystem, wo man ja, dann glaub ich musst du wirklich da gute Aufklärungsarbeit leisten. Mit Informationsveranstaltungen. wo auch wirklich die Pflege aktiv auch spricht, nicht der Hersteller im Vordergrund ist, sondern oder quasi Ein böser Geschäftsführer, der damit einfach nur Profit machen möchte, sondern auch wirklich die Leute, die damit arbeiten, die eigentlich keinen Profit davon haben.</p> <p>Ja, als Beispiel mein Opa hat ja seine letzten, also sein letztes halbes dreiviertel Jahr im sein letztes halbes dreiviertel Jahr in in der in der Pflegeeinrichtung verbracht, meinVater wollte einen Amazon so eine Alexa, Es war ein mega Aufwand, das wär ne Alexa aufstellen durften. Also das war mit er hats beim Land Niederösterreich sogar beantragen müssen. Ja, weil sie Angst hatten, dass sie quasi überwacht werden über die Alexa und dass der zweite Zimmerbewohner damit auch irgendwie ein Problem hat und das waren viele Schreiben sogar über Rechtsanwalt. Patienten, Lesepatienten oder Rechtsanwälte, wie der heißt? [Anm: Patientenanzwalschaft] Aber das ist echt arg gewesen eigentlich, weil da hat, nämlich die Pflege und auch die Hausleitung glaub ich dagegen wirklich interveniert, weil er hat's aufgestellt gehabt und dann haben sie's ihn abmontieren lassen und das war dann wirklich 2, 3 Briefe mit diesem Patientenanwalt. Wenn wir nur anrufen, damit wir ihn halt sehen, wenn er halt irgendwie.</p>
	3.4.2.2	<p>Und du brauchst glaub ich auch wirklich oft auch wirklich die Angehörigen, die dem auch zustimmen müssen. Ich glaub also, das weiß ich jetzt nur, weiß ich jetzt nicht auswendig, aber das wäre jetzt auch nicht interessant, auch wenn es einer VCG nachzufragen oder vielleicht gibt es da auch irgendwelche Zahlen wie viele zu Pflegenden in Pflegeeinrichtung tatsächlich eine Patientenverfügung haben. [...] Habs jetzt richtig richtig unter, dass ich da der Angehörige denk ich zahl ja eh vor allem oder wenn du vor allem im privaten Sektor bist privatzahler Sektor. Musst du so arg ... genau das ist echt eine, also die Kommunikation dahinter ist was wichtiger als das tatsächlich richtige Produkt. Da ist es vielleicht besser du hast bisschen ein schlechteres Produkt, aber dafür eine bessere Kommunikation.</p>
	3.4.2.3	<p>[Rückfrage: Um es mal überhaupt ordentlich testen zu können, muss man es ja quasi fast schon komplett integrieren, ne?] genau das du hast dann nachher eine Komplett Kostenthematik, aber auch eben Den den User ist gleich der Pflegenden oder auch die Zugpflegenden, die damit auch dann verschreckt, wenn du wieder was Neues, dann nachher beginnen sollen wollen würdest. die Zugpflegenden, die damit auch dann verschreckt, wenn du wieder was Neues, dann nachher beginnen sollen wollen würdest. ist nicht im Pflegebereich, im im klassischen Pflegeheim, sondern in Akutspitalern wo der Patient regelmäßig wechselt. Weil der kennt die Sachen nicht, da kannste eigentlich schnell was Neues einführen wieder oder wechseln. Ist ein Aufwand Nein, nein natürlich eh, Kosten alles, aber aber den Patienten wenn ich jetzt sage OK, wir haben jetzt irgendein Sturz oder ich weiß nicht, irgendeine App, die nicht funktioniert kann ich das im Spital besser Neu genau neu einführen als in einem Betrieb mit Langzeit.</p> <p>Aber die gegenüber, die sind jetzt schon seit 20 Jahren wohnen in der VCG und er ist 80 sie ist 90. Sehr technisch affin, wir waren ja noch drüber in der Wohnung und die haben zu uns gesagt, da waren auch die alten Cogvis Sensoren, dass sie Angst hätten beim Kuschein, dass sie beobachtet werden. Wortwörtliches Zitat und dann halt irgendwie ja.</p>
3.4.3	3.4.3.1	<p>[bzgl Einführung eines AAL Produktes in einer Rehabilitation] Auf jeden Fall, mit denen wirklich ganz also da hab ich wirklich versucht das so gut wie möglich über die halt reinzubringen über die Pflege. Wir hatten das Kick Off, wo ich nur mal informiert hab, aber nein stimmt aber auch die von Cogvis war dabei, die war dann auch schon richtig deprimiert. Waren 8 Leute, fast das ganze Pflegeteam war jedes Mal dabei. Weil ich sie einfach halt wirklich gemeinsam da abholen wollte, hat nicht funktioniert kein einziges Mal haben sie es verwendet. Ja, Sie haben immer gesagt es gibt keine Patienten, die die ... Ich glaub, im Jänner hab ich es versucht einzuführen hab ich das erste Mal und im Mai oder so hab ich den Abgebrochen. Die waren andere relativ jung, also also das eigentlich das, was mich schockiert hat. Das Produkt war aus ihrer Sicht einfach nicht gut.</p> <p>Haben es einfach halt auch schon von vornherein eigentlich sehr abgelehnt. Und jetzt musst du bei Cogvis eigentlich der Vorteil ist, dass du das mit diesem Stecksystem ja Plug and Play Aber das hat sie auch wieder abgeschreckt, wie sie es dann nachher einbinden in in den einzelnen Zimmern zuordnen, wie sie das umstellen, wer macht das? So hat alles vor und Nachteile.</p> <p>genau und die Verwaltung sagt voll super, weil du kannst ja Kosten sparen, weil das ist Plug and Play System aber wer macht dann nachher die, die die Verwaltung des Plug and Plays sag ich jetzt einmal, ne wer setzt sich den Hut auf, weil es ist ja auch eigentlich gar nicht mal so ungefährlich. Wennst da irgendwas falsch machst</p>
	3.4.3.2	

3.5	3.5.1	<p>Nein, ganz arg also, ist bei euch jetzt AAL auch zum Beispiel Also aus meiner Sicht gibt es da viel zu wenig, vor allem in Österreich. Ist gar nichts, was wirklich reguliert ist. Weil sich keiner drüber traut. Also ich, wir haben wirklich echt ein Thema gehabt. Weil es auch einfach keine keine Keine keine Grundlage gibt, auf die Du aufbauen kannst und auch keine Use cases, wo du dir das irgendwie anschauen kannst, wo es bereits eingeführt ist. Also es ist bei uns ewig gedauert, es ist alles so schwammig formuliert. Ja, und du hast einfach immer diese, es spielt immer in diese Datenschutzgrundverordnung rein und da ist es an Schwammigkeit kaum zu übertreffen. Das ist, das ist echt ein Thema, und es ist alles so ein ein ein Larifari.</p>
	3.5.2	
4.0		
4.1		
4.2		<p>Aber nein, aber das ist das was ich gemeint hab, da musst du quasi die zuerst die Pflegenden, also die, die die Pflegekräfte mit ins Boot holen, die das Produkt im Endeffekt den pflegenden Nein den zu Pflegenden. erklärt oder oder quasi verkauft überhaupt ist oder woher sollt die wissen, was das ist? Und dieses positive Gefühl oder diese positive Assoziation kann im Endeffekt nur die Pflege herstellen. Weil das sind die die Leute, die damit arbeiten und die, denen man dann auch dadurch vertraut. Weil alles andere ist im Endeffekt ja schön und gut irgendwie wieder wer der mit mir Profit machen möchte, aber wenn mir das die Olga erzählt, die mich jetzt schon seit 2 Monaten liebend pflegt und auch mit den Angehörigen vielleicht auch schon ein gewisses Verhältnis hat, dann vertraue ich der und lass mir das auch erklären und denk mir OK, wenn dir das für gut empfindet, dann hat das sicherlich alles Hand und Fuß, aber wenn ich jetzt einfach da irgendwie also würd ich auch so wenn ich jetzt damals in das Zimmer von meinem Opa gekommen wäre und da wäre irgend ein Kastl was blinkt? und keiner sagt mir was das ist, denk ich mir OK big brother is watching you. Aber wenn jetzt dann der reinkommen wär mir erklärt hätt ja, und damit hätten wir dann nachher die und die Vorteile und das entlastet mich nicht nur, sondern gibt Ihnen auch die Sicherheit und was auch immer hat man dafür für Kommunikationsstrategien entwickelt. Aber das glaub ich ist ohne dem, die verkaufen das Produkt im Endeffekt</p>
5.0		
5.1		<p>Ja ja, das wollt mal eh machen ja Ja, ja das wollt man also buddies oder wie man das halt auch nennt, ja das wollt man eh nur das ist halt extrem schwer, solche Personen auch zu finden. Genau so wie auf so First User, die sind ja teilweise auch richtig stolz drauf. Aber wir haben ja damals diese. In der in der VCG diese diese Show nicht Showroom, sondern eigentlich diese Show Wohnung ja eigentlich ausgestattet, was ja auch schon. Der Sinn dahinter war, dass man vielleicht auch damit bestehend Bewohner auch Interesse damit irgendwie zeigt, oder sie hätten auch die Möglichkeit gehabt, dass sie da einziehen ein paar Wochen Ja, durch testen. Kein einziger wollte das, weil erst einmal die die Mitarbeiter vor Ort obwohl wobei wir sogar ja wirklich Tag der offenen Tür für Mitarbeiter zuerst gemacht haben 2 Tage lang wirklich jeder Mitarbeiter hätte kommen können, der wollen würde. von der Küche mehr als vom Pflegebereich, die Küchenleute waren voll interessiert. Aber es hat kein einziger, kein einziger Bewohner Interesse gehabt, da wirklich, wobei die ja top neu waren alles und ging Ja, ja gegenüber ja. Im Vergleich zu den anderen Wohnungen gefunden und na topmodern im Endeffekt, weil halt klein das ist halt das Problem gewesen, dass nicht mal an Kasten irgendwo reinbrach ich glaube. Das wird aber wo gibt es dein Gewand hin? Wenn du drinnen wohnst. Küche, aber halt auch Wohnzimmer war ja im Endeffekt High End dort ne.</p>
5.2		

APPENDIX **B**

Workshop Resources

B.1 Invitation

Einladung

zum

Active Assisted *Living* **WORKSHOP**

Sehr geehrte Damen und Herren!

Im Zuge der **kreativen Forschung** zu meiner **Diplomarbeit** an der TU Wien beschäftige ich mich mit dem sinnvollen Umgang mit **digitalen und unterstützenden Hilfsmitteln & Technologien** und deren **Einsatz im Alltag** .

Daher möchte ich Sie gerne einladen, an einem interaktiven **Workshop** zu diesem Thema teilzunehmen. Wir werden gemeinsam im Rahmen von **Gesprächen, Spielen und Experimenten** tiefer in das Thema eintauchen. Über Ihren wertvollen Beitrag würde ich mich sehr freuen. Es sind keinerlei Vorkenntnisse notwendig. Die Teilnahme ist für alle interessierten Personen **ab 65 Jahren** möglich und wird in etwa **1 bis 1,5 Stunden** Ihrer Zeit in Anspruch nehmen. Im Anschluss an den Workshop freue ich mich auf einen informellen Austausch bei Kuchen & Getränken.

Ich freue mich auf Ihre Anmeldung!

Herzliche Grüße
Naomi Karner
06645350156

B.2 Declaration of consent

Workshop/Seminar zum Thema “Digitale / Technologische Alltagserleichterungen“: **Informationsblatt mit Einwilligungserklärung**

Im Rahmen der kreativen User-Research-Phase für meine Masterarbeit zum Thema

„Erforschung der sinnvollen Nutzung von Ambient Assisted Living Technologien“

für mein Masterstudium der Informatik an der TU Wien möchte ich, Naomi Karner, Sie gerne zur Teilnahme an einem von mir durchgeführten Workshop (eine Art interaktives Seminar) einladen. Ich möchte Sie im Folgenden über die Ziele und Vorgehensweisen des Workshops informieren und bitte im Anschluss um Ihre schriftliche Einwilligung zur Teilnahme und zu der beschriebenen Durchführungsweise.

Die Teilnahme am Workshop ist freiwillig und wird in etwa **60 bis maximal 90 Minuten** Ihrer Zeit in Anspruch nehmen. Die Workshopinhalte werden sich um den Einsatz von digitalen Produkten und Unterstützungs-Technologien aus dem Bereich **Ambient / Active Assisted Living** für Personen ab 65 Jahren in Österreich drehen. Ich bitte Sie, als Mitglied der Zielgruppe, im Rahmen des Workshops Ihre Gedanken, Erfahrungen, Ansichten und Meinungen zu den verschiedenen Aufgaben und Programmpunkten unter dem genannten Schirmthema offen mit mir zu teilen.

Ich möchte mich im Vorfeld für Ihre Bereitschaft, an dem Workshop teilzunehmen und mich an Ihren Erfahrungen und Ansichten teilhaben zu lassen, sowie für Ihre Zeit, herzlich bedanken.

Informationen zur Durchführung des Workshops:

- Es handelt sich um einen **interaktiven Workshop**, in dem unterschiedliche Aufgaben und Themen gemeinsam in der Runde der Teilnehmer*innen behandelt werden.

- Sie können während des Workshops **vollkommen frei agieren und sprechen**, Ihre ehrliche Meinung und Reaktion ist mir besonders wichtig.
- Jeder Beitrag und jede Diskussion ist wertvoll und ich bin dankbar über jeden Austausch, den wir im Rahmen des Workshops haben.
- In dem Workshop geht es allgemein um **unterstützende Technologien** aus dem Bereich **Ambient / Active Assisted Living (kurz „AAL“ genannt)**, also beispielsweise **Sturzerkennungssensoren, digitale Blutzuckermessgeräte, Smartphone-Applikationen zur sozialen Kommunikation oder Medikamentenerinnerung, uvm.**
- Zudem wird es auch um Gespräche rund um “Digitale Alltagserleichterungen“, den Einsatzbereich und die Möglichkeit, diese Produkte sinnvoll einzusetzen, gehen.
- Der Workshop wird **in Persona** stattfinden, ich bitte um Ihre persönliche Teilnahme zum vereinbarten Zeitpunkt.
- Sie können mich bzw. die Betreuerin der Masterarbeit, Projektass.in Dipl.-Ing.in Janis Lena Meißner, PhD, jederzeit unter den unten angegebenen E-Mail Adressen oder Telefonnummern kontaktieren, falls Sie Fragen oder Anmerkungen haben.

Auf der nächsten Seite finden Sie die Einverständniserklärung zur Teilnahme an dem Workshop. Ich bitte Sie, diese zu Beginn des Workshops zu unterzeichnen.

Für Fragen stehen folgende Personen zur Verfügung:

**Workshopleiterin & Verfasserin
der Masterarbeit**

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Betreuerin der Masterarbeit

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Herzlichen Dank im Vorfeld und freundliche Grüße
Naomi Karner

EINVERSTÄNDNISERKLÄRUNG

Bitte bestätigen Sie Ihre Teilnahme, indem Sie Zutreffendes ankreuzen:

Erklärung	Zustimmung
<p>Ich bestätige, dass ich an der Studie für die Masterarbeit in Form eines Workshops teilnehmen möchte. Meine Teilnahme erfolgt auf freiwilliger Basis und kann jederzeit ohne Angabe eines Grundes beendet werden.</p>	
<p>Ich bestätige, dass ich eine schriftliche Erläuterung des Forschungsinhalts in Form einer Workshop-Einladung sowie eine Erläuterung Datenschutzerklärung erhalten habe. Ich habe außerdem Kontaktdaten bekommen, um Rücksprache bei Nachfragen und Unklarheiten zu halten.</p>	

Vorname und Nachname in Druckschrift

Ort, Datum

Unterschrift

B.3 Privacy Policy

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

Workshop / Seminar zum Thema “Digitale / Technologische Alltagserleichterungen“: **Datenschutzerklärung**

Diese Datenschutzerklärung bezieht sich auf den von mir, Naomi Karner, für meine **Masterarbeit** geplanten Workshop mit Teilnehmer:innen der Altersgruppe ab 65 Jahren:

- Die Masterarbeit verfasse ich an der TU Wien im Rahmen meines Masterstudiums für Media and Human Centred Computing an der Fakultät für Informatik.
- Die **Datenschutzerklärung** bildet gemeinsam mit dem **Informationsblatt** inklusive **Einwilligungserklärung** die Grundlage für die Durchführung des Workshops.
- Ich bitte Sie, die beschriebene Datenverarbeitung zu lesen und, sofern Sie einverstanden sind, um Unterzeichnung der Zustimmungserklärung auf Seite 2.

Für Fragen stehe ich selbstverständlich zur Verfügung und bitte um Kontaktaufnahme (Kontaktinformationen finden Sie auf Seite 2).

Hinweis: Wir werden die Datenverarbeitung zu Beginn des Workshops / Seminars auch nochmals gemeinsam besprechen und es wird genau erklärt, was in der Erklärung in diesem Schriftstück im Detail enthalten ist. Gerne können wir Ihre Fragen auch zu Beginn des Workshops klären und Sie können anschließend jederzeit entscheiden, ob Sie teilnehmen möchten.

Welche Daten werden im Rahmen des Workshops erhoben?

- Im Rahmen des Workshops werden **Beobachtungen** und **Diskussionsbeiträge** der Teilnehmer*innen in Form von **handschriftlichen** und **digitalen Notizen** und ggf. **Audio-Aufnahmen** dokumentiert.
- Da im Workshop verschiedene Aufgaben gemeinsam erarbeitet werden, findet auch eine Dokumentation in Form von **Fotos** statt. Bei den **Fotografien** wird versucht, diese so aufzunehmen, dass es keinen Aufschluss über die Identität von abgebildeten Personen

geben kann. Sollte dennoch ein Gesicht auf einem Bild erkennbar sein, wird dieses mittels Bildbearbeitung unkenntlich gemacht, bevor es für eine Veröffentlichung in der Masterarbeit genutzt wird.

- Ich bitte am Ende des Workshops außerdem darum, in **anonymer** Form einen kurzen **Fragebogen** auszufüllen, in dem ich neben einem kurzen Feedback auch nach Angaben zu Alter, Geschlecht und bisherigen Erfahrungen mit diversen technischen Geräten frage. Das Formular soll helfen, für die Analyse der Ergebnisse eine bessere Einschätzung der Studienteilnehmer:innen zu ermöglichen und mir eine Rückmeldung dazu geben, wie Ihnen die Veranstaltung gefallen hat.

Wie werden die erhobenen Daten verwendet?

- Die im Zuge des Workshops gesammelten Daten und Informationen werden für die **User-Research-Erkenntnisse der Masterarbeit** zum Thema „*Exploring the meaningful use of Ambient Assisted Living Technologies - Evaluation of user-centred approaches for and with elderly*“ (auf Deutsch: „*Erforschung des sinnvollen Einsatzes von Ambient Assisted Living-Technologien – Bewertung benutzerzentrierter Ansätze für und mit älteren Menschen*“) verwendet und im Rahmen dieser Arbeit **analysiert und präsentiert**.
- Etwaige **Notizen, Audio- und Bildaufnahmen** werden ebenfalls zur Unterstützung der **inhaltlichen Analyse der Ergebnisse im Rahmen der Masterarbeit** herangezogen.
- Etwaige im Zuge des dem Workshop gemachte **Fotos/Bilder** werden ausschließlich so verarbeitet, dass keine teilnehmenden Personen darauf identifiziert werden können.
- In Diskussionen genannte **Namen** von Personen werden **in den Notizen anonymisiert**.
- Alle schriftlichen Aufzeichnungen und Fotos, die im Rahmen des Workshops gesammelt werden, werden **ausschließlich** für die dargelegte **Masterarbeit** verwendet. Die Rohdaten werden ausschließlich von der Verfasserin sowie ggf. Betreuerin der Arbeit eingesehen und bearbeitet. Im Rahmen der Verfassung der Masterarbeit und deren Publikation werden nur anonymisierte

Daten verwendet, die im Rahmen der Masterarbeit anschließend zugänglich sind.

- Sämtliches **Rohdatenmaterial** wird von der Verfasserin vertraulich behandelt und in Übereinstimmung mit dem Datenschutzgesetz bis zur Beendigung der Verfassung der Masterarbeit sicher aufbewahrt. Es wird nicht für Zwecke verwendet, die nicht ausdrücklich zugelassen sind.

Für weitere Fragen stehen folgende Personen zur Verfügung:

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ZUSTIMMUNG ZUR DATENVERARBEITUNG:

Name (in Blockbuchstaben):

Mit meiner Unterschrift erkläre ich mich mit der beschriebenen Datenverarbeitung einverstanden.

Datum und Unterschrift

B.4 Questionnaire

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Workshop / Seminar zum Thema “Digitale / Technologische Alltagserleichterungen“: **Abschluss-Fragebogen**

Sehr geehrte Teilnehmerinnen und Teilnehmer!

Herzlichen Dank, dass Sie an dem heutigen Workshop teilgenommen haben! Ihr Beitrag liefert wertvolle Einblicke und Ergebnisse, die ich im Rahmen meiner Masterarbeit diskutieren und so in die Forschung rund um den Bereich Ambient Assisted Living einbringen werde.

Um die gesammelten Beobachtungen in der anschließenden Analyse richtig interpretieren zu können, bitte ich Sie darum, die Informationen auf den nächsten Seiten auszufüllen.

Die zur Verfügung gestellten Informationen werden nicht Ihrer Person zugeordnet, sondern anonym und aggregiert für die Analyse des Workshops verwendet.

Ich freue mich außerdem über eine kurze Rückmeldung zum Ablauf und den Inhalten des Workshops.

Die Angabe erfolgt vollkommen freiwillig, bitte lassen Sie Fragen aus, bei deren Beantwortung Sie sich unwohl fühlen.

Vielen Dank für die Teilnahme und die kurze Rückmeldung!

Naomi Karner

Fragebogen

Fragen zu Ihrer Person:

1. Wie alt sind Sie?

(bitte geben Sie das Alter in Jahren an)

2. Bitte kreuzen Sie Ihr **Geschlecht an:**

- Weiblich
- Männlich
- Divers
- Keine Angabe

3. Welchen **Beruf haben Sie ausgeübt?**

4. Wie gut kommen Sie Ihrer Einschätzung nach mit technologischen Hilfsmitteln zurecht?

(bitte zutreffende Zahl von 1 bis 5 ankreuzen)

1	2	3	4	5
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(1 = gar nicht - 'Technik ist mein Feind',

5 = sehr gut - 'ich beschäftige mich sehr gerne mit technischen Dingen')

5. Möchten Sie erklären, warum Sie die obige Einschätzung gegeben haben? (optional)

6. Verwenden Sie **digitale Hilfsmittel** im Alltag?

- Ja
- Nein

→ Falls ja, **welche Technologien** verwenden Sie?

- Smartphone
- Tablet
- Alexa oder andere virtuelle Sprachassistenten
- Sturzsensoren
- Notfall-Armband
- Notfallknopf
- Armband zur Aktivitäts-Messung
- Digitale Vitalparameter-Messinstrumente
(wie Blutdruck, Blutzucker, Herzfrequenz, etc.)
- Smart Home Technologien (Smarte Steckdosen, digitale
Türklingel, Luftdruckmesser, Alarmsysteme, etc.)
- Andere: _____

7. Würden Sie gerne (mehr) **digitale Hilfsmittel** in Ihrem Alltag
verwenden?

- Ja
- Nein

→ Falls ja, am Einsatz **welcher Technologien** wären Sie
interessiert?

→ Falls nein, **warum nicht?**

Rückmeldung zum Workshop:

Wie hat Ihnen der Workshop gefallen?



(Bitte kreuzen Sie das Gesicht an, das am besten zutrifft.)

8. Was hat Ihnen **gut** an dem Workshop **gefallen**?

9. Möchten Sie noch andere **Anmerkungen** zu dem Workshop rückmelden?



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Bibliography

- [1] ALLEA | All European Academies. The european code of conduct for research integrity – revised edition 2023, 2023.
- [2] Karen Arrant. Ethical considerations when conducting research with older adults. *Journal of Interprofessional Practice and Collaboration*, (2(1)), 2020.
- [3] Vonnette Austin-Wells, Teena Zimmerman, and Graham J. McDougall. An optimal delivery format for presentations targeting older adults. *Educational gerontology*, 29(6):493–501, 2003.
- [4] Ulrike Bechtold, Natalie Stauder, and Martin Fieder. Attitudes towards technology: Insights on rarely discussed influences on older adults’ willingness to adopt active assisted living (aal). *International journal of environmental research and public health*, 21(5):628, 2024.
- [5] A. N. Belbachir, M. Drobics, and W. Marschitz. Ambient assisted living for ageing well - an overview. *Elektrotechnik und Informationstechnik*, 127(7-8):200–205, 2010.
- [6] Doris Berger-Grabner. *Wissenschaftliches Arbeiten in den Wirtschafts- und Sozialwissenschaften : hilfreiche Tipps und praktische Beispiele*. Lehrbuch. Springer Gabler, Wiesbaden, 3., aktualisierte und erw. aufl. edition, 2013.
- [7] Robert Beringer, Andrew Sixsmith, Michael Campo, Julie Brown, and Rose McCloskey. The “acceptance” of ambient assisted living: Developing an alternate methodology to this limited research lens. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, volume 6719, pages 161–167, Berlin, Heidelberg, 2011. Springer Berlin Heidelberg.
- [8] Andreas Braun, Florian Kirchbuchner, and Reiner Wichert. Ambient assisted living. In *eHealth in Deutschland*, pages 203–222. Springer Berlin Heidelberg, Berlin, Heidelberg, 2016.
- [9] Juan Carlos Briede-Westermeyer, Cristhian Pérez-Villalobos, Javiera Ortega-Bastidas, and Isabel Leal-Figueroa. Co-creation workshop oriented to the autonomous elderlies in chile: Unveiling the experience of the participants. In *Advances*

in *Intelligent Systems and Computing*, volume 876, pages 185–190, Cham, 2019. Springer International Publishing.

- [10] Caroline A. Byrne, Rem Collier, and Gregory M.P. O’Hare. A review and classification of assisted living systems. *Information (Basel)*, 9(7):182, 2018.
- [11] Davide Calvaresi, Daniel Cesarini, Paolo Sernani, Mauro Marinoni, Aldo Franco Dragoni, and Arnon Sturm. Exploring the ambient assisted living domain: a systematic review. *Journal of ambient intelligence and humanized computing*, 8(2):239–257, 2017.
- [12] Montserrat Celdrán, Rodrigo Serrat, Feliciano Villar, Sergio Sayago, and Sergio Sayago. Older adults as internet content producers: Motivations for blogging in later life. In *Perspectives on Human-Computer Interaction Research with Older People*, Human-Computer Interaction Series, pages 169–182. Springer International Publishing AG, Switzerland, 2019.
- [13] Donghyeog Choi, Hyunchul Choi, and Donghwa Shon. Future changes to smart home based on aal healthcare service. *Journal of Asian architecture and building engineering*, 18(3):190–199, 2019.
- [14] Grazia Cicirelli, Roberto Marani, Antonio Petitti, Annalisa Milella, and Tiziana D’orazio. Ambient assisted living: A review of technologies, methodologies and future perspectives for healthy aging of population. *Sensors (Basel, Switzerland)*, 21(10):3549, 2021.
- [15] Bundesministerium für Soziales Gesundheit Pflege und Konsumentenschutz (BMSGPK). Pflegepersonal-bedarfsprognose für Österreich.
- [16] 2PCS Solutions GmbH. 2pcs solutions.
- [17] SYNYO GmbH. Aal taxonomie final - annex zu d4.1 beschreibung taalxonomy.
- [18] SYNYO GmbH. Taalxonomy - ambient assisted living project.
- [19] Jean D. Hallewell Haslwanter, Katja Neureiter, and Markus Garschall. User-centered design in aal: Usage, knowledge of and perceived suitability of methods. *Universal access in the information society*, 19(1):57–67, 2020.
- [20] Cecilia Henning, Ulla Åhnby, and Stefan Österström. Senior housing in sweden: A new concept for aging in place. *Social work in public health*, 24(3):235–254, 2009.
- [21] Mordor Intelligence. Global ambient assisted living (aal) market - growth trends covid-19 impact and forecasts (2023 - 2028).
- [22] Thomas Kleinberger, Martin Becker, Eric Ras, Andreas Holzinger, Paul Müller, and Constantine Stephanidis. Ambient intelligence in assisted living: Enable elderly people to handle future interfaces. In *Lecture Notes in Computer Science (including*

subseries *Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics*), volume 4555 of *Lecture Notes in Computer Science*, pages 103–112. Springer Berlin Heidelberg, Berlin, Heidelberg, 2007.

- [23] Sylvia Kowalewski, Wiktoria Wilkowska, and Martina Zieffle. Accounting for user diversity in the acceptance of medical assistive technologies. In *Electronic Healthcare*, volume 69 of *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering*, pages 175–183. Springer Berlin Heidelberg, Berlin, Heidelberg, 2011.
- [24] Tobias Krick, Kai Huter, Dominik Domhoff, Annika Schmidt, Heinz Rothgang, and Karin Wolf-Ostermann. Digital technology and nursing care: A scoping review on acceptance, effectiveness and efficiency studies of informal and formal care technologies. *BMC health services research*, 19(1):400–400, 2019.
- [25] Stephanie Lehmann, Esther Ruf, and Sabina Misoch. Using a socially assistive robot in a nursing home: Caregivers’ expectations and concerns. In *Communications in Computer and Information Science*, volume 1420 of *Communications in Computer and Information Science*, pages 148–155. Springer International Publishing, Cham, 2021.
- [26] Peter Leitner, Julia Neuschmid, and Stefan Ruscher. *Taalxonomy - entwicklung einer praktikablen taxonomie zur effektiven klassifizierung von aal-produkten und dienstleistungen - guidebook*, 2015.
- [27] Wolfram Ludwig, Klaus-Hendrik Wolf, Christopher Duwenkamp, Nathalie Gusew, Nils Hellrung, Michael Marscholke, Markus Wagner, and Reinhold Haux. Health-enabling technologies for the elderly - an overview of services based on a literature review. *Computer methods and programs in biomedicine*, 106(2):70–78, 2012.
- [28] Jordan Miller and Troy McDaniel. Social robotics to address isolation and depression among the aging during and after covid-19. In *Communications in Computer and Information Science*, volume 1420 of *Communications in Computer and Information Science*, pages 164–171. Springer International Publishing, Cham, 2021.
- [29] Verena Nitsch, Christopher Brandl, Roger Häußling, Philip Roth, Thomas Gries, and Bernhard Schmenk. *Digitalisierung der Arbeitswelt im Mittelstand 2: Ergebnisse und Best Practice des BMBF-Forschungsschwerpunkts "Zukunft der Arbeit: Mittelstand - innovativ und sozial"*. Springer Berlin Heidelberg Imprint: Springer Vieweg, Berlin Heidelberg, 1st ed. 2022 edition, 2022.
- [30] Michael J. O’Grady, Conor Muldoon, Mauro Dragone, Richard Tynan, and Gregory M. P. O’Hare. Towards evolutionary ambient assisted living systems. *Journal of ambient intelligence and humanized computing*, 1(1):15–29, 2010.
- [31] World Health Organization. *Active ageing - a policy framework*.

- [32] pA Medien Gmbh. Fachkräftemangel in der pflege.
- [33] Helen Petrie, Tesh Goyal, Per Ola Kristensson, Anicia Peters, Albrecht Schmidt, and Kaisa Väänänen. Talking ‘bout my generation . . . or not?: The digital technology life experiences of older people. In *Conference on Human Factors in Computing Systems - Proceedings*, pages 1–9, New York, NY, USA, 2023. ACM.
- [34] Universität Potsdam. Checkliste powerpoint - folgende checkliste zeigt wesentliche punkte für die erstellung einer barrierefreien präsentation.
- [35] Elisabeth Rappold and Brigitte Juraszovich. Erstmals ein umfassendes bild: Die pflegepersonal-bedarfsprognose für Österreich. *Procure: Das Fortbildungsmagazin Fur Pflegeberufe*, 25(3):38–40, 2020.
- [36] Christopher Reichstein, Ralf-Christian Härting, and Felix Häfner. Challenges in the market launch of active assisted living solutions - empirical results from european experts. *Procedia Computer Science*, 176:2000–2009, 2020.
- [37] Grand View Research. Gvr report coverambient assisted living market size, share & trends report ambient assisted living market size, share & trends analysis report by product (medical assistance products, safety & security, communication devices, telemonitoring, mobility), by region, and segment forecasts, 2024 - 2030.
- [38] Arlind Reuter, Thomas Scharf, and Jan Smeddinck. Content creation in later life: Reconsidering older adults’ digital participation and inclusion. *Proceedings of the ACM on human-computer interaction*, 4(CSCW3):1–23, 2021.
- [39] Marcel Sailer and Andreas Mahr. *Active Assisted Living : Anwendungsszenarien und Lösungsansätze für ein selbstbestimmtes Leben*. Springer Fachmedien Wiesbaden Imprint: Springer VS, Wiesbaden, 1st ed. 2021 edition, 2021.
- [40] Andres Sanchez-Comas, Kåre Synnes, and Josef Hallberg. Hardware for recognition of human activities: A review of smart home and aal related technologies. *Sensors (Basel, Switzerland)*, 20(15):1–26, 2020.
- [41] Kinga Skorupska, Ewa Makowska, and Anna Jaskulka. Interdisciplinary research with older adults in the area of ict: Selected ethical considerations and challenges. In *Digital Interaction and Machine Intelligence*, volume 440. Springer International Publishing AG, Switzerland, 2022.
- [42] Philip Slpepecki and Pauline Pohl. Zukünftige bevölkerungsentwicklung Österreichs und der bundeslädnder 2023 bis 2080 (2100). *Statistische Nachrichten 02/2024*, pages 82–105, 2024.
- [43] Nadine Sohn. Leitfaden zur erstellung barrierefreier dokumente.

- [44] Alessandra Sorrentino, Lorenzo Radi, Filippo Cavallo, Claudia Becchimanzi, Mattia Pistolesi, Francesca Tosi, Erika Rovini, and Laura Fiorini. Design and development of a telepresence and monitoring service to empower the older adults. In *Ambient Assisted Living*, volume 884 of *Lecture Notes in Electrical Engineering*, pages 18–36. Springer International Publishing, Cham, 2022.
- [45] Stefanos Stavrotheodoros, Nikolaos Kaklanis, Konstantinos Votis, Dimitrios Tzovaras, and Arlene Astell. A hybrid matchmaking approach in the ambient assisted living domain. *Universal access in the information society*, 21(1):53–70, 2022.
- [46] H. Sun, V. De Florio, N. Gui, and C. Blondia. Promises and challenges of ambient assisted living systems. In *2009 Sixth International Conference on Information Technology: New Generations*, pages 1201–1207. IEEE, 2009.
- [47] Tobias Thomas and Regina Fuchs. Prognose der bevölkerung und erwebspersonen bis 2080.
- [48] Hendrik Trescher and Teresa Hauck. Mehrdimensionales forschungsdesign. In *Inklusion im kommunalen Raum*, volume 65, pages 45–52. transcript Verlag, Bielefeld, 2020.
- [49] Athanasios Tsitsipas and Lutz Schubert. Towards commonsense reasoning in aal environments. In *Communications in Computer and Information Science*, volume 1420 of *Communications in Computer and Information Science*, pages 567–572. Springer International Publishing, Cham, 2021.
- [50] Julia van Heek, Simon Himmel, and Martina Ziefle. Privacy, data security, and the acceptance of aal-systems – a user-specific perspective. In *Human Aspects of IT for the Aged Population. Aging, Design and User Experience*, volume 10297 of *Lecture Notes in Computer Science*, pages 38–56. Springer International Publishing, Cham, 2017.
- [51] Vivian Vimarlund, Elizabeth M. Borycki, Andre W. Kushniruk, and Kerstin Avenberg. Ambient assisted living: Identifying new challenges and needs for digital technologies and service innovation. *Yearbook of medical informatics*, 30(1):141–149, 2021.
- [52] Adi Vitman Schorr and Rabia Khalaila. Aging in place and quality of life among the elderly in europe: A moderated mediation model. *Archives of gerontology and geriatrics*, 77:196–204, 2018.
- [53] Martina Ziefle, Simon Himmel, and Wiktoria Wilkowska. When your living space knows what you do: Acceptance of medical home monitoring by different technologies. In *Information Quality in e-Health*, volume 7058 of *Lecture Notes in Computer Science*, pages 607–624. Springer Berlin Heidelberg, Berlin, Heidelberg, 2011.

- [54] Carolin Zschippig and Thorsten Kluss. Gardening in ambient assisted living. *Urban forestry urban greening*, 15:186–189, 2016.
- [55] Hilfswerk Österreich. Pflege in Österreich heute.