EU-JAPAN VIRTUAL COACH FOR SMART AGEING

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D2.1 – Description of the End Users and Stakeholder Requirements

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Disclaimer

E-VITA – **European-Japanese Virtual Coach for Smart Ageing**

E-VITA (**EU PROJECT NUMBER 101016453**)

[Number and title of work-package] WP2 – Requirement Analysis

D2.1 – Description of the end users and stakeholder requirements

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Executive Summary

To design and develop the e-VITA platform for active and healthy ageing, we analyzed the requirements of older adults as well as the associated stakeholders, who build a complex user requirements structure. Insights from this will be used to develop a virtual coach for older adults, which mainly uses voice interaction as a mean of communication. Three main approaches have been followed to gain insights. Firstly, interview studies with end users have been conducted. Secondly, a design fiction has been created. By the means of the design fiction, we speculate together with end users and secondary stakeholders (care facilities, medical experts, community, family etc.) about the daily use of a virtual coach in the near future. Thirdly, interviews with family members have been conducted to contribute to a holistic perspective of the design space and complex overall system needs.

We have obtained a rich and fruitful perspective on the life of older adults, which is characterized amongst others by a wish for sociability and autonomy, their idiosyncratic habits, life experiences and cultural backgrounds. We got a first glimpse at meaningful everyday practices of older adults and their expectations and requirements for using the e-VITA coach. The understanding of this will be verified, deepened and broadened in WP3 and WP6.

The overall acceptance of the e-VITA coach often depended on the self-concept of older adults. Many older adults perceived the e-VITA coach as an assistive technology for people with age-related deficits. Those who saw themselves as independent and active, were not able to identify with the idea of getting assistance from such a technology. These older adults preferred functions that enabled them to succeed with individual activities and goals. The ability to socialize with others via the e-VITA coach (e.g., remotely or through an organized event) has been seen as a potential use-case, where the coach functions as an enabler. Acceptance towards the idea of using the virtual coach as a social companion varied between countries and individuals. However, a majority of older adults and secondary stakeholders in all countries, stated that it can never substitute, but merely complement interpersonal relationships. In our design fiction we observed that participants imagined to use the virtual coach for different purposes. In these purposes they found subjective meaning. In this process, they ascribed different roles to the virtual coach and formed idiosyncratic relationships with the technology. Some imagined to use it as a task-oriented tool, while others described using it as a conversation partner. From participants' fictional narratives we could conclude links between the ascribed role and their expectation of what can be done with a virtual coach. The same links became evident for the requirements that older adults formulated for the virtual coach.

Older adults could imagine to use the e-VITA coach for health-related advice, even though the topics that were accepted varied between individuals and countries. However, it became clear that interventions need to offer autonomy, encouragement and empowerment instead of patronizing and instructing older adults. For this it is important that older adults can be put in a position where they can interact with the voice coach independently and feel that they have sufficient control over it. Knowing that the virtual coach is present and connected with others (e.g., family, neighbors, doctors) has been acknowledged as a source of perceived safety (e.g., in emergency situations).

Transparency in the use of personal data by the virtual coach and third parties was important to older adults. Furthermore, topics related to data security and legal aspects have been brought up by older adults and secondary stakeholders. To create a useful and accepted technology, the design and development of the e-VITA coach must acknowledge the needs of older adults and allow them to appropriate it in their individual everyday life.

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Acronyms and Abbreviations

Acronym/Abbreviation	Explanation
JP	Japan
FR	France
IT	Italy
DE	Germany
TOHOKU	Tohoku University - Smart-Aging Research Center
IGOU	J.F. Oberlin University – Institute of Gerontology and Geriatrics
NCGG	National Center for Geriatrics and Gerontology
APHP	Assistance Publique – Hôpitaux de Paris
INCRA	Istituto Nazionale di Riposo e Cura per Anziani INCRA
CARITAS	Diocesan Caritas Association for the Archdiocese of Cologne, Diözesan-Caritasverband für das Erzbistum Köln e.V.
USI	University of Siegen
WP	Work Package
D	Deliverable
ADL	Activity of daily living
BAGSO	German National Association of Senior Citizens' Organisations, Bundesarbeitsgemeinschaft der Seniorenorganisationen e.V.
DiCV	Diocesan Caritas Association for the Archdiocese of Cologne, Diözesan-Caritasverband für das Erzbistum Köln e.V.
ICT	Information and Communications Technology
UCD	User-centered design
NGO	Non-Governmental Organisation

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1 Introduction

In the course of the e-VITA project an innovative ICT-based virtual coaching system will be developed to improve well-being in older adults in Europe and Japan. The coaching system is meant to encourage older adults' involvement, motivation, and empowerment in adapting to lifelong changes. To do so, the e-VITA coach will provide personalized recommendations and interventions, for sustainable well-being in a smart living environment at home.

Designing a system that aspires to be closely interwoven with the domestic life and everyday activities of older adults requires a profound understanding of end user requirements. At this point, virtual coaching systems to improve well-being of older adults in domestic settings are not widespread. Many of available products in this area are designed with a younger target group in mind and are not appropriate or engaging for older adults.

Moreover, technological solutions that aim at health interventions for older adults, show a substantial gap between abstract clinical models and the concrete design of coaching technology. To fill this gap a profound analysis of user needs and the associated usage context has been performed in task 2.1. For our empirical analysis we used established UCD methods, like interviews and workshops. Furthermore, we used the methodology of design fiction to speculate together with end users and secondary stakeholders about visions of a plausible near future. The design fiction methodology was selected as a tool for requirements engineering, because it empowers stakeholders to discuss societal implications and impacts with us (Darby et al., 2018). That way, we can reduce the shock or negative effects that result from disruptive new technologies before they become fully realized. The aforementioned empirical tools allowed us to anticipate acceptance, identify potential barriers and probe for individual and organizational expectations and requirements.

The main goal of this document is to provide an overview of the resulting end user and secondary stakeholder requirements for the e-VITA coach. By taking into account the needs of older adults, resulting from age, habits, life experiences, values and daily routines, an appropriate and engaging coaching system can be designed. To paint a fully, contextualized picture of the design space we include both, the perspective of the individual user as well as the associated stakeholders (care takers, hospitals, community, family etc.), who build a complex user requirements structure.

The following chapters 2, 3, 4, 5 focus on the aforementioned empirical studies. In Chapter 2 we present the results of two early pre-studies with end users in Germany and Japan. In Chapter 3 we describe the approach of the design fiction and discuss the outcomes in Italy, Germany and Japan. Chapter 4 outlines the interview studies that have been conducted by partners in four countries (Italy, Germany, Japan, France). In Chapter 5 we present the insights gained from conversations with various secondary stakeholders. The key insights are discussed in each chapter individually and summarized in the later chapters. In chapter 6 we derive more general, actionable implications for the design of the e-VITA coach. In the end, we draw a conclusion in Chapter 7 and look at the further actions in the e-VITA project.

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2 Early Pre-Studies with End Users in Germany and Japan

2.1 Pre-Study in Germany

In Germany an early pre-study has been conducted between December 2020 and February 2021, during the COVID-19 pandemic, with 11 community-dwelling older adults in Siegen and Cologne. In the context of coaching systems for wellbeing, robots with different shapes have already been used. From robots that look neutral to animal-like, to human-like robots. However, there is a lack of studies showing which appearance of a robot is preferred by older adults. This pre-study aims to answer this question in terms of an exploratory pre-study of the e-VITA project.

Telephone interviews were conducted with 11 seniors still living in their own homes to answer the questions of what a robotic assistant should look like, what capabilities it should have, and what topics the participants could imagine talking about with it. Also, the goal was to identify in this end user group, what concerns and dangers are seen in using such a coaching system by means of a robot, and whether the current Covid-19 pandemic could have an impact on the decision to use such a robot and coaching system. A needs profile for a robotic assistant was derived from the interviews.

It was found that assistants that look like animals or a picture score the lowest. A human-looking robot is most preferred, followed by a plant and a hologram. In addition, the use of robots, for people who are lonely or dealing with mental or physical disabilities, is seen as particularly helpful. However, the participants do not see a necessity to use this kind of technology in their own situation.

Pls. refer to annex 1 for a detailed description of the pre-study.

2.2 Pre-Study in Japan

In Japan an early pre-study was also conducted with 50 community-dwelling older adults recruited from the Sendai City area, Miyagi prefecture (see annex 2). A number of questions and a survey were presented to participants. The survey included elements related to socioeconomic background, and results from this will be provided in D9.8. In the interview, older adults were asked questions across four key domains of everyday activities, health, digitalization, and specifically the virtual coach. Both a quantitative (text mining) and qualitative analysis (key quote extraction) was performed on the gathered data.

In the physical health domain, participants tended to request measurement of vital signs, such as measurement of body temperature, blood pressure, pulse rate, and so on. The reasoning behind this appeared to be a desire for early detection of changes or abnormalities: *"I would like it to conduct blood and urine tests for early detection of diseases"*, and *"I would like it … to inform me if there are any abnormalities in the values*". One participant wanted a reminder from the robot to take such health measurements by himself; and after taking measurements or medication, the information could then be reported to their doctor.

In the case of an emergency, participants wanted the robot to contact the emergency services or family members; and also, for it to be able to detect things such as a fall.

For exercise, suggestions included being taught an exercise, or something such as yoga, and doing it together with the virtual coach; having a personalized exercise regime; or simply being encouraged to exercise or move around. A walking step counter and calorie consumption tracker was suggested. Regarding nutrition, participants valued personalized recommendations from a virtual coach, such as it

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should understand one's personal likes and dislikes, suggest a daily or weekly meal plan, and manage nutritional balance and intake (such as macro- and micro-nutrients, and identify any missing nutrients). Participants were open to learning new dishes, and wanted support from the coach in this, such as "*I want it to teach me recipes for dishes*". One participant wanted it to manage the inventory in their refrigerator.

For social and leisure activities, ideas included playing quizzes and games with the virtual coach, "*I want it to be a chess partner*"; having English conversation, or taking instrument lessons and playing songs. These aspects relate to the conversational aspect of the coach: *"I want to talk about my hobbies and favourite things*", and "*I want to have an intelligent conversation with it*". Participants appeared open to integrating the virtual coach into their daily life, wanting it to answer their questions, listen to their thoughts on books, movies, and even memories: "*I want to share my memories*". The potential motivating presence of a virtual coach was imagined by participants, expressing requests such as *"I want praise and encouragement", "I want it to sympathize and agree with me".*

Participants also imagined how the virtual coach could support their current activities, with comments such as "*I want it to manage my schedule*", and "*I want it to tell me the anniversary of my loved one's death, birthday*".

Regarding interaction and operation of the virtual coach, participants were split in how they would like to use it. Some requested simplicity, "*it can be activated by a single button*", and "*It can be operated by voice only";* whilst another said that "*it would be better if the robot could display text as well, in case I lose my hearing*". One participant wanted the virtual coach to be quite autonomous, such as being able to charge itself, whereas another said that *"since the robot will be my partner, I would like to do things such as changing the battery*".

Pls. refer to annex 2 for a detailed description of the pre-study.

2.3 Implications from the Two Pre-Studies

2.3.1 Implications from the Pre-Study in Germany

From the pre-study in Germany, it can be derived that such a coach should most likely look like a human, but also other shapes are possible, but cultural aspects should be taken into account. Competence of the coach is most valued, besides Connectedness and Stimulation. Furthermore, voice interaction is preferred by the majority. The assistant should be able to take over tasks in the household and talk about various topics, such as political and global current events.

Overall, however, the interview shows that even if not everyone can imagine using an assistant, they still consider the use of such assistants to be sensible, especially for people who have cognitive, physical or social limitations. In addition, there are other design issues that would have to be met, e.g., how to deal with different opinions or how big and heavy the assistant is. Its behaviour, e.g., that it should not brag to the user, speak the same language i.e., for example, not slur words, or also have as clear and human a voice as possible. There may be different user preferences in these examples as well, which could be the subject of future research.

2.3.2 Implications from the Pre-Study in Japan

There were several important findings from the Japanese pre-study. Briefly, the coach may have an important role in enabling those who do not have anyone to talk to, or who usually eat or drink alone in social activities, to expand their circle of consultation and become more socially involved. For

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example, it was found that there was a significant difference between men and women in living and eating alone, with the majority being women.

The coach may also help spread the word about efforts to prevent dementia. Just under half of the respondents, regardless of gender or generation, felt anxious or unsafe in their daily lives. The majority of them were taking active steps in order to prevent dementia and maintain their health, in order to be independent and avoid causing trouble for others. In addition, it was found that people with lower background education level (and so perhaps less understanding of dementia), and people who do not enjoy life (may not want to extend their life longer), as well as men, are those least likely to take steps to prevent dementia. Therefore, the coach can assist these people in expanding their sphere of information, as well as providing various levels of support or motivation.

In general, we were able to confirm that older adults who are concerned about dementia have high expectations for robots to assist them in healthy and active ageing.

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3 Design Fiction with End Users in DE, JP and IT

3.1 Methods in DE, IT, JP

This empirical work aimed to learn more about the factors that contribute to the acceptance and appropriation of the e-VITA voice coach. We collected rich data about ideas, opinions, and feelings regarding an imaginary everyday life with a voice coach. In order to gain insights that are as real and diverse as possible, the method of the so-called Design Fiction was chosen. This method describes a procedure where participants were confronted with artefacts from a fictional future. This world is built employing so-called artefacts (e.g., flyers, radio shows, videos) and is supposed to appear as realistic as possible. The artefacts thereby also serve as "entry points" into the world (Coulton et al., 2017). The idea is to stimulate the participants to immerse themselves in a world in which it is common for older adults to use such technology. The artefacts leave enough space for interpretation and imagination so that by projecting themselves into the world, participants automatically shape the fictional world imagination. Analyzing the participants' imagination allows us to draw conclusions on designing the right thing.

Immersing older adults and secondary stakeholders into this world enables a productive discussion about a technology that does not yet exist in a domestic setting. Participants describe and emotionally respond and reflect about the ideas they are confronted with by projecting their own situation into this fictional world. By letting participants imagine and narrate their own life, set in the world presented to them, we learn more about this fictional world. Furthermore, the method creates the space to think about aspects and issues that may not have been known before. In conclusion, the method enables us to explore a near future together with stakeholders, reveal tacit knowledge, and anticipate requirements for the daily use of the e-VITA coach.

To gather insights through the method of design fiction and to be able to compare between the countries, later on, partners from each of the four participating countries created an individual Design Fiction and an individual artefact. Each of these artefacts was adapted to the respective language and cultural conditions. The study design and implementation in each country was reviewed and approved by the respective ethical committee.

Description of the Artefact

In order to create individual but still comparable Design Fictions, the medium of radio, specifically a radio show (radio conversation), was chosen as a uniform, transnational artefact. Besides the feasibility factor, one of the main reasons for this was the existence of the medium radio in all four participating countries. The Design Fictions were not intended to open up worlds of a distant future. Instead, they should give study participants the impression that the presented world is real and available in the present. Therefore, the artefact had to exist in the present and be specifically familiar and appropriate to the target group of older adults.

Attention was paid to the age of the target group and the question as to which medium could best serve as an artefact. In other words, which medium was already being used by the target group and which medium would provide the best and easiest access for later confrontation with the Design Fiction. Listening to a radio show was therefore assumed to be the most suitable. Thus, the participants of the target group would be able to listen to the radio show, regardless of their digital skills. In this way, the later immersion into the Design Fiction should be made as easy as possible.

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Therefore, all participating countries selected an existing radio show from their respective country (e.g., Germany: 'WDR5 Tagesgespräch') as a template for their own radio conversation. On the one hand, this should simplify the implementation and contribute to the authenticity of the Design Fiction: the impression of a realistic radio show from a realistic, existing radio broadcaster.

The four Design Fictions aimed to create identical worlds despite cultural differences. Worlds in which a specific, advanced voice assistant supports older adults in different areas of everyday life. A thematic guideline was initially developed to achieve this, which described six features (topic areas) of this specific voice assistant. These features were then to be addressed in all radio contributions (physical-cognitive activity, taking the confession*, connecting with the deceased, share/keep memories, establishing contact with relatives, sharing life experiences. *adapted in Japan as meditation/sharing one's worries).

The features/scenarios were chosen to cover various situations and interactions, including controversial ones. In the cultural adoption phase, the features were adopted by all participating countries and, where necessary, adapted to cultural conditions and differences. This ensured that all basic, underlying topics such as spirituality or physical activity were present in each Fiction but individually adapted to the different countries and cultures. This was particularly important to create authentic Design Fictions later on.

In addition, all participating countries came up with the framework conditions for their radio shows, for example, a name for the voice assistant and the associated company, including a CEO (Example Germany: voice assistant 'Minu,' company 'FutureAge').

Implementation

Based on the radio templates of each country, the implementations were organized. All radio shows were based on the idea of a radio conversation about a specific and particularly advanced voice assistant (e.g., voice assistant 'Minu'). The fictional voice coach was called Minu in the German and Japanese artifact, whereas the Italian artifact referred to it as eVITA. In addition to a moderator, the conversations also included an expert and the CEO of the respective imagined company (e.g., 'FutureAge'). In addition, 2-3 callers contributed opinions and questions to the radio conversation. In the conversations, the six features of the voice assistant were examined, discussed, and explained. While some callers expressed critical opinions on topics, positive and open reactions were also part of the conversations. The conversations were recorded and, if necessary, edited. The results were four country-specific radio reports.

Confrontation

The confrontation of the Design Fiction was carried out in all participating countries with the target group of older adults. Participants were recruited based on their age (65+) and their living situation, namely older adults still living independently in their own homes. The confrontation was conducted online due to the pandemic situation. At the beginning of the interview, the respective participant and interviewer first listened to the recorded radio show and immersed themselves in the Design Fiction. Afterward, a semi-structured interview was conducted. The participants remained in the Fiction, believing that both the radio report and the voice assistant described in it were real. The interview format covered questions about experiences (What can I do with it?), motivation (Why do I do these things?), time (When does it happen?), place (Where does it happen?), and how the interaction took place (How does the interaction take place?).

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The first part of the interview was an open reflection. Based on the experienced information, the participants were asked to reflect on how such a technology could be used in their everyday lives. They were encouraged to talk freely about their own ideas and situations and the scenarios presented in the radio show. Overall, situations and possible interactions were to be described in detail. The interviewer did not actively guide the conversation.

In the second part of the interview, the presented features and fields of application of the voice assistant were individually reviewed to discuss and question the opinions and feelings of the participants. Here, the main focus was on the topic of experience.

At the end of each interview, the participants were informed about the Design Fiction and its reasons (Debriefing).

Analysis

To analyze the confrontations, we followed the steps described below. The first step is the coding of qualitative data. We go through the transcripts of the conversations and form cohesive categories using the MAXQDA software. In order to find insightful categories, we use a conceptual framework (Miles et al., 2013) to formulate a research question based on the collected data. In this case, the diversity of individual reactions towards the unvaryingly presented technology suggests a relational divergence. We use the conceptual framework of fluid assemblages, presented by Redström and Wiltse (Redström & Wiltse, 2019) to formulate our research question: How does the relation to a virtual coach shape individual encounters.

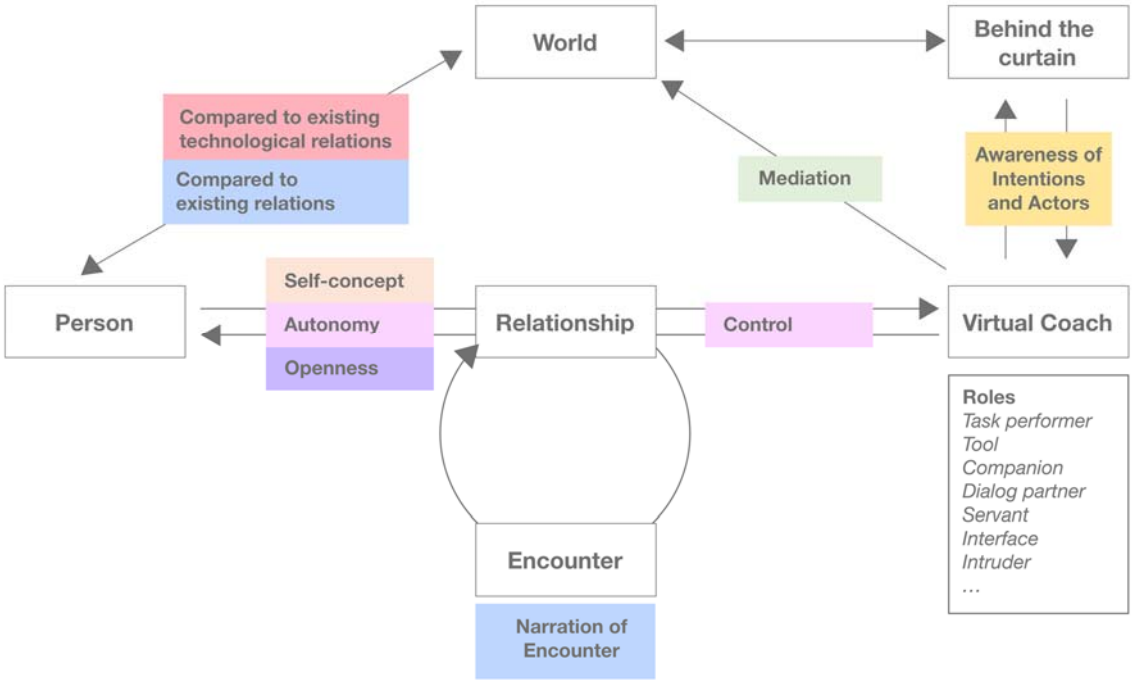

Figure 3.1 Conceptual Framework to describe relations to technology

Essentially, the conceptual framework draws on previous work about technologically mediated relations (Ihde, 2010) (Verbeek & Crease, 2005) and tries to adapt it to contemporary digital,

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computational, connected things. The added dimension of multi-intentionality particularly lends itself to address roles and intentions in a multi-stakeholder approach — that way, a holistic picture of end user requirements and secondary stakeholder requirements can be obtained.

The use of the aforementioned conceptual framework shapes the further analysis of our empirical data. We look at the data to understand how older adults relate to the voice coach in order to make sense of their imaginary encounters, subjective experiences, expectations, and requirements.

Consequently, the transcripts have been coded using the categories from our conceptual framework. With the help of these categories, we can compare individual relations to a fictional voice coach and the resulting cross-cultural encounters. The following codes have been used: existing technological relations compared with the voice coach, existing non-technological relations compared with the voice coach, how is the world mediated through the voice coach, self-concept, openness to experience, perceived control over the voice coach, awareness of simultaneousness roles and intentions and descriptions of the encounter. The categories we used for the coding of data describe links between dimensions of a holistic description of subjective experience.

In a second step, we try to find patterns between occurrences (e.g., rejection, appropriation) and dimensions of relating to the virtual coach. To do so, we made use of Anticipatory Ethnography (Lindley et al., 2015) by making observations based on participants' narratives of fictional encounters with the virtual coach. In an affinity mapping process (Kunifuji, 2013) we developed themes (i.e., types of relationships) from the raw observations, and moved toward producing actionable insights.

In the country-specific results section we describe participants' narrations of imagined encounters with the fictional voice coach and their way of relating to the technology according to the dimensions of our conceptual framework. Finally, we compare the country-specific descriptions of coded categories, as well as the observed patterns between occurrences.

Germany: Country-specific Sample

We used the fictional artifact (i.e., radio show) to immerse older adults (n=8) into a fictional world where the everyday use of voice coaches is common. We asked them to narrate experiences they imagine to have with such a device. To allow comparability of the results we use the shared methodology, which has been described in the earlier chapter.

Individual confrontations with the design fiction in Germany took place with eight older adults. In one case, a married couple has been immersed together into the fictional world. The participants were recruited from a local senior citizen club and acquaintances of project members. The average age of participants was 70 years, ranging from 65 to 79. All participants, except one, were married and living together with their partner. The count of men and women in the sample was evenly distributed. Six out of the eight participants reported that they were actively doing voluntary work or still continuing the job they had before retirement. The former jobs of participants were nurse, industrial clerk, police officer, judge, household clearance. Their educational level can be considered medium to high educated. The interviewer was 25 years old at the time, is male and has a master's degree in human computer interaction as well as experience in conducting qualitative interviews. Due to the COVID pandemic interviews were conducted remotely via Zoom. The interviews took place after immersing participants into the fictional world, by listening to a 25-minute radio show together. Conversations with all participants took approximately 1 hour.

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Table 3.1 Demographic data of participants in the German design fiction

Participant_ID	Gender	Age	Living Arrangement	Residence
P1	Female	67	Living With Husband	Rural
P2	Female	65	Living With Husband	Town
P3	Male	66	Living With Wife	Town
P4	Male	65	Living With Wife and Child	Small Town
P5	Female	78	Living With Husband	Rural
P6	Male	77	Living With Wife	Rural
P7	Female	67	Living Alone	City
P8	Male	79	Living With Wife	Rural

Italy: Country-specific Sample and Conditions

In Italy, a trained psychologist was responsible of conducting the interviews. The participants were recruited to internal contacts of the INRCA Unit. A first call by phone was conducted to explain the objectives of the interviews and to fix an appointment to conduct the full questions. The Informed Consent was signed by all the participants before undertaking the interviews by phone. The fictional voice coach was called e-VITA in the Italian artifact.

In total, 5 older people were recruited, 3 females and 2 males, with a mean age of 70 years old (SD=2.5). The majority was married and live with the partner (4 out of 5). The table below shows the main characteristics.

Table 3.2 Demographic data of participants in the Italian design fiction

UserID	Gender	Age	Marital Status	Living Arrangements	Educational Level
IT_01	Female	72	Married	Living With Husband	Secondary
IT_02	Male	70	Celibate	Living Alone	Secondary
IT_03	Female	67	Married	Living With Husband	Master Degree
IT_04	Male	73	Married	Living With Wife	Higher
IT_05	Female	68	Married	Living With Husband	Primary

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The complete methodology shared with the partners was adopted, without any modification, to allow the comparability of the results.

Japan (Tohoku, Sendai): Country-specific Sample and Conditions

Table 3.3 Demographic data of participants in the Japanese design fiction

ID	DF1	DF2	DF3	DF4	DF5
Age	67	76	85	77	74
Gender	M	F	F	M	F
Home Living Sit.	PA	OT	AL	PA	AL
Residence	CI	CI	CI	CI	CI

Home living situation: AL= Alone; OT= Other; PA= Partnership; Residence: CI = city

3.2 Results

3.2.1 Germany

In Germany a sample of end users (n=8) has been immersed into a fictional experience of using a voice coach.

Key Insights

Older adults relate to the voice coach in different ways (i.e., **no relation, as a task performer, as a counterpart**). These relations **impact the purpose and meaning** of interactions with the voice coach. The three dimensions of relating to the voice coach (i.e., **self-concept, autonomy, transparency**) significantly impacted the fictional encounters and appropriation of the technology.

In all relations to the voice coach, three dimensions were particularly important. First, the participants' **self-concept, perceived autonomy, and perceived transparency of other roles and intentions** had a significant impact on how participants were able to relate to the technology.

Self-concept refers to the observation of how participants experience themselves in a relationship with the fictional voice coach. Participants mostly shaped their imaginary encounters with the voice coach in a way that allowed them to be themselves. Whenever participants felt that using the voice coach in a particular way is not compatible with their self-concept (e.g., independent, loose), they refrained from imagining the situation. For the design of the e-VITA coach, it is essential that it responds to the individual needs of older adults and presents itself accordingly. Generally speaking, that entails offering resources (e.g., inspiration, advice, connections) to conquer challenges (e.g., socialize, learn, discuss) or providing access to new challenges (e.g., knowledge sharing, challenging one's own perspective). That way, the hypothetical domestication that is achieved as part of the design fiction, combined with an observed self-concept, allows us to anticipate more complex human issues such as the desires and idiosyncrasies of the intended audience (Auger, 2014). **For the design of the e-VITA coach, it is essential that it caters and adapts to the older adults changing self-concept in the context of their ageing process.**

Perceived **autonomy** is a topic that came up frequently since participants felt that the coach takes away their ability to decide and act. Instead of being the master of their own actions, many described a feeling

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of being controlled or manipulated by the voice coach. Some reclaimed their autonomy in the imagination of issuing commands, switching the device off, or even throwing it against the wall. In general, older adults were more open to the experience of using such a device if they perceived themselves as the cause of their own actions. **For the design of the e-VITA coach, it is essential that it is not perceived as detrimental to autonomy**.

Transparency, or rather the lack thereof, has been a frequent concern of potential end users, affecting topics such as privacy, trust, and autonomy. Most participants expressed mistrust driven by ideas of hidden exploitation and a lack of understanding. Additionally, some participants stated that it could suspend the belief in ill intention if they knew more about the people and services behind the technology. Therefore, **for the design of the e-VITA coach, it is essential that it is always able to disclose its intention and the intending actor**.

The aforementioned insights result draw on two ways of looking at the data. Firstly, a holistic picture of relations with the fictional voice coach, that results from our conceptual framework and anticipatory ethnography. Secondly, a descriptive analysis of the individual dimensions of all relations with a fictional voice coach.

How Older Adults Related to a Fictional Voice Coach

Looking at how participants were able to relate to and domesticate the voice coach fictitiously, three relational patterns emerged.

In a first way of relating, two participants showed an **inability to domesticate the voice coach**, driven by a feeling of alienation, **loss of control**, and **concerns about being used or manipulated** by a third party. Thus, **the voice coach was perceived as an intruder, threatening the current way of life**. Overall, these participants felt no need to use a technology like this since the value proposition did not meet their needs.

In a second way of relating, three older adults appropriated the voice coach as a task performer that can be summoned at will to assist and tailor to their needs. Consequently, the voice coach was perceived as subordinate to the user and judged by its ability to tailor to individual needs (e.g., socialize, stimulate, inform).

In a third way of relating, two participants appropriated the voice coach as a counterpart with the ability to form and voice its own ideas instead of only retrieving information. Participants used the opinion of the voice coach to challenge, verify and improve their own standpoint (e.g., inspire, question, spar). In the following, the domestication and subjective experience that resulted from these relations will be described in more detail.

The individual encounters can be placed on a continuum ranging from having no relationship through having a diagonal relationship (e.g., tool) to having a horizontal relationship (e.g., conversation partner).

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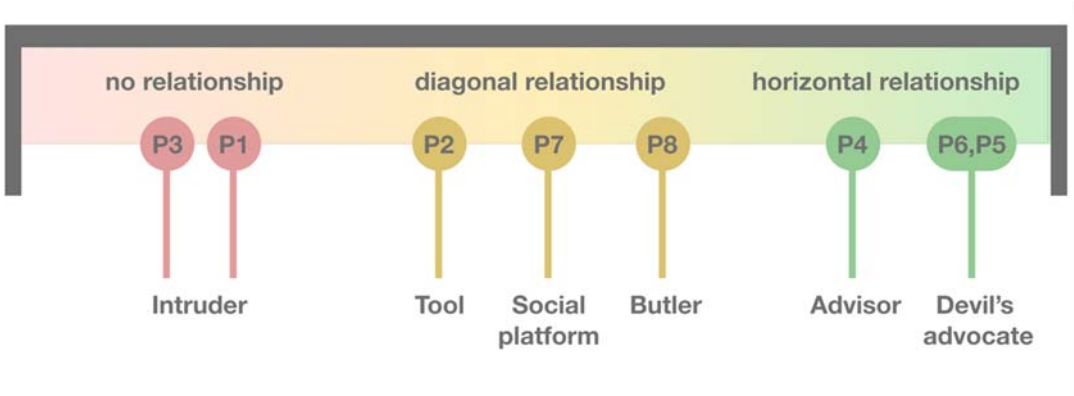

Figure 3.2 Eight individual relations to a virtual coach on a continuum

The differences between the roles ascribed to the voice coach and the evolving relationships are of particular interest. It is noteworthy that diagonal relationships with technology have been cultivated for a long time. Consequently, it is a learned and familiar pattern that provides easy answers to the questions of the voice coaches autonomy and purpose. The transition from using a technology (e.g., control thermostat) to getting personalized recommendations and advice (e.g., Butler, Advisor), opens up new questions about purpose, intention and expectation. In the following chapters, the differences between the aforementioned relations will be described.

Encounters with a Fictional Voice Coach

In the following the narrations of everyday encounters participants imagined to have with the voice coach will be described. The description has been structured according to the different relations that have been described above.

1. The voice coach as an intruder

Potential end users who related to the voice coach as an intruder could not let the device into their life and use it in a meaningful way. Instead, they experienced the device as a threat to their current way of life. The reasons for this can be manifold but generally coincide with **feeling controlled or manipulated,** not knowing or rejecting intentions (incl. hidden intentions) behind the technology, and perceiving experiences mediated by Minu as alienating.

When confronted with a function of Minu to initiate calls with family members, P1 responds: "*I find it strange that a device now has to find out for me that I have to talk to my daughter now. I would rather decide for myself how to do that.*". At the same time, P1 describes the agency of Minu as follows "*For me, that's like an eye that always goes with you, through the house, or through the apartment.*". Trying to explain where this feeling comes from, she says, "*Well, there is someone who stores this data. […] after all, the machine is the people behind it* […] *whom I don't know at all. I can't assess the situation. I can't judge the other person at all.*". Consequently, lack of understanding, fear of losing autonomy, and the mismatch between technological mediation and own values play a significant role in this relation.

2. The voice coach as a task performer

End users who related to the fictional voice coach as a task performer expect assistance in achieving a particular goal in a particular situation. The goals and concrete characteristics of Minu as a task performer ranged from a smart-home tool through a social enabler to a butler. Most participants described using the device in fixed locations (e.g., living room, kitchen, study) with a particular goal in

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mind (e.g., listen to music, find out the incidence of COVID-19). For them, it is essential to control and configure how Minu provides assistance. Proactive behavior is not wished-for and easily interpreted as patronizing. Whenever the feeling of losing control arises in a fictional situation, participants recall their ability to turn the device off. When being asked what would happen if Minu initiated a phone call with family members, P2 responds, *"No, I don't want that. I would immediately stop that. I feel externally controlled […] I would turn off the device."*. However, one participant also mentioned that the proactivity of the voice coach should be adjusted to age and health. Referring to the stimulating ability of the voice coach, P8 says, "*I could prompt the device, but it could also say: Do you want to listen to music or should I read something to you? […] But that depends on the situation. Age-dependent and […] whether you are healthy and can entertain yourself in the broadest sense, or whether you already need more help, need support."*.

The service of a task performer is judged by convenience, efficiency (e.g., time-saving), and the value of the tasks it can perform (e.g., search for a partner, retrieve information). Consequently, participants that see Minu as a task performer often compare it to existing technological and non-technological relations that serve the same purpose (e.g., dating websites, Alexa, smartphone apps, Bluetooth speaker). Referring to her experience with dating websites for older adults, P7 says, "*I would imagine it to be more serious with Minu. I don't know if I'm right there.*" The expectation is that Minu has to be better at fulfilling a task than existing technology (e.g., recommend music according to my taste and mood) or perform a task that existing technology is not able to (e.g., get me dressed).

Expectations regarding the type of language used to interact with the voice coach varied among potential end users. One older adult with a more tool-like relationship imagined adapting her language to the understanding of the machine. She explains this behavior with past experiences she made with electronic data processing and search engines, where the construction of complete sentences does not lead to the desired result. P2 puts it that way: "Just like I used to formulate questions in the 80s, which I entered into a computer. Something like that, not formulated as a complete sentence.". Another participant expected that the voice coach would adapt its language to her own, stating that she wants a loose, conversational, and fun way of interacting with the technology. P7 says: "I would want a loose tone. Where he [voice coach] can also say 'Shut up now, you stupid idiot.' Yes (laughs) little exaggerated, but that is just my nature.". Even though she frames it as an idiosyncrasy, it is interesting how unusual this expectation seems for an otherwise tool-like relationship.

Concerns about the transparency regarding other roles and intentions also vary between individual participants. Two participants with a rather tool-like relation vaguely expressed assumptions about surveillance by the United States. Another participant whose relationship was closer to a horizontal relation explained his concern about manipulation through Big Tech in more detail. It seems that a more horizontal relation comes along with concerns of manipulation.

3. The voice coach as a counterpart

End users who related to the fictional voice coach as a counterpart allowed the device to be part of many everyday situations (e.g., breakfast, gardening, cooking). Since they imagine using Minu in many different situations, they imagine the device to be portable. Within these situations, they were also open to proactive suggestions from the device, as long as they deemed it fitting for a situation (i.e., not during a phone call). In this context, they experienced themselves as the initiator of their own actions and expressed openness to experiences.

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However, they also set limits. In particular, they mentioned reservations about sharing intimate thoughts with the device. P4 specified three degrees of confidentiality: "There are private things of a first, second, and third-degree of confidentiality […] The first would be maybe a particular cooking recipe. Something where you would say it would not matter if everyone knew. Regarding confidential things of the third degree, deeply intimate stuff, I would say no. I don't know Minu because it is not a human. It is a machine. I do not know who the developers are". These reservations were driven by concerns about unknown people behind the voice assistant. Furthermore, the feeling that the mediated experience lacks meaning also caused reservations. P6 put it that way: "Well. Because you have the impression that a machine gives pre-programmed answers, somehow... that's not something that comes out of empathy". P5 adds to that, "Yes, and it's lifeless. Lifeless and also loveless. So that... That's what's necessary for such an intimate conversation".

Conversation topics participants imagined to have included politics, news and personal interest. One could infer a correlation between the background of the participants (i.e., local politician, former judge) and the wish to gain perspective and verification. However, it seems plausible that people with different backgrounds could also relate to the voice coach in a similar way. Interestingly, these conversations aim at verifying a self-concept through a neutral or opposite perspective. P4 imagines asking the coach, "Am I a climate activist now? […] was my reaction too much. Did I behave like an activist? Are the others correct?". That way, the feedback of the coach is used to trigger reflection about the own behavior. Participants were also to imagine this kind of feedback in the field of health and nutrition advice, as long as it is not patronizing. P4 describes the feedback he imagines as follows "If I get a recommendation in a sweet tone, it would make me think afterwards. What did he say? It was said in a nice way, maybe there is something to it? I will put on a coat and go for a walk."

Overall, participants that relate to Minu as a counterpart expect a polite, factual, and in some cases even eloquent use of language. It appears particularly important that Minu can explain the reasoning behind its utterances. One participant explicitly stated that Minu should not appeal to the user's emotion but rather discuss on a factual basis.

Important aspects about relating to the voice coach

In the following observations, regarding the overall dimensions of relating to a voice coach will be described according to our conceptual framework.

Existing relations to the world. In Particular, interpersonal relations were often compared with the voice coach. Even though participants generally preferred to interact with humans, some acknowledged that the voice coach could be better at particular tasks (e.g., objectively criticize). Overall older adults do not want the voice coach to substitute social contacts. P4, who imagined that the machine might be a better advisor than his human friend, put it that way "With my buddy, I drink a beer, but when it comes to a problem, then I take the machine."

Existing technological relations compared with the voice coach. The fictional voice coach is often compared with technological sources of knowledge (e.g., Wikipedia, Youtube) and communication technology (e.g., phones, messenger, online forums). Furthermore, the obvious comparison with Alexa has been made frequently. Often Minu's uniqueness compared to Alexa was attributed to its proactivity and intelligence. Participants who were more optimistic about Minu's abilities saw it as a remedy for current technology deficiencies (e.g., usability, information overload). Others described existing technologies and interaction paradigms (e.g., typing) as more efficient but saw Minu as a way to compensate age-related difficulties in using other technologies.

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Mediation through technology. Participants described fictional experiences they had with the voice coach as different from other experiences due to its technical nature. Overall experiences with the voice coach were described as pragmatic, reflective, broadening the mind, friendly, astonishing, joyful, meaningless, inspiring, stimulating, and dangerous. The coach itself has been described as factual, neutral, pre-programmed, and lacking empathy. Overall, participants preferred to use the coach for a purpose where they deemed the qualities of machines as fitting.

Self-Concept. The self-concepts explain on an individual level why participants imagine the voice coach in a certain way. They imagine something that they can identify themselves with. That way, a technology that presents itself as a proactive assistant is perceived as a mismatch if older adults do not see themselves needing assistance. However, all participants were aware of their own ageing and acknowledge that assistive functions could be helpful in the future. Furthermore, the self-concept entails particular values and openness towards experiences (e.g., spiritual experiences, technologically mediated experiences).

The older adults' self-concepts are particularly interesting when it comes to intervention. Getting nudged by the voice coach is perceived very differently depending on the self-concept. The self-concept can be understood as the source of intrinsic motivation, which is key for a persistent transformation. That way, P7 rejects nutrition advice by the voice coach saying, "I'm also not a gourmet cook, it must taste good. There can also be mayonnaise in it. […] So, I don't know if you can ask older people to change their lifestyle habits that they had over 60 or 70 years. Change. It's hard.".

Autonomy. In general, not feeling limited in one's autonomy seems to impact the voice coach's acceptance positively. Users who could fictitiously domesticate the voice coach described that they could command or scold the device and have physical control over it (e.g., switching it off, throwing it against the wall). Even a certain intellectual control over the device has been implied by proclaiming that they are feeding the device with information. Lack of autonomy (e.g., feeling manipulated or controlled), on the contrary, often correlated with reservations or inability to let the coach into one's life.

Awareness of simultaneous roles and intentions. The majority of participants expressed concerns about unknown actors, hidden intentions, and misuse. The public debate around voice assistants in Germany often addresses privacy issues. Thus, many participants referred to things they had heard about Alexa. Prevalent concerns have then been transferred to the imaginary voice coach. To overcome reservations about hidden roles and intentions, the e-VITA coach needs to address existing fears and present itself more transparent than existing technologies.

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3.2.2 Italy

Key Insights

All participants consider e-VITA a **useful and positive service.** No particular usage issues emerged and everyone described a positive atmosphere. The less appreciated function of e-VITA seems to be that linked to physical activity. Participants stated that they would not particularly like to be helped on this matter. The most appreciated function is that linked to **reading, cooking and health in general**. Participants have a very positive opinion about using the voice coach in connection with this topic. Overall participants were open to the idea of having the voice coach in their home and receiving advice from it, even if they did not consider it useful. A match between their self-concept and the perceived purpose of the voice coach coincides with the perceived usefulness. Participants felt that the voice coach is not detrimental to their autonomy. A certain control over the voice case (e.g., switching it off) has been described. Awareness about the intentions and intending actors mainly **focused around family members** (e.g., children), who would potentially purchase such a device for their parents. Participants ascribed various roles to the voice coach including **companion, mediator, assistant and information source**.

Encounters with a Fictional Voice Coach:

In the following the narrations of everyday encounters participants imagined to have with the voice coach will be described:

In the everyday encounters that participants imagine to have with the fictional voice coach, no particular time of use emerges. What emerges is an "on demand" use of e-VITA, for example during the preparation of meals or during moments of loneliness, to have company (IT_03: “If I were home alone, I would talk to e-VITA so it would keep me company”; IT_02: “While I am cooking if I notice that some ingredient is finished, I can tell him to mark it on the shopping list.”).

In terms of placing the device in their home, 2 out of 5 participants felt that e-VITA should always be close to them, so they can use it right away if needed (IT_01: “he should have wheels and move by himself, especially if I have difficulty moving, he could reach me and help me”). The other participants would prefer to keep it fixed in a corner of the house, always available (IT_05: “I would leave it on, in a corner, so I can use it when needed”).

Each participant imagined a different use case. In any case, everyone has found situations in which e-VITA could be useful and in which they would like to use it (IT_01: “I had COVID for a month, during that time it would have been useful to keep me company. We could have conversations, keep me stimulated”; IT_02: “It would also be useful for me to get in touch with my relatives, if maybe I am on the sofa, I would ask them to call my sister to talk a bit with her”; IT_03: “I would use e-VITA to do computer courses, it could put me in contact with some computer teacher”)

In general, all the participants imagine a positive and pleasant atmosphere during the use of e-VITA, no participant believes that there may be elements of disturbance or negativity (IT_01: “I think doing some things with this e-VITA is better, it would not bother me”; IT_05: “the atmosphere would be positive, I would not mind having it at home”)

With regard to the type of language, 2 participants imagine that e-VITA has a female voice, 1 participant a male voice, while the 2 participants did not express preferences. From the interviews it emerges that the participants imagine a friendly and reassuring language (IT_01: “e-VITA has a male voice, similar to

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that of a human. I talk a lot, I would like the conversation with him to be very long"; IT_03: "I imagine a female, warm, welcoming and calm voice").

As for taking the initiative in a conversation, 3 out of 5 participants report that they would prefer e-VITA to speak only when asked, without taking the initiative (IT_05: "it should only activate when I request it, I would not want it to start a conversation on its own")

Conversation topics: 3 out of 5 participants report that they would talk about everything with e-VITA, both to be cognitively stimulated and to combat loneliness (IT_02: "I would tell him about everything, I am a person who loves to talk, even if deep down I am a shy person. Talking to him would be better"). 2 out of 5 participants reported that they would only talk about some specific topics with e-VITA, such as something related to health or literature (IT_05: "I would only ask for health advice, I would not talk about anything else"). No particular expectations emerge from the interviews for the voice coach regarding rules and norms (IT_01: "there are no particular things e-VITA should not do or say")

Some participants (N=4) report that they would recommend e-VITA to their friends or relatives and that they would not be ashamed to have it at home (IT_03: "I think it is a useful, positive thing, so I would recommend it to my friends, I would love to share this with them")

Important Aspects about Relating to the Voice Coach

In the following the different dimension of the participants relation to the voice coach will be described according to our conceptual framework.

Existing non-technological Relations to the World

The results show that there are some activities for which the participants would not want any technological mediation, so they would not even use e-VITA. Three out of 5 report that they would not use any technological device for everything related to interpersonal relationships (IT_01: "for now I am talking to my husband, I would not need e-VITA, but in the future maybe I would use it"). Three out of 5 report that they do not need e-VITA for everything related to physical activity (IT_02: "I would not be interested in the yoga or meditation services that e-VITA could offer me, as I prefer to do outdoor activities"). Other activities for which participants would not want help from e-VITA are reading and cooking (IT_03: "I would not use it for reading, that is an activity I like to do on my own"; IT_01: "I would not need help in the kitchen for now").

Existing technological Relations compared with the Voice Coach

The interviews show that 4 out of 5 participants use technological devices for some activities that they would not be willing to replace with e-VITA (IT_03: "I practice yoga and follow a girl online who makes videos, so I would not use e-VITA for this practice"). Two of them use their mobile phones, the other 2 use their computers (IT_04: "I play chess on the computer, I could also use e-VITA, but the computer is fine for now").

Mediation through Technology

4 out of 5 participants reported that it would be useful, interesting and curious to have e-VITA at home and to carry out daily activities with him (IT_03: "It would be curious and interesting to be able to get in touch with my relatives through e-VITA"; IT_01: "I think doing some things with e-VITA is better, I would not mind"; IT_02: "I really like music, I imagine myself dancing and singing with the robot"). One participant reported, that he would have no problem to live with e-VITA, but at the moment he cannot

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imagine being able to actually do it (IT_04: “I would not mind having e-VITA in the house, but at the moment I cannot imagine using it”).

Self-Concept

Regarding this point, in general 3 out of 5 participants report a positive attitude towards the fictional voice coach. They do not report the fear of losing their self or their self-efficacy or independence (IT_01: “there are no cases in which it would bother me, I would not see it as intrusive”). Specifically, they consider e-VITA useful for fighting loneliness (IT_02: “I love being alone, but I realize that sometimes I may need help, so I would rather e-VITA than a human being”), to get help even in those activities in which they thought they did not need it (IT_03: “In my opinion, e-VITA is useful at any age, it depends on the use you want to make of it. For example, I would use health advice even now that I am completely independent, instead other functions such as calling the doctor for now would not serve me. When I am alone and less self-sufficient, I would use other functions, such as those more related to care”). Two participants, on the other hand, report that they cannot imagine themselves in relation to e-VITA, as they are still completely autonomous (IT_04: “it is not easy for me to think about using e-VITA in my daily life. I am a very active person; I do not stay at home a little. I am completely independent”).

Openness to Experience

All participants report that they are entirely in favour of a product like e-VITA, no form of aversion towards the technology emerged (IT_05: “I have no particular fears, I see no problems in using it. For example if someone came to visit me I would show it and recommend it”; IT_02:“I would definitely not be ashamed to use e-VITA, I would recommend it to all my friends. I would buy it, I am absolutely in favour”). In particular, it emerges that participants would be open to health advice from e-VITA (IT_01: “as far as health is concerned, I would like e-VITA to give me some advice. I already listen to them on television, so I would accept them from him too.”).

Perceived Control over the Voice Coach

In general, participants do not feel that e-VITA can have too much control over their life (IT_01: “when I do not need it I would leave it in the living room, even if it were to speak I would still hear it, as my house is not very big”). However, the desire to be autonomous in deciding if and when to use e-VITA emerges (IT_03: “If I were to start seeing it as too intrusive, I would shut it down”; “IT_02: “if it is a quiet day, when I do not have many things to do, maybe I would keep it off”). Despite this, no participant sees as negative the possibility of e-VITA to have a certain amount of autonomy (IT_04: “If e-VITA told me to do physical activity, even though I am already active enough, it would be a positive thing, I would not experience it as an intrusion”).

Awareness of Simultaneous Roles and Intentions

Three out of 5 participants report that they would not buy e-VITA of their own free will, but that it would be more plausible that it was given to them by their children (IT_01: “e-VITA was given to me by my children, because I am starting to get old, so they think it might be useful to have some help”). Of these, 2 out of 3 say they agree with their children's decision, as they find e-VITA very useful (IT_05: “I would agree with her, however it is a useful service”). One participant admits that he probably wouldn't use e-VITA, as he doesn't feel the need (IT_04: “my son may have given it to me, but honestly I do not know how much I would use it”). On the other hand, 2 out of 5 participants imagine that they have spontaneously bought e-VITA, as they consider it a useful device (IT_02: “I live alone, I believe that if I needed help my relatives would not help me, as they are always very busy. So, I guess I'd buy e-VITA of my own accord”).

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3.2.3 Japan

Key insights

Participants had generally not heard of such a voice-assistant device before, and while surprised at the advanced technology, **initial reaction was positive** with regard to the functions of MINU (DF5: *I thought the function of being able to share life experiences with people who have the same problems, and the fact it could listen to people who are having problems was very good.)*. Participants imagined to have **intimate conversations** with the voice coach, but also functional interactions. In terms of conversations, they also referred to the **advantages of a conversation with technology** (e.g., no social norms). Some participants ascribed the role of a **friend and social companion** to it.

Encounters with a Fictional Voice Coach from the Design Fiction in Japan (Tohoku, Sendai):

In the following the narrations of everyday encounters participants imagined to have with the voice coach will be described. The description has been structured according to the categories of the interview guideline.

Experience

Participants imagined a variety of ways that they would want to use MINU, from the ease of asking it to play certain music, help with nutrition and cooking suggestions, to utilizing the experience from a career in order to keep a social connection. Conversational ideas were proposed, (DF2: I want to have conversations with my deceased parents, siblings, and friends who are far away.) and (DF5: I want to have a conversation... I sometimes have flashbacks of painful experiences before going to bed and can't sleep, so I want it to be something that listens to me when I have these flashbacks and helps me to stay close to my heart.)

Other than described in the radio show segments, other potential functionalities included turning off the lights, having suggestions for exercises that can be done at home (DF3, DF4), and talking about things that would improve one's mood if feeling down (DF5 and DF1), talking and introducing things they are interested in (DF2 and DF3), reminders on security such as locking the door or forgotten items before leaving the home (DF5); and room-sensing, or guidance for places to visit (DF4). For example, DF3 proposed the benefits of older adults taking responsibility for general health: "I think that if more older people have the mindset to help themselves, the government can reduce medical costs.", while DF5 explained that by talking to MINU, "even if the answer/reply is something I don't agree with, just saying it out loud makes me feel different."

Motivation for Usage

Participants envisioned talking with MINU when simply sitting at home, after coming back from outside and being welcomed home and greeted. As DF4 takes care of his wife, he expressed a desire for MINU to check how long he is taking with certain activities, and intervene, as well as "it would be nice if the voice assistant could tell me what I'm doing wrong and what I need to do better."

However, DF1 could not imagine using the device now, as he is living with his wife. If he ever lived alone, he could imagine using it for keeping up daily conversations. DF3 said that "It gives me a sense of security" to be welcomed home; while DF5 alluded to the fact that one can communicate in a different manner than one does with people: "Talking about the past can help me get my head around it. I don't talk about deep things even with good friends, but I can talk to my device."

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Participants were asked how MINU would impact the things they value most in their daily life. They valued going out and participating in society, having conversations with family, and offering respects at the home shrine. DF5 imagined that MINU could motivate her through sympathizing and understanding her weight loss goal; DF1 that "I think my life would be more fulfilling if my voice assistant could help me participate in society and introduce me to places where I can make use of my career", while DF4 imagined a kind of lifestyle advisor that could help him live within his means.

When and How the Device would be Used

In their daily life, participants wanted MINU to check their schedule, help with cooking, or when they wanted to talk about something, provide topics to change one's mind or help to get to sleep; and for relaxing, like singing. Although DF5 did not want to be told to do housework, and would not use it for cooking herself. Participants did not want to use it in the bathroom or toilet, nor take it outside. They were happy to use it with others around, and indeed even show it off "(DF5): I want to tell people that the device is "my friend" because it is ahead of its time.", "(DF3): I want to tell people that I have it and that it is useful." Some said that they would leave MINU in the living room or bedroom, while others would take it if moving rooms.

When asked to imagine how they would actually talk to MINU, responses included saying good morning and asking about the day's schedule, talking about trivial matters, or talking about what happened during the day. In response, they wanted MINU to respond and ask how they are, reassure them, or simply answer them accurately when they have a question. Regarding the length of conversation, answers ranged from just having simple replies once the concern is answered, to wanting to have a flowing conversation with different topics.

Most participants expressed a desire for a gentle, kind manner of speaking. They wanted to be complimented at the right time; and did not want their own ideas to be denied or put down (DF2 and DF5), although DF4 was open to MINU interjecting. All participants could imagine the device becoming either like a family or close friend. DF5 imagined it as a friend, and also expressed that "with devices, I don't have to worry about them because I can say what I think without worrying about it." Others also noted the difference between talking with a human and talking with a device, with the major concern being the lack of emotion (DF1, DF2, DF3). However, DF4 stated that "I talk to the device as if I were talking to my wife. I think MINU will give me a personalized response", while DF5 further elaborated "Conversations with humans are more interesting and you can get a wider range of information because they don't have a set response, but you have to think about what you should say and what you shouldn't say."

Features

Regarding the functions that were introduced in the radio show, for cooking, DF3 and DF4 were positive, "(DF3): It is convenient to cook while listening to the voice rather than looking at a book or recipe", whereas DF2 was concerned that "I don't think I would be able to get the words into my head with only audio." DF1 thought about using it if he was living alone, "I would like to learn how to make meals that are easy for beginners to make and have good nutritional balance."

Related to health, participants had a lot of ideas. Usage suggestions ranged from the influence on the practical and everyday: "(DF2) I would like it to say something to encourage me to move my body" (also DF3), "(DF3): I would like it to tell me that I'm eating too much sugar", "(DF4): I'd like to know how many calories I'm consuming", "(DF1): I would also like to see suggestions and advice on exercise to prolong my healthy life."; to more medical-related functionality: "(DF3): I think it would be convenient if the

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device could measure it [blood pressure] for me." (also DF1). Other points included, "(DF1): I want it to refer me to a good hospital or a good doctor when I am not feeling well.", and "(DF5): I'd like to see a function to track my sleep time and status at night."

Participants could not say definitively that they had no resistance to taking advice from a machine, as there were still concerns about accuracy, and the lack of emotional capabilities. DF5 outright said that she did not want advice from a machine, whilst DF4 said that he was happy to be taught.

Feature 2 of radio show introduced the idea of guided meditation, self-reflection, and talking to MINU about one's personal concerns and worries. While the caller in the radio show offered a critical opinion, this feature was largely very well received by participants. "(DF4): I want to use it because I think it can change the course of my life. I try not to tell anyone about my worries and anxieties in order not to make them feel uncomfortable, but I can easily tell MINU, so I think it will help relieve my stress", and likewise "(DF2: I think I can say things to MINU that I can't say to my kids.". "(DF5): I think this is a very good feature because it helps me fall asleep." Only DF1 mirrored the caller in the radio show, "(DF1): I can't imagine... I don't think machines can do that much."

Participants were also open to the feature that allows them to discuss deceased relatives with MINU. They wanted to talk about old memories (DF1, DF2, DF4) and be reminded of anniversaries. DF3 wasn't sure what the response from MINU would be, while DF5 envisaged the situation when she prays at the home shrine, and thought that MINU could offer a reply of "Yes, that's right" when she talked about her memories of the deceased.

As for the feature with MINU set in the local history museum, some participants did not know how much they would be able to share themselves, but all of them wanted to know the information provided by others and broaden their perspective.

For the feature where MINU connects two people together, DF1, DF2, DF3 and DF4 expressed positive opinions, such as it being good to know when someone is free, that MINU could help kick-start conversations, and that one could hear the other's voice (rather than communicating through email). They were considerate of contact at a convenient time, and DF1 expressed concern if MINU really knows if the other person is free or not, while DF5 did not want to interfere in her children's or grandchildren's lives.

Finally, regarding the knowledge-sharing and linking feature, some participants did not feel comfortable with it (DF2 and DF4), whereas DF3 and DF5 wanted to share their experiences to the younger generation or others, such as stories from the war, or how to deal with certain problems. DF1 who earlier talked about going out and maintaining social contact, also thought that it could expand society and lead to new jobs.

3.3 Discussion

Overall, the cross-cultural insights show that **certain topics are relevant regardless of cultural background, while attitudes and relations differ between the country-specific samples**. Compared to the German sample the Italian participants were more open to using the voice coach. All Italian participants were able to imagine and everyday use of the voice coach, whereas in Germany two participants consistently rejected to imagine such a device in their home. At the same time German participants often feared that the voice coach could be detrimental to their **autonomy**. In Italy this phenomenon could not be observed. This may be attributed to differences in tone and language of the culturally

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adopted artefacts. Even though we tried to create comparable artifacts in all countries, slight differences in tone and language are an inevitable result of country-specific production and adoption. With this in mind, it should be noted that the Italian artefact (i.e., radio show) particularly emphasized that the voice coach does not impose itself over the older adults. The German artifact on the other hand painted a picture of a more proactive voice coach. Thus, the fictional world may be perceived due to a country-specific implementation and audience.

Concerning the awareness of intending actors and intentions the German participants were very focused on privacy, commercial and corporate intentions as well as potential misuse. In the Italian confrontation we mainly found statements about family members, for example busy children, who would have bought the device for their parents.

In Germany the idea of using the voice coach as a social companion has been strongly rejected. All interactions with the voice coach follow a particular goal, in which the role of the voice coach is never purely social. The same task-oriented attribution of roles has been observed in the Italian sample. Three participants from the Italian sample also imagine to have longer conversations with the voice coach whenever they feel lonely. The Japanese participants also referred to task-oriented encounters, however they were more open to the idea of having intimate conversations with the voice coach beyond practical use. At the same time the technology inherent qualities of the voice coach have been emphasized by Japanese participants- (e.g., non-judgmental).

3.4 Implications

The design fiction revealed different ways in which older adults relate to a voice coach, as well as areas of interest that are important when designing a voice coach for older adults. In terms of acceptance three intertwined key areas have been identified.

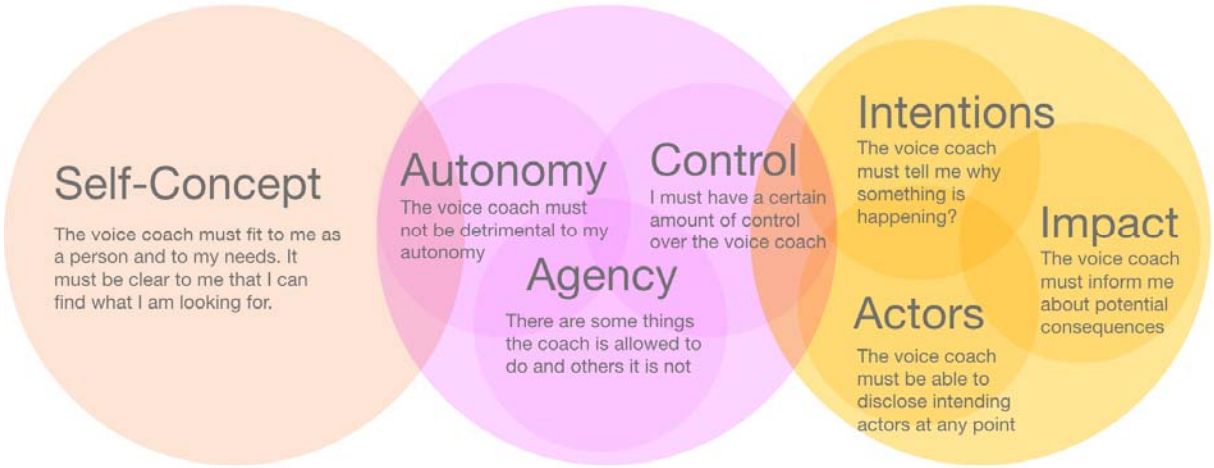

Figure 3.3 Key topics addressed by participants in the Design Fiction

Self-Concept: First the self-concept of older adults seems to be a driving factor when it comes to acceptance. The feeling that the voice coach fits to them and that they can be themselves in a relationship with the voice coach, increases acceptance. On the other hand, a mismatch between the perceived purpose of the voice coach and one's self-concept, results in rejection. To give an example, older adults who see themselves as independent are likely to reject a voice coach, which purpose

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appears to be, to assist frail people. When it comes to tasks being performed by the voice coach, older adults assess whether these tasks have value or meaning to them. Those who see the voice coach as a counterpart also expect the voice coach to complement themselves in a certain way.

Autonomy: Older adults want to feel that they are the initiator of their own actions rather than feeling controlled by external forces. The coach must not be detrimental to their autonomy. That way, any proactive behaviour of the coach is easily interpreted as a threat to their autonomy. Having the feeling of being able to control the device appears to counteract worries about adverse effects on autonomy. Older adults with a more horizontal relation to the voice coach allow it to have more agency (i.e., capacity to act independently) than others. For older adults with age-related autonomy deficits, it becomes more important to maintain intrinsic capacity, rather than looking for a past level of autonomy.

Awareness of intentions and actors: A third crucial factor for acceptance appears to be the awareness of other roles and intentions and ability to bring them in accordance with own goals and autonomy. Uncertainty about actors or assumed ill-intent usually results in rejection of the voice coach. Participants who did not agree with assumed intentions and the potential impact (e.g., surveillance) also rejected the voice coach. Overall, the older adults expected to be informed about intentions and intending actors. A positive image of intending actors (e.g., family) may have a positive impact on the acceptance of the voice coach.

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4 End User Interview Study in DE, FR, IT, JP

4.1 Methods in DE, FR, IT, JP

Individual interviews with potential end users were conducted in Italy, France, Germany and Japan between March and April 2021. The interviews aimed to receive first information about the daily life (before/after Corona) of potential users, how they deal with their own health, their experiences as well as attitudes towards different technologies and digitalisation. In addition, information about initial expectations regarding the e-VITA Coach and the language interaction should be gathered, and possible initial barriers regarding the implementation of the virtual coach identified.

The interviews were conducted using a semi-structured guide based on the structure of (Helfferich, 2011) which was initially written in English and then adapted by the respective partners to the language of the countries conducting the interviews. The guide consists of a total of 5 topic sections, each of which was introduced by an open-ended narrative prompt (**Fehler! Verweisquelle konnte nicht gefunden werden.**, Appendix).

Before the actual interview, the interviewer briefly introduced him/herself and thanked the respondent for his/her willingness to take part in the interview. The e-VITA project was then explained and the goals of the interviews were discussed. Interviewers were careful not to convey any negative stereotypes towards older adults to mitigate the risk of distorting the interview. We explained that the interview would last about an hour, that it would be recorded and then transcribed, and that no conclusions could be drawn about natural persons. After the interview, there was room for open questions from the participants.

The interview guide was divided into a total of 5 topic blocks. Topic block 1 "Everyday Life" served as an introduction to the actual interview and pursued the goal of obtaining knowledge about the everyday structure and activities of the interviewees.

Topic block 2 "Health" served to determine the importance of health in the interviewees' everyday lives and obtain information about the personal handling of health. In addition, information about health literacy was to be determined. From this, initial indications of possible areas of application for the virtual coach can already be derived.

In topic block 3 "Technology/Digitalisation, " information was collected on which digital and technological devices the respondents already use and their basic attitudes towards technology and digitalisation.

Topic block 4 "e-VITA Coach" introduced the transition to project-related interview content. Here, statements regarding the acceptance of a possible virtual coach were determined, which specific usage scenarios would be conceivable for the respondents and which barriers and opportunities they see in the use of the coach.

Topic block 5 "speech interaction" specifically targeted the ideas of language interaction with the coach and what expectations the potential users have of it.

All partners had the opportunity to give feedback on the content and structure of the guide during its development. For example, after the first draft, topic block 5 was added. Due to the ongoing SARS-Cov-

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2 pandemic, the interviews were conducted digitally via different platforms in the European setting which means that the respondents were interviewed in their homes. After conducting the actual interview, demographic data of the interviewee was additionally collected using a structured questionnaire (Page 124, Appendix), or by asking for the demographic data verbally at the start of the interview (Japan). In Japan, in addition to digital platform interviews, interviews were conducted in-person owing to the relaxed restrictions during the pandemic.

The subjects were recruited purposively. Basically, people aged 65 and over who had an email address were included. In addition, the subjects had to live mainly independently in their own homes. This means that the test persons can manage essential activities of daily living (ADL) without major (professional) help from third parties. Persons younger than 65 years or without a valid email address were excluded, as well as persons who need (professional) help to cope with their essential ADL and thus cannot lead a completely independent life. Differences in the interview procedure and subject recruitment are explained separately for each country in the course of the chapter. In addition, a pilot test was conducted with a 58-year-old female from the circle of acquaintances of one of the project partners.

The interviews were analysed using a content analysis based on Mayring (Mayring & Fenzl, 2019) using the software MAXQDA. For this purpose, a uniform coding system was first created deductively on the basis of the guideline explained above, in which the main and subcategories were each explained in terms of content (Table 9.1, Appendix). This coding system formed the basis for the evaluations in all countries; the partners were free to add new inductive categories based on their interviews.

Germany: Country-specific sample and conditions

For Germany, the project consultant for the e-VITA project of the Diocesan Caritas Association for the Archdiocese of Cologne (DiCV) conducted the interviews. The interviewer was 27 years old at the time, is female and has a master's degree in health care science as well as experience in conducting qualitative interviews. This information was also given to the interview partners before the interview. The interviews were conducted via the Zoom video conferencing platform (Zoom Video Communications, Inc.). All participants were in their homes during this process, but no other people were present. The cameras of both parties were switched on. In parallel, the audio track of the interview was recorded via the dictation mode of a Samsung Galaxy A40 (the interviewer's work mobile phone); the participants were informed that only an audio and no video recording would take place.

The participants were recruited in April 2021, on the one hand, via the e-mail distribution list of the open help for the elderly of the DiCV and, on the other hand, via the newsletter of the German National Association of Senior Citizens' Organisations (Bundesarbeitsgemeinschaft der Seniorenorganisationen e.V., BAGSO). The BAGSO is made up of around 120 associations and federations of civil society that are supported by older people or are committed to the interests of older people. The newsletter is published weekly and reaches around 8100 members of the association who have subscribed to the newsletter. The BAGSO newsletter is published digitally and currently has 8.100 subscribers. The people mainly register via the BAGSO homepage. They are multipliers (full-time and voluntary) from the fields of local authorities, NGOs, politics and science. But it also reaches the individual senior citizen.

Both the DiCV and the BAGSO published a call for interview partners with essential information about the e-VITA project (goals, duration, content) and the interview (duration, content, anonymisation). In addition, the contact details of the responsible project consultant of the DiCV were given, so that interested potential interview partners could contact her independently.

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A total of eight interviews were conducted at the end of April 2021, four of them with females. The average duration of the interviews was 1:28:02 hours. Due to staff resources, recruitment was stopped at a number of 8 persons. There were no drop-outs and no declined interviews. The average age of respondents was 71.63 years (range: 66 - 87 years). Three persons lived in rural communities, the rest in cities. Most (n = 5) were married, one divorced, one in a stable partnership and one widowed. The majority (n = 6) had children, the average number of children was 1.75 (range: n = 1 - 2). Of these, 4 had grandchildren and one already had great-grandchildren (number of great-grandchildren: n = 1). The number of grandchildren has a range of n = 1 - 9. With regard to the level of education, a majority of the respondents (n = 6) had a university degree, one person had a high school diploma, and another had a technical diploma. All respondents were retired, the average years of retirement was 8.75 years (range: 1 - 21 years). Seven of the respondents were involved in voluntary work. A total of seven of the interviewees were recruited via BAGSO, one person via the distribution list of the DiCV. The transcription of all interviews was carried out by an external service provider and followed the rules of Kuckhartz (Kuckartz, 2007). The transcripts were not sent separately to the interviewees for review, but the participants are informed about the results of the interview study. An overview of the demographic data is shown in (Table 4.1).

Table 4.1: Demographic data of participants in the German interview study

ID	TN_01_VS	TN_02_VS	TN_03_VS	TN_04_VS	TN_05_VS	TN_06_VS	TN_07_VS	TN_08_VS
Age (Years)	77	68	87	66	71	67	71	66
Gender	M	M	F	F	F	F	M	M
Residence	RC	C	C	RC	C	C	RC	C
Residence situation	WP	A	A	WP	WP	WP	WP	WP
Marital status	MA	D	W	P	MA	MA	MA	MA
Children (n)	2	0	4	3	1	2	1	0
Grandchildren (n)	5	0	9	4	1	4	0	0
Education	U	H[1]	U	U	U	U	U	VC
Employed	No	No	No	No	No	No	No	No
Retired (Years)	17	9	21	1	8	5	8	1
Voluntary work	yes	yes	No	Yes	Yes	Yes	Yes	yes

M = male, F = female; RC = rural community, C = City; WP = with partner, A = alone, MA = married, D = divorced, W = widowed; U = University degree, H = High school, VC = vocational baccalaureate
[1]Gymnasium in Germany
[2]Fachabitur in Germany

Japan: Country-specific Sample and Conditions

For Japan, interviews were conducted by Tohoku University in Sendai; the National Center for Geriatrics and Gerontology (NCGG) in Obu, Aichi; and J.F. Oberlin University in Machida, Tokyo

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Tohoku, Sendai:

Interviews were conducted in rotation between two interviewers. Both interviewers were female, aged 30 and 55 respectively. Neither had experience in conducting qualitative interviews (prior to the pre-study), although one had experience as an experiment tester. A total of 12 interviews were conducted in-person at IDAC, Tohoku University, Sendai. An additional 5 interviews were conducted via the Zoom video conferencing platform (Zoom Video Communications, Inc.). All participants were in their homes during this process, and no other people were present. In all cases, the cameras of both interview participants were switched on. In parallel, the audio track of the interview was recorded via the voice memo application of an iPhone 8 / iPhone 6 (the interviewer's work mobile phones); the participants were informed that only an audio and no video recording would take place.

Participants for in-person interviews were recruited from existing contacts who had expressed their desire to be available for future experiments at the university, and from paper advertisements placed at local city district ward offices. Zoom participants were recruited from an advertisement placed in a free newspaper (Kahoku Shinpo – a daily newspaper published in Sendai). For in-person interviews, conducted during April and May 2021, participants were 6 males and 6 females. The average duration of the in-person interviews was 1h:34m:53s. zoom interviews conducted during May had an average duration of 1h:21m:25s; for 3 males and 2 females. There were no drop-outs, while one person declined to come for an interview after initial contact, and the data recorded from two interviews was excluded as one participant (004) identified that she was already taking part in another experiment concurrently, while for another (002) there was an issue with the audio recording, where the audio was not captured.

The average age of respondents in the in-person interviews was 73.83 years (range: 70 - 83 years). For the zoom interviews, the average age was 71 (range: 67-75). All participants lived in Sendai City. The transcription of all interviews was carried out both by an external service provider; and also using IBM Watson (IBM Corp.) “speech-to-text” service, with further checking of the transcript file conducted by the interviewers.

Table 4.2 Demographic data of participants in the Japanese (Tohoku) interview study

ID	001	003	005	006	007	008	009	010	011	012	R01	R02	R03	R04	R05
Age	72	76	70	70	71	83	79	72	70	77	68	75	70	75	67
Gender	M	M	F	F	M	M	F	F	F	M	M	M	F	M	F
Home Living Sit.	AL	PA	AL	OT	PA	PA	PA	AL	OT	PA	PA	PA	OT	AL	OT
Residence	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Education level	HS	HS	HS	V	U	U	HS	V	V	U	U	U	HS	U	U
Voluntary work?	Yes	No	Yes	No	No	Yes *	Yes	No	Yes *	Yes	Yes	Yes	Yes *	Yes *	No

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Home living situation: AL (alone), PA (with partner), OT (with other family); Residence; CI (city); Education level: HS (high school graduate), V (vocational, specialist or technical school graduate), U (university graduate); volunteering: * indicates was doing volunteering up until the start of the coronavirus pandemic (current activities curtailed)

NCGG, Nagoya:

The interviewer was a female occupational therapist who has worked at a hospital for 15 years. She learned how to do medical interviews, and routinely conducts interviews with community-dwelling older people and patients of all age groups (i.e., from children to older people) as a professional.

A total of 5 interviews (4 men, 1 woman; mean age 69.8±2.9 years; range of age, 65-73 years) were conducted in April 2021. Two participants came to NCCG in order to do the interview, and three conducted this interview via the Zoom video conferencing platform (Zoom Video Communications, Inc.).

The camera was turned on for both parties during the online interview, but only the audio was recorded using an IC recorder, the same as for the in-person interviews. Participants were informed about this. The average duration of in-person interviews excluding the explanation was 27 min: 35 sec (the in-person interviews group, 28 min: 24 sec; the online interviews group, 27 min: 51 sec), and none dropped out or refused the interview.

About the characteristics of the respondents (n=5), all of them lived in Aichi prefecture, were married and each person had two children. Of these, three had one or two grandchildren.

About the level of education, all of them had a university degree, one is still working, and one was a full-time homemaker. Three were retired, the average number of years of retirement was 6.0 years (range: 5 - 8 years); one of the three retirees was involved in voluntary work.

The transcription of all interviews was carried out using IBM Watson speech-to-text service, with further checking of the transcript file conducted by the interviewers.

The transcripts were not sent separately to the interviewees for review, and the participants weren't informed about the results of the interview study. However, if the participants should ask it, they will be able to receive the results.

Table 4.3 Demographic data of participants in the Japanese (NCGG, Nagoya) interview study

ID	NCGG00	NCGG01	NCGG02	NCGG03	NCGG04
Age	65	72	73	71	68
Gender	M	M	M	M	F
Home Living Sit.	OT	OT	PA	PA	OT
Residence	CI	CI	CI	CI	CI
Education level	U	U	U	U	U
Voluntary work?	No *	No	Yes	No	No

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Home living situation: AL (alone), PA (with partner), OT (with other family); Residence; CI (city); Education level: HS (high school graduate), V (vocational, specialist or technical school graduate), U (university graduate); volunteering: * still working, not retire.

IGOU, Tokyo:

The interviewees were selected by snow-ball sampling. The interviews with the older subjects were conducted by two interviewers, four by face-to-face survey and four by online survey using Zoom. The interviews were conducted between April and May of 2021, and took between 30 and 95 minutes. There were no drop-outs and none declined an interview. All interviews were transcribed using the IBM Watson speech-to-text service, and the transcription files were further checked by the interviewers.

All subjects were female and ranged in age from 61 to 89 years (mean 71.5 years). The family structure of the subjects was as follows: five lived alone, two were married couples, and one lived with her husband and mother. Five of the subjects were independent in their daily lives, but three were receiving some kind of home care service. The educational background of the subjects was as follows: 2 graduated from high school, 3 from vocational school, 2 from university, and 1 from graduate school.

Table 4.4 Demographic data of participants in the Japanese (IGOU) interview study

ID	OU001	OU002	OU003	OU004	OU005	OU006	OU007	OU008
Age	65	65	85	65	89	74	61	68
Gender	F	F	F	F	F	F	F	F
Home Living Sit.	PA	AL	AL	PA MO	PA	AL	AL	AL
Children	1	0	2	0	2	1	1	0
Residence	CI	CI	CI	CI	CI	CI	CI	CI
Education level	PG	U	HS	U	V	HS	V	V
Work	Yes Part-time teacher	Yes Cook	No	Yes Tea ceremony teacher	No	No	No	No
Voluntary work	Yes	Yes	No	Yes	No	No	Yes	No

Home living situation: AL (alone), PA (with partner), MO (with mother); Residence; CI (city); Education level: HS (high school graduate), V (vocational, specialist or technical school graduate), U (university graduate), PG (post university graduate)

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France: *Country-specific Sample and Conditions*

In France, a doctor in psychology conducted the interviews. He therefore has experience in conducting qualitative interviews. The interviews were conducted via the Skype video conferencing platform. During the interviews the participants were in their own homes, in a quiet room. The cameras of both protagonists were switched on. The sessions were recorded using the video recording tool of the Skype platform. The participants were informed about the audio and video recording of the interview. Due to technical problems, one interview was conducted and recorded using an Honor mobile phone (the interviewer's personal phone); another took place at the Broca Living Lab premises and was also recorded using the same mobile phone.

Participants were recruited in March 2021. An e-mail was sent by the researchers to the participants of the workshop "multimedia Coffee" of the Broca Living Lab – APHP. This workshop "multimedia Coffee" familiarize seniors with the information and communication technologies for daily use; offer a space for listening and exchanging information on age-related disorders and technological aids; allow a meeting between senior, health professionals and creators who will provide the assistive technologies of tomorrow. In the mail sent to participants, essential information about the project e-VITA was indicated (goals, duration, content), as well as the information about the interview (duration, content, anonymization). Persons interested in this project were invited to contact the researchers by e-mail or by phone call.

A total of 12 interviews were conducted until the end of March 2021, with 5 men and 7 women. The average duration of the interviews was 1:29:06 hours. The average age of the interviewees was 74.2 years (s.d = 7.5; Min 63; Max 87). One person lived in the countryside, one in the suburbs and the others lived in Paris. Marital status was variable, they were either single (n=2), divorced (n=3), married (n=3) or widowed (n=4). The majority of participants lived alone (n=8), three lived with a partner and one in another situation. Only two people had no children, the average number of children was 2.5 (s.d=2; Min = 0; Max = 7). Of these, 9 had grandchildren (M= 4.4; s.d= 5.3; Min = 0; Max = 17). With regard to education level, the majority of respondents had a university degree (N=8) and 4 had a high school degree. Only one respondent was not retired due to retirement entitlement procedures that were not completed. The average time in retirement was 14 years (s.d= 9.1; Min = 3; Max = 29). Seven of the interviewees were engaged in voluntary work. All transcriptions were carried out by the e-VITA project consultants.

Table 4.5 Demographic data of participants in the French interview study

ID	1	2	3	4	5	6	7	8	9	10	11	12	*Statistics*
Age	74	79	68	81	84	87	74	79	67	63	69	65	M= 74,2 s.d= 7.9; Min=63 Max=84
Gender	F	M	F	F	F	M	F	M	F	M	M	F	
Home	AL	AL	OT	AL	AL	PA	AL	AL	AL	PA	A	PA	
Residence	CI	SU	CI	CI	CI	CI	CI	CI	CI	RU	CI	CI	
Marital .Sit	SI	WI	SI	WI	WI	MA	DI	DI	WI	DI	MA	MA	
Children	0	1	2	2	3	5	0	2	7	3	2	3	M= 2.5 s.d= 2; Min= 0 Max= 7

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Grandchildren	0	2	5	3	5	13	0	3	17	0	1	4	M=4.4 s.d= 5.3; Min= 0 Max = 17
Degree	HS	UN	UN	HS	UN	UN	HS	UN	UN	UN	HS	UN	
Work	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
Retirement	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	
Time retirement	13	25	6	16	29	22	15	19	5	0	15	3	M= 14 s.d= 9.1; Min = 3 Max = 29
Voluntary work	YES	YES	YES	YES	NO	YES	NO	NO	YES	NO	YES	NO	

Sex: F (Female), M (Male); Home: AL (Alone), OT (Other), PA (Partnership); Residence: CI (City), SU (suburban), RU (rural), Marital. Sit.: SI (Single); WI (Widowed); MA (Married); DI (Divorced); Degree: HS (High school degree), UN (University Degree)

Italy: Country-specific Sample and Conditions

In Italy, a trained psychologist was responsible of conducting the interviews. The participants were recruited to internal contacts of the INRCA Unit. A first call by phone was conducted to explain the objectives of the interviews and to fix an appointment to conduct the full questions. The Informed Consent were signed by all the participants before undertaking the interviews by phone.

In total, 8 older people were recruited, 7 females and one male, with a mean age of 80.7 (SD=6.7). The majority was married and live with the partner (5 out of 8). The table below shows the main characteristics. The complete methodology was shared with the partners and was adopted, without any modification, to allow the comparability of the results. The following table summarizes the characteristics of the participants included in the interviews:

Table 4.6 Demographic data of participants in the Italian interview study

UserID	Gender	Age	Marital status	Living arrangements	Educational level
IT_01	Female	75	married	living with husband	higher
IT_02	Female	79	married	living with husband	secondary
IT_03	Female	88	widow	living alone	elementary
IT_04	Female	84	married	living with husband	secondary
IT_05	Female	80	married	living with husband	secondary
IT_06	Female	86	widow	living alone	elementary
IT_07	Female	86	widow	living alone	elementary
IT_08	Male	68	married	living with wife	higher

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4.2 Results

4.2.1 Germany

Key Insights

Interpersonal relationships and accompanying activities turned out to be a central aspect in the daily life of older adults. Many older adults reported that they invest time into acquiring **expertise** in various areas (especially during the pandemic). They were generally open to the use of technology and could imagine using the e-VITA coach in the areas of **social contacts, nutrition, reminders, information provision**, among others. However, they also mentioned concerns about **data security, ethics, trust, pricing and learnability**.

It can be stated that the everyday life of respondents in Germany "normally" consists of many different activities. "Normally" because the Covid 19 pandemic had an impact on various areas of life, both negatively and positively. Above all, **social contacts and relationships** were important to the interviewees and their restrictions due to the pandemic were experienced as a burden. However, positive aspects could also be identified. The interviewees reported that the benefits and their own **expertise** in various areas had improved. It was also seen as positive that **digitalisation** in Germany had received a major boost as a result of the pandemic. Participants particularly referred to the more established use of digital communication technologies (e.g., video calls) in their circle of acquaintances. Another relevant point in everyday life was the maintenance of a daily **structure**.

Respondents actively deal with the topic of health, but it does not take over everyday life. All respondents used the internet to get information about health and were confident that they could filter out relevant information. In doing so, they mainly relied on their previous medical knowledge from their education or profession. With regard to their own health, it was important to the respondents that their physical and cognitive abilities remain intact for as long as possible.

The attitudes towards technologies and digitalisation were generally rather positive, but they also considered aspects such as **data protection** or ethical dimensions as critical issues. All respondents used at least one smartphone and a laptop or computer. The advantages were seen mainly in video conferencing, in facilitating social contacts and generally in making things easier. A problem was seen mainly in the danger of older people not keeping up with the fast technological progress and being left behind.

Regarding the ideas about the virtual coach of e-VITA, human-like, animal-like, abstract forms and specific robots were mentioned. The important aspect was that **the coach should not look too realistic**. The respondents could imagine possible use scenarios in the areas of **social contacts, nutrition, reminders, information provision**, among others. **Ethical aspects** were named as major possible barriers to use, but also the **fear of losing control, financial barriers** and above all **data protection**. As prerequisites for use, it was again important to the respondents that they **know the functions of the coach, that they have time to try it out, that there is a trustworthy organisation behind it and that they know exactly how their data is handled**. In terms of voice interaction, an important aspect was that users feel that the coach understands them and that **they can trust** it. Furthermore, the interaction should not be too robotic. Regarding the function of small talk, opinions were very mixed.

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Everyday Activities

The respondents reported a number of daily activities (Fig. 4.1). These include **voluntary work**, like TN_06_VS reported *"(17) Yes, I am a counsellor at the children's and young people's helpline 'Nummer gegen Kummer.' That is supposed to be nine hours a month in shifts of two or three hours, so that is*

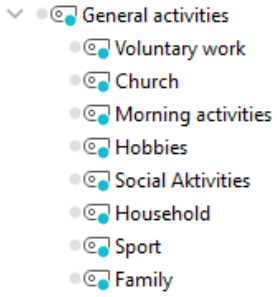

Figure 4.1 Identified Activities (Maincode with Subcodes)

almost every week, and then I am also a reading mentor at school." Furthermore, the **family** of the interviewee takes up space in his/her daily life, TN_05_VS: *"(11) One day I have my little grandson from eight, half-past eight, who keeps me on my toes, for one day, so Thursday is also an entertaining pre-Corona and in-Corona time day."*. **Social activities** outside the family circle were also identified. TN_07_VS explains *"(13) So, I am, yes, as I said, married, am present in a network of about 20, 30 friends, some of them eternal friends since childhood. (…) There were still eight friends from my studies, who are now still working like I was (…) and are now retired, with whom we now regularly engage in, for example, electronics tinkering."* In addition, various **hobbies** are reported, including gardening, cultural events such as concerts or visiting museums, but also going on trips. For example, TN_04_VS reports *"(23) We are both very active when it comes to art exhibitions and like to go somewhere, so, I don't know, to Documenta or, or to Münster or, we are both very interested in art"*. They also talk about **church activities**, **household activities** and **sports**. Regarding the latter, for example, TN_08_VS says: *"(5) We went hiking a lot and also regularly did something for our health, that is, meditated for two hours in the morning, did gymnastics, then we often went walking, up the [specifically named mountain] here".*

Four categories were identified as particularly important aspects of the respondents' everyday lives in the German sample: Being active, having a daily structure, self-experience, and **social relationships**. With regard to **being active**, for example, TN_02_VS reports that he sets his own goals in order to stay mentally fit: *"(15) Yes, on the other hand, perhaps the important aspect, which is perhaps also important in old age (...) is that in this respect, of course, one is also challenged by these own goals and, and thereby also remains mentally fit and active through these activities".* Concerning the categories of **daily structure** and **self-experience**, for example, TN_08_VS reports *"(25) (...) Well, I think what is very important for me is that I have noticed that I need a task, something where I have the feeling that yes, that makes sense. And I need a regular daily routine".* In the fourth category, **social relationships**, the respondents report on the importance of social contacts in everyday life, within the family as well as with friends. For example, TN_01_VS describes what dealing with his grandchildren means to him: *"(49) I say, dealing with, with, with grandchildren, that is not just a grandpa or grandma task, that is a joy of life. Because you see how the children develop. The words that the smallest one suddenly starts to know. The truth is, I'm not an old grandpa, but I LOVE to play with blocks. I also like to play with the (…) ten-, the oldest is 16 of the five. I like to play with what, what there is to play with. One is a great footballer:- 'Oh, Grandpa, why don't you stand in goal?' (…) It's not a burden, it's a joy.".*

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The Covid-19 pandemic leads to different positive and negative changes in the everyday life of the respondents. It was reported that many activities that previously took place in direct presence are now increasingly taking place **digitally**. This was reported as a positive factor, among others. Thus, TN_02_VS *explains "(51) Well, of course I am learning, of course I have also learned a lot in, in the last year in the topic of video conferencing. Before, I was occasionally active in the field of videoconferencing, but only to a very limited extent, because it also resulted from other association activities. But now, of course, through this voluntary work, I now know how MS teams work or how other systems work and, of course, we also use this very much in this voluntary work and in this respect, yes, each of us has to learn accordingly".* Furthermore, the pandemic resulted in **new activities**, such as TN_08_VS *"(17) What has happened now is that I have been doing Corona rapid tests at [specific place] since January. (...) (19) I really enjoy that. (...) (21) Because it is simply a bit of contact with the world of work, without me having a lot of responsibility. And that's just, I go there (on a?) different day and test a few people and then go back again.".*

On the other hand, negative aspects are the restriction of social contacts, the loss of activities, and the **absence of voluntary activities.** Regarding the first category, TN_06_VS reports *"(37) We also have a grandchild, a small one, who is now two and a half years old, with whom we ALSO meet sometimes, but last year, for example, we didn't meet at all for almost three and a half months. And with such a small child, they forget you too. That's a pity"*. Regarding the **loss of activities**, TN_07_VS says: *"(41) Not to do any events at all, not even under Corona conditions with protective shields and air filters and such, and in large rooms, that is something that many here, personally our family, cannot understand. I would say that last year in summer it was also open, people kept their distance, took protective measures. So, it's a huge burden"*. Some **voluntary activities** can also no longer be carried out, according to TN_08_VS *"(11) A bit that has changed, I no longer do these reading mentors at the moment and the "Bahnhofsmission" [Christian charity at railway stations] is closed. I do go there regularly to look after things, but it's just not busy anymore, so I see that I'm mostly alone."*

Health

The role of one's own health in the everyday life of the interviewees is reflected in **conscious discussion** or is rather **in the background**. The former is described, for example, by TN_08_VS *"(29) (laughs) That is (...) unavoidable at my age. So, I'm, I would say, I'm healthy, no, I don't have any serious illnesses, but you have aches and pains every day and every few weeks some part of the body comes up, a joint, a muscle, a tendon that doesn't work as it should. And that means that I am busy compensating".* TN_01_VS is representative of this with the quote *"(55) Good question. On the one hand, of course, I can't get along without doctors, starting with the ophthalmologist to the dentist to the cardiologist and (.) these (.) people, of course, have no position at all in my, in my everyday consciousness, I would say. My day is filled".*

With regard to possible **worries and fears**, specific illnesses are reported, such as TN_02_VS *"(21) So in this respect, I naturally (.) also worry about how far this illness could change in the long term, could worsen, although it has not, let's say, worsened in the last 10, 15 years in such a way that it would be dramatic in any way, but these thoughts, this illness will of course influence my further life accordingly and can of course also lead to further physical failures. Whether it still has to do with mental deficits then, that's a question, we'll see everything."* The lack of doctors in rural regions was mentioned as another concern by TN_07_VS: *"(51) I used to go to the doctor every quarter of a year to take blood and see how the sugar level is, is there a change somewhere else. In the meantime, it is a bit more difficult because our doctor only takes a certain quota per day, yes, so even at the family doctor's, you have to*

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reckon with waiting times of six to seven weeks for examinations as a private patient. On top of that, of course, we hardly have any doctors left in rural areas, yes. They all retired a few years ago, yes."

Important aspects with regard to one's own health are, on the one hand, the preservation of physical functions, as TN_01_VS also describes *"(65) Yes, it is important to me, everything is important to me. So, I, I want to keep my mobility, I want to keep my, my moment. I said yes, I've just been to the, to the eye doctor and one eye is not as it should be. I have an aneurysm in the, in the abdominal area somewhere, but the internist says it's not bad, it's within the normal range. So, I can list you many organs now, of course they are not as perfect as with my one-and-a-half-year-old grandson, yes, but, it, I have no impairment, and I am grateful for that. The head is super clear according to my feeling."*. Aspects such as avoiding loneliness or good nutrition were also addressed.

Four different categories could be identified in the acquisition of health information: Internet, prior knowledge, social networks, and medical institutions. With regard to the first category, TN_06_VS describes *"(79) Yes, nowadays of course on the internet, of course. What if it twinges in the back? But then I know where it comes from. I often have tension in my shoulders or something. Now that I don't work anymore, it's not so extreme. Actually internet."*. However, some of the interviewees previously worked in the health sector and therefore draw on their existing prior knowledge. For example, TN_03_VS *"(63) Well, first of all I have basic knowledge as a doctor and I have actually always expanded it. I always read everything I could find (...)"*. With regard to social networks, the family and acquaintances are used, TN_05_VS reports *"(75) Well, you're already, at 70 there is virtually no little ailment that a friend (laughing) or a friend in the environment has not already had, yes. (...) So, be it the colonoscopy, the (laughing) haemmorhoids, or, really, because that, (...). In this respect, one has a basic set of (laughing) information, loving information together with the corresponding advice and the corresponding pharmacy, yes"*. Finally, medical institutions such as the family doctor or health insurance companies are used, TN_02_VS *"(23) And on the other hand, if I notice something that seems strange and unusual to me or some deterioration, I see it as more sensible to try to get an appointment with my family doctor at short notice and discuss it, or also with my diabetologist, if I see it in connection with that, rather than (.) getting information from perhaps strange sources."*

The Covid-19 pandemic also had an impact on health aspects of the respondents. For example, respondents reported that important check-ups had to be postponed and that they had to be more careful in everyday life to avoid infections *"(75) Well, it depends on how I answer now. In a general sense I say: No, I am the same as before. The whole truth is, of course, that we, both my wife and I, know that we are a risk group and that we stay away from everything and everyone, that we don't show up anywhere without a mask. I have here in the house, so in the, in the house almost no one comes in. Apart from the fitter, we don't let anyone in. And in the car, I always have two or three masks ready to hand as soon as I get out."* - TN_01_VS. Or also that they have become more sensitive to their health, e.g. TN_05_VS *"(21) (...) until (..) after a few weeks it became clear, so it won't be that quick, (laughing) it won't be different again and especially in, so then in the lockdown the (.) explosiveness especially for older people became particularly, particularly clear and was then at first the first big shock that I belong to these poor sods who are so old and have to be protected and because until then I had actually not imagined it like that"*.

Technologies in Everyday Life

On the one hand, the interviewees have a positive attitude towards technological progress. For example, TN_07_VS explains *"(125) Yes, of course positive, because in the course of my life I have simply*

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seen how things develop. (...) I had to write my diploma thesis in sociology with a typewriter. But at that time, I didn't have an electric typewriter either, I had a mechanical one, and that was torture without end." On the other hand, this is also seen as **inevitable**, according to TN_03_VS *"(123) Well, I think that, first of all, it is inevitable. When I look at it now, yes, people no longer ask whether or why, but it is simply taken for granted. And I also see this now, as far as I am still aware, in the processes of the clinics, these are things that are really unavoidable"*. However, **sceptical** and **rather negative** statements towards technological progress were also expressed, e.g. TN_08_VS *"(125) On the other hand, I already have such, yes, such a slight trepidation at the idea of where this will lead. But I'm in the situation that all older people are in and were in 2000 years ago, that you have a certain life routine and it's getting harder and harder to learn and change completely."*.

The interviewees used a range of different **technological devices** (Fig. 4.2). Behind the specific applications is the use of email, various messengers and other specific applications such as certain smartphone apps, smart home technologies or wearable. However, certain applications are deliberately not used, such as TN_08_VS *"(159) (...) I found it quite interesting, because for me Alexa is such a, such a red rag. I don't order anything from Amazon on principle (laughs) and so I won't buy Alexa either (...)"*. Use scenarios in the everyday life of the interviewees are the use of technical devices in **voluntary work**, to pursue **hobbies**, or to **consume media** such as news or similar. But **health-related** usage scenarios also play a role, TN_07_VS describes in this regard *"(51) Then I have an Apple Watch, yes, with which I check my heart rate once a week, for example, or take a look at it, it's like an ECG that's built into it. Does it show any peculiarities or something (...)."*. Furthermore, technical applications are used in **social life**, TN_03_VS *"(23) And I (need?) that so, as far as communication is concerned and I can send a picture. Take a picture, send a picture, so right now, I have grandchildren, quite a few, and I communicate with them in this way, that I simply ask, do you have time, will you come over, or they say, I'll come over then and then"*.

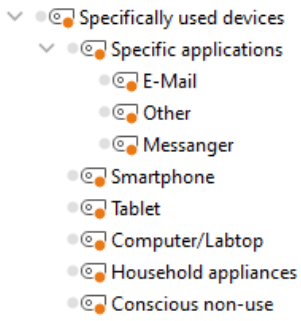

Figure 4.2 Specifically used devices, maincategory with subcategories

With regard to technical devices, various **advantages** and **disadvantages** were described which their use entails. Within the **advantages**, a total of four different subcategories could be distinguished: **Makes things easier, videoconferencing, simplifies (social) contacts** and **support**. Regarding the category **makes things easier** TN_06_VS for example *"(143) Well, the advantages? I find it handy that I can read my daily newspaper anywhere in the world now and with the [specific German city] part and what interests me there*." The possibility of video conferencing is also seen as a positive factor: *"(27) (...) so I would NEVER have thought of holding a face-to-face event online cleverly. And I am SO excited about it (...)"*- TN_05_VS. Within the category **simplifies (social) contacts,** it is described on the one hand how technological devices make it easier to maintain contact with family and friends, but also that it is

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possible to call for help quickly in emergency situations. *TN_03_VS explains in this regard "(123) And for me, the important thing is just these contacts that I can keep through them. These contacts are especially important to me now, because my daughters are spread all over Germany, my friends are spread all over Germany. And I see that if they, if they don't have WhatsApp or something, it's INCREDIBLY difficult to keep in touch."* In the category of **support**, functions are mentioned that simplify activities or make them possible in the first place. For example, *TN_03_VS "(5) (...) I can't write by hand very well anymore, so I write everything on the PC."*

On the other hand, the danger of **being left behind** due to rapid technological development is perceived as a disadvantage, TN_04_VS *"(139) But I think it is important. Well, I sometimes think that those (.) who are now ten years older than I am somehow have simply MISSED the connection*.". In addition, **useless functions** are described as disadvantages of technical devices and various barriers to use were identified (Fig. 4.3).

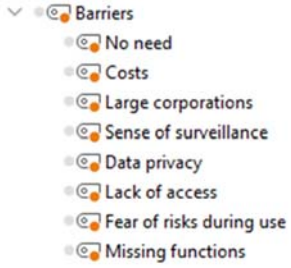

Figure 4.3 Use barriers, main category with subcategories

During the conversation about technologies in the everyday life of the interviewees, different **needs** could also be identified. These include that the **advantages** that the use of certain devices bring with them **must be clear** (TN_05_VS: *(43) "In this respect I really share, so I think it is an important task to inspire as many older people as possible in time and, and to convince them of the, of the possibilities, because I already notice that when I start with it, well, I don't start with it at 88"*), the users must have **time to familiarise** themselves with the device and to be able to **gather information** about it and receive **personal support** in learning how to use it (TN_03_VS: *(139) Yes, so I try out quite a lot, (un.) of course over time (un.), but at the end of the day I sometimes call, I have a grandson (.) here or a daughter whom you can ask for a moment").*

e-VITA Coach

Under the term "virtual", the respondents imagine that they are not confronted with a real person or that it is specifically about apps or technical devices: TN_06_VS *"(179) Well, that would be an app on the smartphone for me*.". With regard to the appearance of a virtual coach, there were various ideas. These included human-like or animal-like robots, certain shapes such as cubes or TV-like or concrete robots such as Nao or Pepper. Concerning the human appearance, however, it should not appear too realistic, TN_07_*VS "(165) So Pepper is already quite good. Well, he has a few characteristics that are positive, he has a friendly face, can smile and so on, speaks very well understandably and so on, moves like a machine and not like a human being, for example*".

Conceivable use scenarios in the area of **social life** could be that the coach establishes contact with friends and family on behalf of the user (TN_07_VS: *"(230) So of course it could be that you automatically establish contact with your friends and acquaintances, yes, at certain times, that you say, virtual coffee hour every Wednesday at 3 p.m.")* or that he establishes contact with strangers who, for

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example, have the same interests. Some scenarios were expressed in which the coach himself represents a social contact, e.g. TN_08_VS *"(169) Spouses have the tendency to die in old age, then you stay behind and your friends die too, your relatives are, even if you have your own children, they are often scattered all over the world. And that's where an avatar can be quite helpful"*. Various scenarios were mentioned in **everyday life** (Fig. 4.4). Providing information, for example, includes the coach answering questions, reporting current news or reading out content (TN_04_VS: *"(259) Yes, for example, reading out current information, that is, somehow, when it becomes more difficult to see, and the other could also be played out in such a way, so that perhaps, there are now films where it is described what is happening or so"*). Physical support in the household was also conceivable. In the area

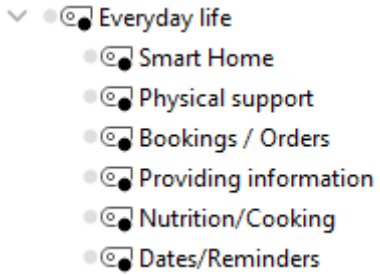

Figure 4.4 Use scenarios in everyday life, maincategory with subcategories

of **health**, the interviewees could imagine that it reminds the user of various appointments (preventive care, exercises, tablets), that it demonstrates physical exercises, and that it can call the emergency doctor in an emergency. But also, that he could make diagnoses, check physical functions or that he would provide health information (on specific request) (TN_02_VS: *"(65) also give suggestions and advice based on information that I had to disclose beforehand, of course"*. In the case of the Covid-19 pandemic, the coach could also provide information about current incidences and what restrictions are currently in.

However, **concerns and barriers** to use were also mentioned in relation to a possible virtual coach. These include **ethical aspects**, e.g. that a too realistic appearance would be cheating on people or that human togetherness would be pushed even further into the background *(TN_01_VS: (127) Yes, it is a help when I am sitting in the old people's home and can stroke this cat and it also reacts somehow. But of course, it is also cheating on the feelings of people who have become weak.").* Furthermore, concerns were expressed about a possible **loss of control** *(TN_03_VS: "(315) I would be afraid of that. Besides, with increasing knowledge of what is possible, you don't know who can influence the thing. So, there are many possibilities")* as well as **data protection** and **financial barriers**. In addition, there were concerns about developing a **dependency** *(TN_07_VS: (177) And there is quite a big danger that one might become too emotionally involved, perhaps no longer wanting to work with others or simply becoming too technically involved, yes. Like some people get up in the morning and switch on the TV")* and it is not desired that the coach **makes rules or evaluations** *(TN_06_VS: (217) Yes, if he tells me, have you (...) already made the beds or something, well, if it is in such everyday things, or cleaned the kitchen or something, so things like that, where I mean, I have to determine myself when and where and how I do it").*

As prerequisites for the use of a virtual coach, it was important to the respondents that they **know its functions**, have **time to try it out** and that a **trustworthy organisation** is behind it (TN_08_VS: *"(173) I think it would be important that (.) I don't have the feeling that there is some commercial provider in*

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the foreground. So, if it were Caritas or whatever, or any other provider that I find trustworthy and neutral, that would be okay."). In addition, the **use and sharing of personal data** should be **transparent** *(TN_04_VS (293) (...) but I would already, already want to know how I can use it and what the basic functions are, what data it collects and where this data goes. And I would also like to be able to control the data and, if necessary, delete it or something")*, it should be **personalisable** and **compatible** with existing devices, and it should be known **how to react if problems occur**. Furthermore, a **contact person** should be available (TN_03_VS *"(179) But if you now approach the 90, then there is still the question of where from, where to and how it will all be. I think that plays more of a role, at least for me. And of course, you can get information from all kinds of books, but (.) it is also important to simply talk to someone")* and the **financing** should be clarified.

Speech Interaction

With regard to the speech interaction with the virtual coach, the interviewees expressed that they need a certain relationship of trust with him, the feeling that he understands them (TN_08_VS *"(227) Yes, what would be important to me? (8) Yes, I think (clears throat) (8) it is basically important to me in conversations that I have the feeling that my counterpart, so once, I can trust him, ne, (8) and my counterpart (6) reacts understandingly.")* and can respond to emotional concerns *(TN_01_VS "(167) Well, I say, as a rational person, the device should be able to record my questions, i.e. process them and record them and should also give a reasonable reaction, answer to them, but why, if I don't say anything or feel something desperate, that is also information to which I could use a reaction").* Also, the interaction should not be too "robotic" (TN_04_VS *(297) (...) and that there is not just such a, such a reeled off three-variant somehow, so not, not that it is so very robotic, but that it is already somehow relatively close to life"*) and that there is the possibility to select different voices. In the area of small talk, the statements were mixed, on the one hand it was conceivable (*I: "(298) Hm. And would, well, to refer a bit to your statement just now, would you wish to be able to discuss Foucault with the coach? TN_04_VS: "(299) Yes. Why not, eh? Well, I mean, it's a bit like that when you don't have anyone else?"*), on the other hand, no benefit was seen in it (TN_05_VS: *"(153) Well, at the moment I can imagine it for ME the way I live now, at the moment I can live, I wouldn't want to have anyone greeting me cheerfully from an apparatus or something").*

Further Notable Aspects

The coach meets committed potential users who all lead an active but very heterogeneous life. Therefore, e-VITA must have enough space for the individual needs of the people. It is important that the users have control over the coach and that the use of personal data is transparent and comprehensible. At this point, however, the characteristics of the sample must also be taken into account. Almost all of the people carry out voluntary work (some even in digital areas) and all have a high level of education. Therefore, the insights of less active people who have less technical experience remain open for the time being and should also be taken into account in the further course of the project.

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4.2.2 France

Key Insights

The interviews' analysis permit to show that older people have before the coronavirus pandemic, an **active life with many different activities**.

Unfortunately, the coronavirus pandemic has impacted participants' **social activities** and explains why for some people this period was hard to live through.

However, the pandemic also has positive consequences such as the **discovery of new activities and the use of new technologies**.

Health is important to respondents, so they take care of it. But few of them inform themselves.

The participants use at least one technological tool in their daily life. For some respondents, technology is synonymous of progress if it is under control.

Regarding the virtual coach, most of the people interviewed **do not imagine themselves currently using this type of device**. For them, the virtual coach is intended for people who are losing their autonomy. The participants had difficulties in imagining the coach in terms of appearance but also in terms of functionality. Furthermore, participants have some concerns about this device notably about the **loss of control and autonomy or data management**. To use this technology, participants want a detailed description of the coach, control of functions, ease of use, and contact with a human if problems arise. Concerning voice interaction, participant think is should be about **useful** elements, **everyday** elements and the voice should be a human sound that adapts when necessary.

Everyday Activities

The participants report having a fairly full life with many activities *(FR_04 "My day is generally very full. Because I have a lot of activities")*, both inside the home, such as cleaning, DIY or cooking, and outside through social activities. These social activities could be adapted physical activity classes, walking *(FR_01 "Depending on the weather I went out for a walk"), cultural activities (FR_01 "visiting museums, galleries, gardens")*, volunteering but also meeting up with family and friends. Participants took advantage of weekends to see their family *(FR_07 "Because on weekends we saw each other as a family")* or to do more activities *(FR_08 "On weekends I allowed myself more cinema sessions or to go for a walk there too")*. The participants therefore had a fairly full daily life and the covid pandemic slowed them down in their activities, especially in terms of social activities *(FR_09 "before the pandemic, I had more activities outside than now it's certain")*. The cessation of these activities explains why some interviewees had a bad experience of this period, which was perceived as routine and monotonous *(FR_04 "It's monotonous and uninteresting. Because what's the point of getting up in the morning, having breakfast, lunch, dinner and then doing nothing afterwards? For me, that's not living")*. However, some participants explained that they had set up new activities, in particular with the help of IT tools, some had made more calls or video conferences *(FR_03 "With my granddaughter we made cakes by Skype")*, others had taken advantage of this period to follow conferences or do sport via the Internet *(FR_01 "I also did yoga with the Internet and YouTube")*.

Health

Being healthy for the participants refers to being able to do whatever they want without being limited in their activities *(FR_04 "Being able to be active and independent")*. This is why most of the participants express that they take care of their health, through diet, physical activities and regular check-ups with the doctor *(FR_02 "I used to have technical check-ups every four or five years")*. The greatest fears mainly concern cognitive pathologies such as Alzheimer's disease, loss of autonomy or pain *(FR_03 "My big worry is not so much the physical illness, but the cognitive illness, Alzheimer's")*. Most of the participants explained that they did not seek to keep themselves informed because the information

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provided was too generalized, because they did not feel the need to know more, but also because they were afraid of recognizing themselves in the symptomatological criteria of a pathology *(FR_12 "In addition, I am afraid that there is too much information and I am afraid of having all the diseases that I read about")*. Others, on the contrary, seek information through television programmes, radio or books. The coronavirus epidemic has had an influence on people's lives both through the adoption of barrier measures and the physical and moral impact that this stressful period has had *(FR_04 "Ah need to rest because with the Covid-19, the worry gives me tension")*.

Technologies in Everyday Life

For some people, the progress made in new technologies is a step forward, as it allows them to multiply the possibilities of action, to save time *(FR_12 "I really like this tool which allows us to do a lot of things")*. The participants mainly use television, radio, telephone, tablet, some have an Apple Watch or a connected speaker. They explain that they use technological tools for various tasks such as: games, socialising, research, word/excel documents or to satisfy their passions.

However, other participants expressed reservations about these technologies, particularly with regard to the use of data, the numerous advertisements and cookies *(FR_03 "You buy something at Fnac, you get something afterwards and they say 'Oh you might like such and such a book' I find it atrocious"*). For some, technology has an impact on the human body, particularly the eyes and memory (*FR_04 "I think it doesn't make you work on your memory any more"*) and for one participant on the environment (*FR_06 "The cost on the climate is a very high cost in terms of electricity consumption"*). Some participants consider that new technologies eliminate the human interface, whereas on the contrary, as they age, they need more human contact to compensate for the disruptions caused by ageing (*FR_07 "When you get older, you can't see well, you can't move well, you can't hear well, etc. You need to have a human interface again, because it will work at the speed at which you live"*).

e-VITA Coach

The term virtual means for the participants something that is not real, without a person *(FR_09 "that everything is through a phone or a screen is all. There is no human in front of it")*. When asked **what the coach would look like**, some participants found it difficult to imagine what he or she might look like *(FR_05 "I can't imagine a virtual coach")*. Others proposed various ideas, the virtual coach could be an application, be on a tablet or phone, be invisible through sensors, or humanoid robots like Nao or Kompaï (*FR_09 "I would prefer a robot that has a bit of a humanoid shape rather than a robot like an automatic hoover"*). However, the latter should not take up too much space in the flat. Some imagined the coach based on the characteristics of connected speakers (*FR_11 "I could see something like my Ok Google plug at the limit"*) or a connected bracelet (*FR_10 "we could also imagine an electronic bracelet system that would indicate what has been done"*). Almost all the participants do not currently imagine themselves using this type of device because they consider themselves to be healthy and autonomous. However, they see the value of this tool for people who are losing their autonomy (*FR_07 "I would say in proportion to the loss of what we call autonomy when we get older, of cognitive functions, of all that, yes of course. For a person in full possession of his means, it can be a gadget, it can be fun but it's not necessarily necessary. Whereas when you get older and you start to lose capacity, the machine can actually replace that capacity. ")*

Participants had some **difficulty in imagining how the virtual coach could be useful to them**. The main functions mentioned are related to a diary or an alarm: reminder of appointments or to turn off the gas (*FR_05 "it could know when I am there, tell me if I have turned off the gas, tell me if my soup is ready,*

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tell me if I have an appointment. That's how I see a virtual coach"). The virtual coach could suggest various activities: physical, cognitive, cultural, talk about interesting films, books, indicate conferences etc. (FR_10 "He could suggest entertainment or activities, theatre, concert, music"). The coach could be useful to suggest social contacts (*FR_09 "On the other hand, it could suggest to the person to think about calling someone or to ask them why they didn't answer when this or that person called"*).

In terms of **health**, the virtual coach could remind participants to drink water, take medication, etc. It could also act as an intermediary to help them to make the right choices. It could also be used as an intermediary to call medical emergencies (*FR_07 "Instead of picking up the phone and calling 15 we would have a dashboard and we would have to press a button and automatically [inaudible] that would ask you what you have etc., that could take your blood pressure from a distance etc."*). One participant expressed the value of the virtual coach during the coronavirus pandemic, particularly in reminding her of barrier actions (*FR_09 "to remind me when I open the door to wear a mask so that I don't have to turn around when I come into the street"*).

However, participants also expressed many **constraints** on the use of such devices. The main constraints concern the loss of free will in the choices to be made, which affects the capacities of the older adult, particularly their memory, and therefore also impacts on their autonomy (*FR_05 "A little, but above all, it doesn't stimulate the person every day to act and stay in shape. You have to keep yourself busy every day, not be constantly assisted, it's not good. On the contrary, it's bad for the elderly to be too assisted"*). Questions about data management were also raised (*FR_11 "I'd be embarrassed if he used the health data I gave him without asking me and without telling me what it would be used for"*), as well as questions about the type of information given by the coach. Indeed, the participants expressed the need to be in control of their actions and the coach's functions *(FR_10 "it should be flexible and docile, so that I can go back to it if I have an unexpected problem. It shouldn't have too much effect on my life. It should not manage my life. I should feel that I am in control of my life, even if he helps me and offers me advice, I should still be in control. If we ever slip up, he shouldn't make me feel guilty. There should be safeguards at that level")*.

The use of this type of device would be under the advice of a multidisciplinary team for two people. Indeed, the use of this device would be decided in consultation with a medical team, the family and the user *(FR_08 "Yes but it's me if you want or in agreement with the medico-social environment")*. Before installing the device in their homes, participants would like to have information about the device: its functionalities, advantages and disadvantages, its price, who can install it, data collection and management. Participants expressed the importance of being able to configure the device according to their needs and preferences *(FR_06 "I would have to talk to this system for a certain amount of time so that it would know me")*. The use of the device should be simple *(FR_02 "it should be simple what, it should be within people's reach").* Finally, it would be interesting for participants to have a human interface if necessary *(FR_07 "And still managed by a human being. And still have the possibility at some point of having a human relationship. ").*

Speech Interaction

Not all the participants find it interesting to be able to discuss with him, especially when the discussion concerns everyday life *(FR_08 "No, good appetites, do you eat? No, not at all").* Some people imagine they can interact with the coach but on very utilitarian, basic elements of life. They do not imagine themselves having philosophical or very advanced exchanges *(FR_11 "he can make suggestions, but I won't talk with him, not philosophical debates. That would be purely utilitarian")*. One reason mentioned

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is the fact that the virtual coach is programmed and that the exchanges will be limited according to the programming *(FR_07 "Any way he will only be able to reproduce a certain number of things that we will have already pre-programmed, it could indeed be the beginning of an exchange, but I don't think it will be able to go very far.)* However, the timbre of the virtual coach's voice needs to be worked on because the mechanical voice is not considered very pleasant for some participants, particularly those with hearing aids *(FR_01 "I don't know because electronic voices are not very good. I think that should be improved")* and the voice will have to be adapted to each person's abilities *(FR_08 "if he understands that I am repeating the same thing several times, and either he needs to raise his voice or he needs to have a slower phrasing")*.

Further Notable Aspects

The analysis of the interviews highlighted some important aspects to be taken into account for the development of the coaching system. The virtual coach should aim to enable people to stay at home as long as possible (FR_12 "*yes yes, I think that it does indeed help to delay it because there is health but there is also solitude which means that we need support. It can postpone the deadline*. ") . It is important that future users can control the system: they decide what is done by the virtual coach and how the data is used. Finally, it will be necessary to consider facilitating the acceptability and usability of the device by modifying the virtual voice so that it is less mechanical. But also, to ensure that the use is simple and secure.

4.2.3 Italy

Key Insights

Participants reported an increasing concern for their health, especially after the pandemic that forced everyone to manage and monitor their everyday health status, particularly for those that live in rural areas and are mostly far from the hospitals. If previously the only concern was related to the advancing age, now there is a new awareness about **health risks**.

Even if most respondents said that technology is important and useful, they claimed to not have knowledge or skills for using technological devices, except for mobile phones that are commonly in use. This seems to be a barrier caused by a **poor technology literacy**.

Most probably, the latter point determined the great difficulty in imagining what a virtual coach could do and how it could be useful for them, especially regarding the increasing concern for health management and monitoring. Moreover, for them, it is very difficult to understand the meaning of the words "virtual" and/or "technological device".

Everyday Activities

The main activities carried out during the day by the interviewees were going out for shopping, walking and meeting some appointments, such as going to the doctor or to the hairdresser *(IT_03: "I go out for a walk, I go shopping, I meet some friends, I go to the church").* For what concern the activities carried out during the weekend, most of them used this time to leave the country, go to the cinema and spend some time with their children and grandchildren *(IT_05: "My husband and I went to visit new cities or went to the beach.").* After the covid the situation has changed for most of them, they report feeling less free and more worried *(IT_02: "I go to the supermarket only the bare minimum. I miss old things a lot, but I do not regret it, but the covid has changed all my habits. I am concerned about my sons' work. I always listen to the news to know when the activities will reopen and how the pandemic is progressing").* Their habits have changed, they go out as little as possible and they can no longer see their affections as before *(IT_01: "Several things have changed as compared to the past. In the last year life has changed radically. I go out little or nothing due to restrictions, I see little my friends, my daughter*

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and my grandson. The cinemas and restaurants are closed, so I only go out to do the shopping or for a walk around the house. I really hope to get back to my old life soon")

Health

Most of the respondents report that they take their health into consideration, even if they are not particularly worried and report contacting someone only when the situation starts to get serious *(IT_02: "If something hurts me I do not get alarmed, I wait for the pain to pass and I look for some DIY remedy. I only call my family if the situation is serious").* Among the main concerns for the future are those of being able to be independent for as long as possible and that one's health deteriorates rapidly *(IT_03: "I am worried about when I am no longer independent").* Most of them report keeping up to date on health issues, especially watching television *(IT_04: "I listen to the news every day, I am very aware to health news").* 2 subjects report changing channels when the covid news gets incessant *(IT_05: "In the evening I watch the news to know how the day went. But I have to say that after a while I get tired of hearing the same things, so maybe I change the channel").* All respondents report that the pandemic has increased their health concerns, they report that they are paying much more attention now *(IT_05: "Before Covid I was less concerned about health, now for me the fear of Covid is a constant concern", IT_08: "I am more careful now, I try to follow all the rules").*

Technologies in Everyday Life

Most respondents say technology is important and useful *(IT_01: "I believe that technology can help people in many ways").* All the participants used to watch television and use their mobile phones, only two of them use a PC. Some of them have used technological devices extensively during the pandemic to stay in touch with their loved ones, to have company and for practical things, such as calling the doctor *(IT_03: "luckily I have mobile phones, so I can call my sons and grandchildren", IT_06: "Now I can reach my doctor only by phone").* Despite this, most people report being worried about the excessive use of technology, especially by young people *(IT_06: "It hurts, young people are obsessed with cell phones. It has become like a disease.").* 1 participant reports that she has no interest in the technology, even though she thinks it is useful *(IT_06: "I do not really care about it").*

e-VITA Coach

One participant failed to understand what was meant by "virtual" and "technological device", so he failed to answer the next questions (IT_06). 4 participants had difficulty understanding what the word "virtual" meant *(IT_03: "According to me, "Virtual" means something positive, like a virtue").* As for the appearance of the device, 3 participants imagined something similar to a small robot *(IT_05: "I imagine a robot, I always see them on television"),* others an app on the phone or on the watch *(IT_02: "Maybe I would accept something that works over the phone or something like an alarm clock").* Participants report that the coach may be useful to **remind them something important**, such as appointments, medication to take or shopping list *(IT_03: "It could be useful to remind me something, like an appointment").* It might also be useful to keep food under control *(IT_06: "this device might check if I ate and ask me what I ate")*. Two participants report that it could also take **company** and provide **emotional support** *(IT_02: "It should calm me down and give me some emotional support").* Others report that it might be useful for lonely people in the house, to call someone in case of need. 4 participants report that they do not want a physical device at home, for **fear of being controlled** or that their privacy is invaded *(IT_03: "I do not want something inside the house. It should only call me a few times a day. I do not want to be controlled in what I do, it should just remind me something").* Other subjects do not report particular fears or concerns about the virtual coach.

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Speech interaction

Most of the people interviewed would not want to have a conversation with a tech device *(IT_06: "I would not like to have a conversation with it")*. Among the main concerns reported are the fear of not being understood by the device and not understanding it *(IT_08: "Sometimes I miss words in conversations so I do not want to talk to this thing.")* and the fear of not talking to a real person *(IT_03: "I do not talk to things or people I do not know and I cannot see")*. On the other hand, 3 of them report that they are in favour of a conversation with the technological device and imagine that they can talk to him to **have company and feel less alone** *(IT_01: "I would like to have a conversation with the robot. Even though I know it would not be a conversation with a real person, it would still keep me company")*.

Further Notable Aspects

Older adults expressed the wish to remain **autonomous** as long as they have the ability to do so *(IT_03: "I do not want a caregiver in my house, but I do not want to go to a nursing home either. I want to stay in my house, but I do not think I would take a carer. I am jealous of my things, my home, my body. I am 88 years old and I have always been independent, so I do not want anyone to tell me what to do")*. Furthermore, **staying connected with family** (e.g., son, grandson) has been stated as an important aspect of life *(IT_03: "it was important for me to spend time with my grandchildren, that is the only thing I am sorry about").* Beyond that, older adults expressed the wish to maintain their **privacy** *(IT_08: "I do not want to have a thing in the house, like a robot")*.

4.2.4 Japan

Key Insights

Participants were taking active measures to maintain their health, such as participating in regular physical activity and monitoring their diet. They were conscious of the need to maintain or improve their health, and gathering health information from a variety of sources. Health concerns related to the fear of specific diseases, in particular dementia and forgetting things, as well as the feeling a sense of urgency to prepare for the future and the ageing process.

A range of technologies were in use, especially PCs, smartphones, tablets or smartwatches. Surprisingly, none of the participants mentioned or used smart speakers. They **mainly used devices to keep in touch with friends and family, and to get the latest news and information**, and **valued the convenience** for these activities. On the other hand, some felt the pressure of being too connected and needing to respond to calls/messages, and the physical strain of the devices on eyes or the neck. There was mention of technologies being a hassle to initially set up, and some preferred the physicality of books and letters.

The e-VITA coach was generally imagined as being either somewhat **humanoid, like a pet (small animal), or like a robot**. There was some mention of the "uncanny valley" feeling, and several said they could not quite imagine how it would be to actually talk with a robot. However, **demand for speech capability and to have conversations with the device was very high**. They wanted **personalization to their own interests and desires, to get information and guidance** (about everyday activities, and also about health, such as nutrition), **to be given choices, to get motivation to exercise,** the device should **relax and reassure them, warn family or medical services in the case of a fall/emergency, measure the quality of their sleep,** and make some **measurements related to health** (such as blood pressure, etc). **Conversation should be natural, personalized and stimulating.**

Concerns included practical matters of whether it would fit into a (typically small) Japanese home, what to do if it needed repair/maintenance, the perceived lack of emotion in a robot, being overly monitored or warned too much, the payment and affordability, and use of personal information – although personal information usage as a requirement for personalization was generally accepted.

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Tohoku, Sendai

Interviews have been conducted remotely and in-person by Tohoku in Sendai.

Remote Interviews (Tohoku, Sendai)

The following category-specific insights resulted from remote interviews with older adults (n=5).

Everyday Activities

Almost all of the participants were involved in volunteer activities. One member volunteers with a non-profit organisation (NPO) and delivers lunchboxes to older adults and people with disabilities, while another is using his experience from his working life to volunteer at a local informatics organization. Others volunteered in the local community, such as at a soccer team, or with recycling.

Before the impact of the coronavirus, participants were involved in a range of other daily activities, some through their volunteering work such as playing golf or games with their team members, joining a gymnastics class for seniors, or going to the hot spring (a popular and common activity in Japan).

With the impact of the coronavirus, activities have been greatly reduced. Participants expressed that how often they saw friends and family was reduced, and many activities they were doing before had been cancelled. Although, some of them took up new activities, such as golf, gardening; or used the time to tidy up their house, and kept in touch with contacts through email and calls – and indeed one participant kept up her hobby of amateur radio.

Health

Participants were conscious about the importance of health, taking active measures to maintain their health. Three participants mentioned they perform a number of physical exercises, such as aiming to walk 5000 steps, doing exercises following the TV, walking outside at least 4 days a week. One participant tracked his activity with a smartphone application, and also input his eating habits. Keeping a healthy diet was mentioned by another, as was keeping one's brain active, with one participant learning a new language, and playing the game Go, for this purpose. Health information was gathered from internet research, books, TV, and consultation with a family doctor.

Participants had worries about their health due to the impact of the coronavirus pandemic. One participant expressed that he refrained from going to the gym in order to avoid being in close proximity to others, and another also felt that "r03: *I have to refrain from doing things*", while another was worried about catching the virus during everyday activities such as shopping. Isolation and loneliness were also concerns. More generally, two participants expressed their worry about forgetting things, such as names or *kanji* characters; and others had concerns about their future health, with the relationship to a family history of disease. One participant said that "r03: *In my case, I live alone, so I feel like I need to do something in advance*".

In view of these worries, as mentioned above, participants consciously confronted their health, "r02: *It's important to keep the daily rhythm*", "r04: *I'm concerned about frailty, so I do physical exercise for prevention*".

Technologies in Everyday Life

All of the participants who joined the Zoom interviews were actively using technologies in their everyday life. All participants used a smartphone and owned a PC, with "r02: *I've been dealing with computers all my life because of my business*". The majority used a PC every day. They tended to separate the usage of their smartphone and the PC: "r01: *I use the PC for documents as the phone*

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screen is too small.", "r02: *I can use a computer to get news, make purchases … I only use [smartphone] for e-mail and phone calls*", "r03: *For information gathering, I usually use my computer*", "r05: *I use the PC for watching videos rather than my smartphone (in order to save data allowance costs*)".

Participants saw the advantages of technology, such as being able to keep in touch with family or contacts no matter where they were, getting the latest news from the internet, using satnav in their car, and using the PC for printing photos or making New Year's cards. On the other hand, one participant mentioned the annoyance of being too connected, "r01*: [like] receiving a phone call when you are taking a break*", or "r01: *I had been in touch with [volunteer colleague] several times via e-mail and phone, but when I missed his e-mail, I'd get a message asking, 'Where are you?'*". Participants were wary of phishing scams and putting credit card information into their phone; and also experienced eyes getting tired, with small font sizes, felt the keyboard was too small, or were not used to horizontal Japanese text.

e-VITA Coach & Speech Interaction

Regarding the e-VITA coach, participants were asked to imagine having a conversation about their everyday life with "something", while comfortable in their living room. In response to this, participants expressed their first unspecific ideas: "r01*: It could be a little robot, … humanoid or even dog-like … that you can talk to and it will give you an answer*", "r03: *I want someone like a human being … it would be better if it had some kind of presence*", "r04: *I imagine a beautiful woman with long hair… it could be an uncle, an aunt, a picture of a child*", "r05: *like a cute grandchild*".

In terms of requirements and possible use cases, all participants made some reference to interaction with the device through talking. One participant said that its hobbies and interests should match hers, so they can enjoy talking about something together; another wanted to get information about required procedures in daily life, and to be given various choices that he could then select. Another wanted to play Go with the device, and also expressed a desire for it to "r02: *listen to music with me, or read my favorite books for me, or share some part of my life with me*". Likewise, "r03: *the robots should grow and develop as they respond to their environment… I would like to live together with it for a long time*". They also saw the practical conveniences, like asking about the weather, being reminded to eat, and having interconnection to smart devices. One participant expressed a desire for it to be easy for the older person to understand, and to use something like face recognition or a password.

Related to health, participants could envisage the benefits of having a virtual coach present in their daily life: "r01: *if you could give me some advice … and some advice related to everyday eating habits… [it could say] it's exercise time, let's do it together. Let's do some stretching.*"; "r04: *when I'm sleeping, there could be sensors on my futon or pillow that can tell me my heart rate and breathing.*" Some participants also mentioned that the device could check on them after a fall or if it detects some abnormality, and contact family / the emergency services.

Concerns with having a virtual coach related to personal information being on a server, and whether that information was secure; and the affordability of such a device, whether it would come from health insurance, taxes, or personal purchase "r05: *don't robots cost a million yen?".* Some participants were concerned about monitoring, or being warned too much about health issues, "r04: *I wouldn't like it if it followed me to the bathroom*", and expressed a desire for a privacy mode, where one could ask the

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device to be switched off a predetermined amount of time. Although, participants were generally open to the idea of personal information being required for the service, and for personalization.

Insights from In-Person Interviews

The following category-specific insights resulted from in-person interviews with older adults. In-person interviews were conducted by Tohoku, Sendai (n=12), NCGG, Nagoya (n=5, *3 conducted via zoom) and IGOU, Tokyo (n=8, *4 conducted via zoom)

In-person interviews (Tohoku, Sendai)

In the following the insights from the interview study conducted by Tohoku will be elaborated.

Everyday Activities

Before the impact of the coronavirus pandemic, participants were participating in a range of activities, such as ballroom dancing (011), going outside to see friends or family more than 4 times a week (005, 012), having piano lessons (011), going for walks in locally (006), or the mountains, making photographs and drawings (008), and so on. Several were active in volunteer activities (001, 005, 008, 011, 012).

The pandemic has had a great impact on the scope of activities. It was felt that "(007): *The whole year has been a pain, as I keep saying… I've lost a year of my life*.", and the participants felt extremely cautious about going outside: "(001): *I refrain from doing anything that involves meeting with people"*, "(003): I never go out on weekends" and "(006): *I try to stay in on weekends*". It was stated that they saw their family and friends much less, only for relatively important occasions such as birthdays (001); and even they had experienced losing contact with several acquaintances (003), or some they hadn't been able to meet for 2 years (010). Many regular activities such as going to the gym, visiting museums, dinners or playing games such as mahjong had been curtailed.

On the other hand, positive aspects arising from staying at home more included being able to read more books (001, 005, 012), listening to music (003), organizing things at home (005), having more time to enjoy interests at home (such as knitting and cooking (006)), or spending more time with pets (012). One participant continued to hold a get-together with a "drawing club", described as "(010): *a way to get together and draw pictures… with 5 people*".

Health

Participants valued their health and were actively working to maintain it, "(003): *I think the most important thing is my health*", "(008): *I do take care of myself, and that's the basis of my life", "(011): Health is important*", and "(012): *Physical exercise (is the most important thing)"*. Conscious confrontations included "(005: I *think it's important to have a good diet, a well-balanced diet, and to interact with other people*", "(007): *I did aerobics following along with the TV show that did gymnastics*", and "(008): *I have my room on the second floor, so I have to go up and down the stairs many times a day*", as well as "(003): *I walk 8,000 to 10,000 steps, play golf, and take care of my garden. I have five to six trees that I take care of myself*."

Health-related information was gathered largely from magazines and the newspaper (001, 003, 006, 011, 012), the TV (003, 006, 011, 012), searching on the computer (003), or through talking with close family and friends (003, 008, 012).

The impact on health due to the pandemic was variable among participants, with some suffering worse effects: "(007): *These days I don't do any exercise, or talk to people who go out… I watch TV all day and*

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drink at 5 o'clock", after several volunteering activities were cancelled; and "(007): *my body hurts… if I stay at home, I drink alcohol every day now*".

Some were able to maintain their activities to some degree, such as continuing (paid) volunteering: "(011): *We go into those areas and help them. They help people in the hospital, clean, iron, weed the garden, and so on.*", or going out "(008): *I go to town once in a while, and go into a bookstore to get information. That's about it. But I'm willing to walk*", and experienced less impact on their health: "(011): *My health also hasn't changed, even though I've gained weight."*

Health-related fears predominantly revolved around the increasing rate of ageing process and loss of faculties, such as "(005): *I'm not in pain, but my muscles are deteriorating*", "(006): *As I've gotten older, my hearing has become more distant* (also 011)", "(001): *if my brain or blood vessels suddenly collapse, it's a little scary to be alone*". Several participants explicitly mentioned dementia, "(012): *As for dementia, I'm really starting to forget things more and more. I don't like it.*", "(011): *I think I'm most afraid of losing track of who I am and what I am*", "(003): "*I don't want to go to a place where I don't have any freedom anymore. It's also important to avoid dementia*". Further to concerns about future living situations, there were concerns relating to looking after a spouse who had dementia (009), how to live if one partner passed away (003, 007), or needing to change home in the near future due to living in an old house (005). One participant also mentioned that, "(012): *in my case, my goals are disappearing. That's why I'm not very happy anymore*".

Furthermore, regarding ageing and getting older, some currently felt no obstacles: "(008): *I don't feel any inconvenience. I'll be 84 this year. I can even ride a bicycle.",* "(012): *I don't go to the doctor at all [because no health issues]*", others were working to improve their health, "(010*): I've started from my birthday this year, and the first thing I did was to lose weight and check my blood pressure every morning.* ", while some highlighted the difficult aspects, "(011*): I've lost a lot of muscle strength, and of course, I have a little bit of fat around my stomach that I want to lose, and that's probably not going to happen unless I'm forced to do it.*", "(006): *My hearing is getting deaf and my eyes are getting blurry.*"

Psychologically, ageing was seen as "(010): *… a battle that I will have to fight for the next ten years*", and "(005*): I'm not sure if my cognitive ability, or whatever it is, will be able to keep up.*", while there was also acceptance of such matters "(001): *I've tried to divide thinking into two parts: the mental part and the physical part.*", "(012): *If I want to die, I'll just die. That's it, really*".

Technologies in Everyday Life

Devices used in everyday life were: a smartphone (001, 003, 005, 008, 010, 011), flip phone (012), computer (001, 007, 012) or tablet (007); 009 did not have a PC, and 012 did not use a smartphone. Smartphones were largely used by participants for communication: email (010, 003), and contacting family (008). Some were also using the e-payment service PayPay (006, 008, 009), or using their phone to quickly look up information, search the weather, etc (006, 008).

Participant (007) said that "*Cell phones are too small for my eyes*", and preferred to use a PC, especially for watching video/movies. (012) said that "*I use the computer mostly. On a daily basis*", and was using it for reading e-books and having zoom calls (also 010). Meanwhile, (003) uses the PC "*only for New Year's cards / playing mah-jong*". 006 used to use the computer every day when working, but hasn't used it for a few years.

Such technologies had a large impact on participants' social lives, "(003): *I can do everything on my phone, so my phone is very important in socializing.*", "(001: *It's very convenient to use the LINE app to*

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keep in touch and meet up.", "(009: *I use it the most because I have free phone calls. I send out postcards to friends I don't see due to corona, saying I called because I want to hear their voices*".

Considering the attitude towards technologies, on the positive side, participants saw the convenience as a benefit: "(003): [regarding e-money] *Once you use it, you know. So when I borrow my wife's card to go shopping, it's convenient because I don't have to calculate the change every time.*", "(005): *In my generation, cell phones were a dream come true, and when I was a kid, it was unbelievable… it's so convenient.*", "(006): *it's amazing how much information you can get in such a small space*", and the convenience of being able to find information quickly (001, 003, 006), such as news, for travel, Wikipedia etc; and the convenience of contact (003, 006, 008, 010, 012): "(006): *it's easy to keep in touch*." They also valued being able to talk to their family by voice, see their faces, and contact had become easier as a result. 001 was also using Amazon for online shopping.

Conversely, participants were concerned about increasing digitalization: "(010): *I think it's naive to think that your personal information isn't being leaked*", and "(008): *There are monthly magazines, but there is a tendency for these to disappear due to the current trend toward digitalization, and that makes me sad*", "(009): *I'm not very good with machines, so I don't want to buy a computer… I like writing letters*".

In addition, the number of scam/phishing emails (011), regarding making payments online: "(006): *when it comes to shopping or anything involving money, I feel a bit scared*", and also the health effects of using technology: "(001) *I'm also concerned about the strain on my neck caused by the use of cell phones*".

Finally, some participants experienced negative social impact from the use of technology, like feeling that they had to reply to group messages quickly (005), receiving calls while busy/driving (003), or younger family members tending to look at phones in silence, and so feeling lonely even when together (006).

Computers and phones were used as sources of information relating to health: "(003: Sometimes I do (use the computer to look up information). *Sometimes I look up the names of diseases*", "(006): [after a health issue] *I looked it up right away.*" 010 was also using an app to follow nutrition after entering the foods eaten; and 001 had been using a meter app to track how many steps taken each day (although was no longer using it).

e-VITA Coach & Speech Interaction

Participants were asked to imagine they were sitting comfortably at home and having a conversation with "something" that could respond and give them information. Their first unspecific ideas included thoughts on the appearance of the "something" – "(005): *I'm thinking of the robots that we see everywhere, like Pepper*", 006 imagined something like the bird she keeps, 008 also imagined an animal, 012, 009 and 007 thought of something that looks like a human or a woman; while the others tended to talk about a robot.

001 said that "*The other day on TV, there was a female robot that looked like a human, but it made me feel scared or strange*", while 003 thought of a robot "*I hope it doesn't get in the way too much, it's compact… the face is close to a human face*". 011 requested "*I'd like to see a robot with human skin and a sense of touch*". 003 also thought about touch "*I think it's better to touch it to feel more secure.*"

They also had initial ideas about how they would use the device: "(010): *it would be boring if the answer was "yes" or "no."… Everyone is different and has different interests, so it would be good to have*

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something that would elicit [a more interesting] kind of response", "(008): *It's like a being that can read what I want, or what I want it to do… I think it would be great to have a robot that can read your inconvenience and bring you coffee*", and "(001): *If I were asked what kind of robot I wanted, I would have a robot that doesn't spoil me, a robot that jokes around all day long, and a robot that will appreciate and praise me when I do something*."

Furthermore, regarding potential use case scenarios, many participants wanted to have everyday conversation (006, 007, 009, 011, 012); 006 wanted it to "*register my likes and interests in advance*", so that things such as events, movies could be recommended, as did 005: "*I'd like it to ask me about something I enjoyed*", and 007: "*I'd rather have a robot that can understand me closely, and what I want to know.*" 001 would "*leave it in the home and see if it creates an atmosphere for conversation.*", while 003 said that "*I think it would be nice to have a mahjong game on the screen, so that a player can play against you*"

Participants requested to be motivated by the robot (001), reassured and have it listened to their thoughts (005), get suggestions for what they should do, or receive guidance (011). 009 and 010 did not want a conversation partner that simply agreed with them: "(009): , *I also want to hear your opposing opinions. I think you'll get bored with just sympathy.*", and "(010): I feel like I want to argue with a robot. "*No, I don't like that. I'd like to try annoying the robot. It would be nice to have someone who replies, "What are you talking about?"… It's good for brain activity*."

Requirements included that it did not have an overbearing presence, could fit into a small home (001, 009), that it could move and respond physically (001, 005, 012); while 001 and 005 suggested using voice only, 003 and 012 that it was better to have both text and sound, although "(003): *I think so [verbally is better], because it's less complicated to operate*". Final thoughts on speech interaction were that the voice could be changed to a voice you prefer, and that they may still feel a little uncomfortable actually talking with a robot, or a hologram (008, 012).

Regarding health, a number of responses included a robot being able to measure vitals, such as temperature and blood pressure (001, 003, 005), as well as detecting serious emergencies, or recommending a hospital to go to. 003 wanted "*to keep a record of what I've eaten and try to balance it out over the course of the week*", while 001 said that "*I am curious about how deep my sleep is, so if it could show me a diagram, and I would know when I can wake up comfortably, it would be very useful*".

Concerns included the lack of emotions in a robot conversation partner (003, 007, 012), being monitored and how data will be used (009), if it is easy to use (011), and what to do if it stopped working, or how to repair it (006).

Participants were not overly concerned with privacy aspects, "(006): *I think the system is designed to have a certain degree of security or protection in that area*", but still asked to ensure that the information would be protected (010). They could accept that use of personal data was necessary for AI analysis to personalize the system (011, 012).

NCGG, Nagoya

In the following the insights from the interview study conducted by NCGG will be elaborated.

Everyday Activities

Some participants did not notice much change to their schedule as a result of the coronavirus pandemic, whilst others noted that events (such as *Noh* theatre) and leisure activity classes (such as

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water aerobics) had been cancelled. Contact with friends had decreased, and one participant reflected on the importance of having connections. Participants were fairly active in their everyday activities, with one participant stating that he/she "01: *I'm aiming for an active life*", and was participating in a swimming class 3 times a week, table tennis twice a week, and walking the dog. Another participant participated in tai chi classes, water aerobics, and a history study group (before the pandemic). They tended to also be active during the weekend, spending time with grandchildren (04 and 02), going out walking (01, 03), or taking part in volunteer work (00).

Health

Participants, as well as staying active, also paid attention to diet (01: "*focus on three meals*", 02: "*aim to eat plenty of vegetables*", "03: *reduce sugar*", 04: "*limit salt content*"). One participant (00) mentioned he/she was too busy with the volunteer work to exercise, but felt healthier as the number of drink/dinner parties had reduced due to the coronavirus. He/she also explained that 00: "*focus on diet rather than exercise*"). Two participants mentioned they receive regular health and medical check-ups, and gathered health information from doctor (01), as well as through consultation with a public health nurse and nutritionist (03). Likewise, health concerns related to the chance of getting particular diseases, needing cancer screening (01), and managing bodyweight (01, 03).

Technologies in Everyday Life

Regarding technology usage in everyday life, participants were using a range of devices, such as smartphones, PCs, or a smartwatch. The advantages were recognized by some, such as "00: *You can get information immediately … using the scheduling functions*", "01: You can search for information easily", and "03: *(the smartwatch) will let you know when someone has called you*". Indeed, according to (00): "*you can't live without a smartphone or computer*".

On the other hand, (01) said that: "*I don't need to use PC every day… (although) do check smartphone every day to see the news*", and "03: *If you find it convenient, you can use it. If not, you don't need to*". One participant preferred the physicality of books, and going to the library, while others (00, 01) mentioned being distracted by smartphones, and did not want to disrupt the rhythm of daily life.

Participants had also experienced some frustrations relating to technologies, such as: "02: *I would like to use zoom … (but) the first setup for things like zoom is a hassle*", or being berated by their family "02: *(I was told) 'Don't you understand this? I told you before!'*". Similarly, (03) wanted the settings of technology to be made easier to understand for older adults.

e-VITA Coach

For the e-VITA coach, when participants were asked to imagine the virtual coach, for several participants it was unclear, or difficult to understand the concept. Under further direction, (00) imagined a kind of avatar or animal, while (01): "*If you ask a question by voice when you have a problem, it will answer, and you will get a reply when you want advice*". Potential use cases included exercising along with the avatar (00), getting help with gardening (03), and relating to health – which supplements to take (00), measuring blood sugar levels or blood pressure (01), and providing motivation (04).

Regarding requirements for use, participants requested that "It would be great if it could be done easily with simple operations (03)". One participant mentioned that they would not ask for advice if they were feeling healthy, while another said that they would like it to give them advice while teaching them various things, and providing better choices.

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Finally, one participant mentioned that they would be concerned if the personal data collected by the coach were leaked.

Speech interaction

Participants were largely positive about the benefits of speech interaction: "00*: I think it would be fun if you could have a good conversation.*", "01: *I think it's important to maintain a relationship where you can have a conversation… At our age, daily conversations decrease, so I think it's important to talk to a coach who can be a partner for daily conversations, listen to your worries, and be easy to talk to.*"

On the other hand, another participant expressed caution "02: *When it comes to talking with machines, it may feel a little strange*".

Further requirements specifically regarding speech, related to being able to use local dialect (03), and not being ordered around by the device: "03: *I don't like it if it's just imperative, "please do this"... It would be nice if the it could talk to me (like a person) even though it's a machine*".

IGOU, Tokyo

In the following the insights from the interview study conducted by IGOU will be elaborated.

Everyday Activities

Changes in the subjects' lives due to the COVID-19 epidemic included the following topics: there the frequency of going out and shopping had decreased; that they could not see family and relatives anymore, and that there were fewer visitors to participant's homes. On the other hand, comments were made that they had become more patient, were able to work online, and now had more time for hobbies.

Interviewees using Zoom

All four were independent in their daily lives. One was a part-time teacher, one was a tea ceremony teacher, one was a cook, and one was unemployed. Three of the four were aware of sleep deprivation, sleeping 4 to 7 hours a night. One person did not go out at all, and three people went out about twice a week. All of them went out less frequently and interacted with friends less than before COVID-19 epidemic.

Most of them talked on the phone with their children, husbands, friends, brothers and sisters, etc. almost every day, but there was little face-to-face interaction. One of the respondents refrained from interacting with her neighbours due to neighbourhood problems.

As for pets, only one person had two dogs. For hobbies, learning English, listening to music, watching TV, and knitting were mentioned. As for religion, two respondents were Shinto and two were Buddhist, but there were few daily religious activities.

Subjects of the Face-to-Face Survey

Of the subjects, only one was independent, and three were using a bathing service. All of them were unemployed. None of them felt sleep deprived. One independent person went out almost every day, but the other three relied on others for shopping and other errands. As for pets, only one person had a cat. One person had no hobbies, and two people listed handicrafts as a hobby. One independent person listed golf as a hobby, but had not played in more than one year due to COVID-19 epidemic.

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The three subjects were visited by their care providers at least once a week, and the formal care providers were the main consultants, with relatively few conversations with family members. The religious affiliation was Buddhist (2), Catholic (1), and non-religious (1), but there were few daily religious practices.

Those who were independent tended to have frequent conversations at work or on the phone, but few face-to-face conversations at home. On the other hand, those who needed assistance had relatively more face-to-face interactions with formal care providers.

Health

All eight subjects were hospital visitors and were taking some medication. Two of the face-to-face survey subjects received home visits. Only one subject mentioned the problem of forgetting to take his medication. Five subjects used eyeglasses, and two used contact lenses. Only one person had a hearing aid, but he did not use it. In terms of health concerns, most of the participants cited forgetfulness, such as forgetting where to put valuables and not being able to remember people's names. Three of the four face-to-face survey participants had fallen more than once in one year.

In order to improve their health, they try to walk as much as possible, take health foods, and do squatting exercises.

Technologies in Everyday Life

None of the interviewees used smart speakers such as Alexa or Google Home. All interviewees using Zoom had access to a personal computer and used the Internet. There were no particular problems in their use. Those who were self-reliant used health devices such as blood pressure monitors and massage devices. One of the interviewees used a tablet, one used a smart phone, and two had neither a cell phone nor a smart phone.

The independent subjects were interested in IT devices and actively used them, but the older person requiring care tended to avoid using them, which was thought to be due to a decline in cognitive function.

The subjects of the face-to-face survey were looking for the development of robots that could support them in their household chores, such as robots that could cook for them, robots that could do the heavy lifting and yard work, and robots that could disinfect the house.

e-VITA Coach and Speech Interaction

The Zoom interview subjects showed interest in the talking doll, but the face-to-face survey subjects showed little interest. The reasons for their lack of interest were that they felt uncomfortable and could not imagine what functions the doll would have.

As for the external form, the following points were raised.

- I want something that can actually talk, like a bird.
- It should resemble a pet, such as a dog or cat.
- It should be comfortable to hold.
- Too much resemblance to humans is creepy.

The following functions were mentioned as desirable.

- It should greet you in the morning.

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- It can heal me/relax me.
- It should have a drone function and fly close to you.
- It can answer our questions.
- Moves in response to your instructions.
- It tells you how busy the facilities are.
- It tells you interesting stories.
- They talk about daily life.
- They tell you their daily routine.
- They can detect abnormalities when bathing.
- Detects common scam schemes frequent in Japan.

As for the voice of the coach, some users said that a robotic voice is acceptable.

4.3 Discussion and Implications

Across all countries, we observed that the participants were living an active and social life. Our results hence do not back the stereotype of the inactive and isolated older adult. Above all, social relationships and the availability of social contacts played an essential role in the lives of the people interviewed. **The importance of social contacts should therefore also be addressed in e-VITA**. The coach should support the users in maintaining as well as building new relationships. At this point, however, the **first cultural differences** become clear. When it comes to **religion and spirituality**, in Europe, it was mainly the community and social aspect that motivated people to participate in church activities. In Japan, this topic is treated more individually and as a private activity.

In the case of one's own health, participants in all settings are already pretty aware of their health-related issues. In Italy, several participants stated that the pandemic made them more aware of their health state, which indicates a general potential of a coach hinting at health topics. Regarding health-related advice, the participants in all settings saw potential benefits of a virtual coach for a reminder or recommendation features. **We also observed country-related differences regarding health-related information consumption**. For instance, interview partners from Italy stated that they mainly received their information from the TV while Japanese and German ones receive them from the internet. In order to be able to classify information found on the internet, respondents in Germany in particular drew on previous medical knowledge from their profession or education. At this point, the virtual coach should support the user in filtering out information from the internet, as not everyone will have prior medical knowledge.

Regarding technology usage in everyday life, all participants were regular PC and/or smartphone users. During the pandemic, they increasingly learned how to use technologies to stay in contact with relatives and acquaintances, indicating a **general openness to technology as a measure for social interactions**. Some participants were also vivid users of self-tracking devices or apps. Several participants from France and Italy were especially worried about excessive tech use (especially for younger users). The French participants, particularly, about potential downsides of technology usage, which involve impacts on the body (e.g. the eyes), ecology, and a decrease in social interactions.

These insights provide first implications for the design of the e-VITA coach regarding requirements, appearance of the coach, and possible use scenarios. Some participants had problems grasping the term 'virtual' while others were even knowledgeable about e.g. different kinds of robots. Hence, the coach needs to take different technical competencies that reflects the diversity of older adults into account.

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As some participants faced frustration in setting up devices or software in the past, they asked for a contact person in case of technical difficulties (help desk). Regarding potential market solutions, this needs to be considered. Concerning the role of **the coach as emotional support**, opinions were mixed between countries. For example, in Japan and Italy, it was quite conceivable that the coach would also respond emotionally to the users' needs or be a life companion. In Germany (but also partly in Italy, too), on the other hand, this function was seen rather critically and declared as 'fake.' It is also important to mention that concerns about the coach being not trustworthy enough and too commanding was frequently stated in all countries. In this vein, participants want to preserve a sense of control over the device. A vital worry, mentioned across all settings, were furthermore **privacy issues**. In this respect, it is of great relevance that users can clearly determine which of their personal data is to be used and that the use and transfer of the data are transparent and easy to understand.

Moreover, participants across all contexts were worried about potential **financial barriers.** Thus, regarding a market solution, one has to manage trade-offs of satisfying diverse needs and expectations but create low-cost solutions.

Opinions were diverse regarding the **appearance of the coach**. Some requested a human-like one which should yet not look too realistic (uncanny valley effect). Others suggested an animal-like appearance. Others already named concrete Robots (Nao, Pepper). The interviewees from Japan seem to prefer a more 'handsome' or 'cute' ('kawaii') appearance. These preferences need to be paid attention to again in the further course of the project, as the appearance of the coach could have a great influence on the acceptance of the users.

Speech interaction can provide potential for possible impairments, although participants desired that the voice needs to sound 'realistic' and not too robot-like. In addition, voice should be customizable which means that a set of different ones should be provided. With the openness towards **conversation** with the robot received mixed opinions, they at least must offer a certain amount of sophistication and intelligence. As several participants stated that the coach should not be too commanding but rather helpful and not commanding personality, there should be the option to deactivate certain features or the coach entirely (for a certain period of time) to avoid annoyance or potential technostress.

Another design trade-off is the necessary amount of customization and adaption to cultural differences compared to several 'one-fits-all solutions.' For instance, as participants regard self-tracking functions to be one of the most beneficial aspects of a virtual coach across all settings, this important function should be integrated. Matters of spirituality, it e.g., turned out, revealed not only cultural but also individual preferences. It is furthermore important to consider cultural differences in a practical way, e.g., interfaces not used to horizontal Japanese text and in an individual way regarding, for example, small font sizes and keyboards etc.

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5 Interviews and Design Fiction with Secondary Stakeholders (DE, JP)

In order to get a better perspective of associated secondary stakeholders, we included family members and other organizations (I.e., municipalities, NGOs etc.) in interviews and the design fiction. In Japan, interview studies and the design fiction have been conducted with family members. In Germany secondary stakeholders from associated domains (I.e., community, health care) have been involved by the means of a design fiction. From this we gained a first glimpse at the overall user requirements structure. A more detailed and cross-cultural description will be provided in D9.8 as part of the stakeholder analysis.

5.1 Methods for Stakeholder Involvement

Two methods were applied when consulting secondary stakeholders in regards with e-VITA.

1. **Interview method (JP)**: we choose to use qualitative data. To do this we developed a semi-structured interview guideline that was jointly developed and then translated into the languages of the countries doing the interviews. Japan (Tohoku) conducted 1-on-1 in-person interviews individually with each stakeholder rather than focus groups due to the ongoing coronavirus prevention measures. IGOU (Japan, Tokyo) conducted a face-to-face survey with three family members (a 38-year-old woman, a 35-year-old man, and a 40-year-old woman). All interviews were recorded and later transcribed. The data we collected was analysed by building categories. In total six categories have been built: unmet needs of older adults; Functionalities of the Coach; Integration in Organization; Barriers; Finances; Social Role of Coach. The building of categories was a deduction of the question asked in the interview guidelines.
2. **Design fiction (JP, DE):** To immerse secondary stakeholders into a fictional world where it is common for older adults to use virtual coaches, we used the same artefact (i.e., radio show) and method that has already been described in chapter 3.1. Family members were asked to imagine a situated, everyday use of the voice coach. Secondary stakeholders that were representatives of larger organizations (i.e., NGOs, municipalities, care facilities, companies) have been requested to imagine the implications and changes for organizational members and their work, as well as ways in which the use of such a technology could be utilized by their organization.

5.2 Results

5.2.1 Interviews with Family Members in Japan

Sample Tohoku, Sendai

Tohoku stakeholder interviews: Family members

Table 5.1 Demographic data of secondary stakeholders (family members) in the Japanese (Tohoku) interview study

ID, age	SK1, 44	SK2, 70	SK3, 69	SK4, 47	SK5, 68	SK6, 49
Gender	M	F	M	F	M	F
Living sit	S	T	T	S	S	T
Family	Pa	M	M, ML	M	M, ML	M
Age	79 (both)	96	94, 88	74	89, 88	78

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Living situation: S (living separately) T (living together); Family: Pa (both parents), M (mother), ML (mother-in-law)

Sample IGOU, Tokyo

IGOU stakeholder interviews: Family members

ID, age	SKO1, 28	SKO2, 35	SKO3, 40
Gender	F	M	F
Living sit	S	S	S
Family	F, GM	M	F
Age	F (64), GM (88)	63	75

Living situation: S (living separately) ; Family: F (father), M (mother), GM (grandmother)

Key Insights

Participants imagined that the virtual coach could assist their older parents in many situations. Referring to situations where their parents are alone, they suggested that the virtual coach could keep them company, connect them with neighbours, provide reminders and information or even reminisce with them about the past. Furthermore, the topic of emergency detection and health checks has been raised. At the same time, concerns about nurses and doctors being replaced by robots have been voiced. The cost of such a device and learnability for older adults were also crucial topics.

Topic: Unmet Needs of Older Adults

Family stakeholders who were living together with their parent (in all cases here, with their mother or mother-in-law) were able to directly observe the everyday activities of the parent, and so could comment on unmet needs, such as observations that (SK3) their mother seemed to be stressed by not being able to go out whenever she wanted (needing to ask family). SK3 commented that a function that could support the family scheduling, and to speak on behalf of the mother. It would also remind her of forgotten items, or medicine. Also, when the mother is alone, to provide daily talk and conversation (SK3, SK4). This would also satisfy worries about developing frailty or falls through keeping active physically and mentally; in addition to providing the ability to detect falls or emergencies with sensors and notify the family (SK5). Those living separately were able to comment on different aspects, such as the lack of ability to use the internet or a PC (SKO3), and so the family were needed to assist with these functions where possible.

Topic: Functionalities of the Coach

Regarding possible functions of the coach, ideas included having physical support functions (SK2, SKO1, SKO2), contact the family in case of emergency (SK3, SK5, SKO1, SKO2), providing general support, information and conversation (also regarding memories and old stories), or detect changes in physical condition (SK3, SK5, SKO1), motivation (SK4). Another idea was the ability to show old photos, to aid remembering and thinking about the past to activate the brain (SK5).

Topic: Integration with Ongoing Family Activities (Daily Life)

Suggestions included sharing responsibilities for simple things in everyday life (which would also boost acceptance), being a conversation partner when alone (SK2, SK6, SKO2), setting up communication with

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friends in the neighbourhood (SK2, SK5), and support to continue desired activities through health checks (SK3, SK4).

Topic: Barriers

SK1 was concerned about acceptance, especially if the person has dementia (also SK6). As long as it can be charged simply, and move rooms when the mother moves rooms (SK3). Concern about nurses or doctors being replaced by robot or device interactions (SK1), and whether it will be possible for the older family members to learn to use such devices at advanced age (SK6), or not just simply about possibility, but the fact it may also cause stress needing to learn/use such new technologies. SK2, SK3, The ability to shop on the Internet is convenient, but as the dementia of the elderly increases, children are worried that the elderly may inadvertently make expensive purchases (SKO1). SK4 saw no problem with personal information usage, as long as security is good (and wanted to avoid having payment functions – SK4). Some concern about costs (SK5), further details in the next topic.

Topic: Finances

General figures were in the range around 100,000JPY to purchase it (+/- 755 EUR). At rental, 10,000JPY/month (+/- 75 EUR). Comments included being able to make payment in instalments (SK3), provision of maintenance and upgrades (SK3), if there are subsidies from the government (SK2, SK5). If the figure is much higher, should be covered by insurance or subsidized (SK3). Idea included renting first to test it (SK4); monthly payments made in the same way as utility bills, or by direct debit (SK5). Security functions are a big attraction for having the device and the expenditure (SK1, SK6).

Topic: Social Role of Coach

Comments included that it could be "(SK4): a friend and a doctor". SK2, SK3 and SK5 also suggested the idea of it acting as a doctor that can advise on current health condition and provide support; while SK5 said it should rather act as the interface between the user and the doctor, rather than it solving everything by itself.

As well as offering reminders for important things (SK2), or in times of emergency (SK1, SKO1). SK4 suggested there being a function to connect you to people who are in trouble (who have the device), something similar to one of the Design Fiction features, and that this would give her a sense of purpose in being useful for someone in need (not just for their family member using the device).

SK6 suggested it could act in the role of a pet, providing healing and relaxation, with a little conversation.

There was a request that family stakeholders sometimes get angry when they are talking to their parents, so they wanted someone to mediate for them (SKO1).

Topic: Benefits

Family members saw potential benefits such as being support for the years ahead (SK2, SK5), reducing loneliness through conversation (SK3), peace of mind and reducing stress – not just for the older adult user, but also peace of mind for the family relations (SK3, SK6) – discussion about warning system or alerts for the family when the user is alone (SK3, SK5). SK5 mentioned if the robot could notify the family of problems that the mother had told to the robot, so they could understand her better.

Some requirements or disadvantages foreseen: ease of use, not only voice but also text when necessary; should automatically turn on when entering the room (SK3), how to handle malfunctions and repair problems (SK2, SK4).

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5.2.2 Design Fiction with Family Members in Japan

Sample

Stakeholders confronted with the design fiction were two daughters, each living together with their mother:

- DFSK1: 51years, female, mother aged 76
- DFSK2: 56years, female, mother aged 84

Together with insights from the aforementioned interview study and additional empirical data from D9.8, the results from the design fiction described below add to a bigger and more complex picture of all involved secondary stakeholders.

Key Insights

Children were open to using the device together with their parents. They imagine that the voice coach could be a **companion and conversation partner** for their parents while they are out. They expect this to ease their conscience and **reassure them of their parents' safety**. Furthermore, children also imagine **using the device for themselves.** The voice coach was appropriated as an information source for health and cooking. However, some concerns about **becoming dependent** on it have been voiced.

After listening to the radio show, DFSK1 had the image of Alexa. Her initial thoughts were that she would use it for recipes, and it would be good if it encouraged her to exercise. Thinking about her mother, she thought it would be difficult for her to use, as she finds it difficult to respond quickly for prompts even on a smartphone. DFSK2 thought it would be useful, but was also concerned about becoming too dependent on the device. As for her mother, she thought it would be used a lot as someone to talk to. She was also concerned about who would do the initial setup, and the difficulties of using MINU if one had dementia.

DFSK1 imagined using it for research, such as for finding addresses and hospitals, and a call feature; and for her mother as a daily conversation partner. DFSK2 imagined using it for emergency responses, checking items in everyday life (not forgotten anything), or as a substitute for PC. Assumed her mother would be able to use it, if the operation was smooth, otherwise envisaged difficulties.

They imagined using it when alone, or just testing it out for the mother to use. They may use it at the same frequency as the TV remote, so likely daily use. DFSK1's mother uses a hearing aid, so she is not active in conversation, so she thought it would be good to have a text function as well. She also thought that older adults have difficulty using touch screen, and prefer buttons. In addition, it could be used for dialogue if there is spare time, and DFSK1 also thought about her mother using it to look up the weather, or things related to her interests. DFSK2 thought it would good to be able to check her mother's safety while she is out, as well as schedule, disaster information, etc.

DFSK1 did not want to use it in front of other people, or at work; while DFSK2 did not want it when watching TV. Depending on the size, DFSK1 thought that MINU would not be limited to just the home – it could be taken in the car or when travelling. For DSK2, she would use it in the bathroom, or for making sure the door is locked when leaving the house, and also mentioned the possibility of taking MINU with her. For mothers, they thought it will be left in the living room.

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When questioned further about real usage of MINU, DFSK1 wanted to talk about events that had happened that day; as did DFSK2, mentioning daily life. They imagined that conversations with MINU would not last long, and would not be too in-depth. They thought of it as just a machine, and did not have any particular concerns about how MINU would speak to them, or relationship with the device.

Regarding features raised in the radio show, both would use the cooking feature; both wanted advice about health, such as being reminded to stretch, and more general reminders such as a countdown to being late for an appointment. They expressed they had no resistance to receiving advice from a machine.

DFSK1 was interested in the idea of MINU-led meditation and reflection, while DFSK2 thought it was a little bold feature to have, but was open to the idea if it was easy to use. Both participants said they would like to use feature to talk about deceased relatives and friends, while DFSK1 wondered if her mother would use it or not, she questioned if she is feeling lonely; and DFSK2 said that her mother would rather talk about positive things in the future than thinking about the past.

About the local history segment, they thought their mothers would be likely to participate, and DFSK2 might join depending on the information, while DFSK1 was happy just to listen. DFSK1 was keen on the feature that allows the sharing of knowledge, and thought her mother would use this too. DFSK2 had more concerns about it, such as the difficulty of sharing and helping during dementia progression in older adults.

5.2.3 Design Fiction with Secondary Stakeholders in Germany

In Germany a sample (n=5) of various stakeholders has been confronted with the design fiction.

Sample

To gain insights about the requirements from a stakeholder perspective, we confronted 5 stakeholders, who are working with older adults in 4 different domains. Representatives of the different stakeholder domains were mostly female, except one. Different types of organizations were represented, including an NGO, a fitness company, care facilities and a municipality.

- Fitness Company with multiple locations and various offers ranging from rehabilitation sport to prevention. The representative (female) was working in physiotherapy, human resource management and research projects.
- Care facility for older adults. The representative (male) has been working in the field for decades. He is currently working in a facility with dementia patients.
- Local NGO concerned with the digital literacy of older adults. The representative (female) has been working in the field for almost 20 years. She is mainly concerned with organizational tasks, but also offers and conducts courses for older adults.
- Hospice with room for min 8, max 16 guests. The representative (female) has worked as a nurse for a longer time. Continuing her professional development, she recently finished her master's degree. She is currently manager of the hospice
- Municipality of a city in Germany. The representative (female) has been working for the municipality for three years. She manages the senior citizens' office.

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Key Insights

Secondary stakeholders expect to profit from **social networking**, increasing **availability in private settings** and more extensive information about their target audience to **tailor their services** to end users. They imagine the voice coach to have a positive impact on their services, clientele and **work satisfaction** of organizational members.

However, secondary stakeholders also voiced **concerns about losing meaningful parts** of their work to the voice assistant, such as face to face interaction with clients. Consequently, they only wanted to employ the voice coach in a way that it creates space for meaningful tasks (e.g., conversations, shared activities and fun). Furthermore, participants expressed doubts about their **clientele's acceptance towards this technology**, as well as concerns about the voice coach's usability for older adults. Last but not least, some participants also mentioned the limitations that a voice interface imposes on particular services.

In the following parts, we present the insights from various domains.

Physiotherapy

We immersed a representative of a company with multiple locations and various offers ranging from rehabilitation sport through physiotherapy to prevention into the design fiction. The physiotherapist considered getting information about their customers' level of activity a valuable benefit, in order to tailor treatment and recommendations to the customers' needs. Currently the company tries to address the need for a customized training program with a questionnaire that customers fill out when signing up on the website. In terms of infrastructure the interviewee voiced the requirement that this information would need to be accessible for all staff members, since trainers and therapists are not assigned to dedicated customers. She imagined a mobile app dashboard that could be used in the training zone or therapy sessions, before approaching individual customers. At the same time, she saw this as an opportunity to improve internal communication by allowing trainers and therapists to leave customer specific memos.

Furthermore, she saw an opportunity in offering help for self-help, by inscribing expert knowledge into the device. That way, the device could make sound recommendations (e.g., default exercises), which could be re-adjusted and updated by experts if need be. The physiotherapist also mentioned, that time limitation and group sizes often leave little space for individual advice and feedback. Knowing that their clients receive individual feedback outside the training sessions, could thus increase work satisfaction of trainers. STKH1 explained "*And that would also significantly increase employee satisfaction. They are always unhappy that they have too little time for their patients. This means that if they thought I had a super device that virtually replaced me at home, they would be mega happy.*". However, self-help should not substitute, but complement sessions in person. Additionally, the representative suggested that the virtual coach could organize social, physical activities (e.g., hikes, bicycle tours) for members, which are currently organized informally (e.g., coffee klatsch). STKH1: "*When I think about it, you look for groups with whom you can somehow not only drink coffee together, but actually become active as well".*

Care Facilities

We immersed two representatives of care facilities into the design fiction. They emphasized the potential of the voice coach to lighten the workload of care staff. Both mentioned that the facilities are often understaffed and lack the time they need to provide care they are satisfied with. STKH4: "*Then [if the workload was less], of course, other conversations arise because the employees have more time.*

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During the day so many things have to be done.". Both representatives of care facilities imagined that assistive functions could allow their guests to perform simple tasks by themselves. They also mentioned the benefits of being able to monitor their guests, with special regard to older adults suffering from dementia. In particular, information about the course of a disease was considered useful for the staff and internal arrangements.

A representative of a hospice emphasized that their guests often take pleasure in social activities. She emphasized that the voice coach must not replace these social encounters. However, she also assessed that the current lack of resources in home care often involves longer periods where older adults are on their own. In the context of his own organization, STKH2 mentioned that the virtual coach could organize social activities and events *"So such a voice assistant could also serve a purpose on its own, [...] the voice assistant itself could organize such events or things like that"*. Furthermore, both representatives mentioned that the infrastructure in their facilities might not be advanced enough to support the use of such a technology.

NGO

We immersed a representative of a local NGO with the goal to improve technological literacy of older adults into the design fiction. From her experience she explains that their clientele is mostly interested in learning about popular communication technologies such as messengers. She emphasizes that older adults would be rather skeptical about a voice coach. According to her, they generally prefer straightforward technologies that are easy to understand. Overall, the representative imagines that the widespread use of voice coaches would bring up many problems that she already observed with other technologies. She mentions that the use of such devices could make older adults more vulnerable to fraud by unknown people over the internet. STKH3 said "*The one acquaintance who has lost the savings on her bank account, she had TeamViewer on the computer and that was her undoing.*"

In general, the interviewee cannot imagine to use the device in her organization, since their clientele is mostly looking for sociability and face-to-face contact. According to her the social encounter and exchange, with coffee and cake, is an important aspect of their work and should not be substituted by any technological mediation. At the same time, she sees no complementary benefit of the voice coach.

Municipality

We immersed a representative of a local senior citizen's office in a German city into the design fiction. From her personal experience the interviewee mentioned differences that she observed in the behavior of different age groups. On the one hand, she states that older adults around the age of 65 are much more open and tech-savvy. On the other hand, she mentions that older adults with an age of 80 or more prefer to engage with the senior citizen's office face-to-face. During the COVID-19 pandemic the senior citizen's office experienced difficulties in introducing new communication technologies (e.g., Zoom) to older adults. The interviewee expected similar difficulties regarding the voice coach.

Social connectedness has been mentioned as a major area of potential for the voice coach. The representative of the senior citizen's office suggested that the voice coach could also direct conversations to pleasant topics or even tell a joke, instead of focusing on the negative aspects of ageing. STKH5 imagined „*Minu could tell some jokes. Something where we would say, that was something. We were able to laugh together again.*"

Furthermore, she explains that attempts of the senior citizen's office to educate older adults about nutrition often fail to attract their target group. STKH5 said "*The response was not always that big,*

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because many think 'I do not like that. The healthy stuff.' […] others who came are already knowledgeable or have dealt with it before […] There could also be an opportunity. If you can reach people at home via such a device, you might be able to reach them in a different way".

With regard to the topic of sharing knowledge through the voice coach, STKH5 talks about the limitations of learning through audio "*I would say that one only appeals to the auditory type of learner. There are also people who simply learn best through imitation.*"

The interviewee also imagines a positive impact on her own workload, since the device could simplify organizational tasks. In particular, she comes up with the idea of having a direct way of communication, instead of having to print and distribute flyers. At the same time, the interviewee expressed concerns about an increased workload, due to expectations about availability a device like this would raise.

5.3 Discussion and Implications

Japan

Family members (here, sons and daughters) envisaged the virtual coach as giving them a sense of **reassurance, safety and security** regarding their parent(s). They valued the **peace of mind** that would come from knowing their parent is receiving assistance, can be alerted if there is an emergency and has something to talk to and receive advice from, while the parent is home alone (either through living separately or when left at home). This sense of a sharing of the burden of the care, and gratitude for support from a virtual coach, may have an origin in the **sense of duty and obligation that is expected in Japan towards family and parents**, especially with caring and looking after older members. Indeed, to even better understand what their parents require, there was a comment that they would like to know from the device what their parent had talked to it about, and this also implies that they imagined a scenario where the parent feels more comfortable sharing their concerns with the device than directly to family members.

The family member's main question was whether or not their parents would be able to actually learn and use the device, with worries about forgetfulness and dementia. This may have been driven by the advanced age of their parents, with ages over 75+, and the oldest at 96. While these ages are quite far beyond the targeted age of the device (65+), it did highlight how the device could be expected to integrate into the daily lives of users even at very old ages and how the device should evolve with the progressive needs of the users.

Finally, there was high inequality within this group regarding finances: it might be easier to purchase the device for some than for others, with the consequence that the coach might end up being a product only for those who are financially well-off, and so may end up reinforcing health and social inequality.

Germany

From the design fiction we gained insights about the perspective of various secondary stakeholder in Germany. Secondary stakeholders imagined various ways in which the technology could be incorporated into their work, but also referred to the potential of the virtual coach outside the scope of their work. In general, stakeholders expected older adults to benefit from social, stimulating and cognitive activities facilitated by such a coach. For care facilities these activities, also referred to as entertainment, were directly integrated into their day-to-day work. Thus, the representatives expected that the workload of employees would be reduced if the coach supported forms of entertainment (e.g., singing, playing games, listening to audiobooks, music, news, weather etc.). That way, the virtual coach would compensate for the lack of time that employees have to engage with individuals and their needs,

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which reportedly could increase work satisfaction. At the same time, representatives from other organizations (i.e., physiotherapy, municipalities) also emphasized the potential of **social activity and connectedness** mediated by the virtual coach. Overall, the **organization of events** through the voice coach inside and outside of the organizational context was seen as a benefit. The ability to connect people to help each other or do things together was seen as a great potential for the e-VITA platform.

Regarding the use of the voice coach inside their organization, secondary stakeholders mentioned barriers including the **attitude of leaders and managers** towards the technology, as well as technical and organizational infrastructure. Some were concerned with their **staff's capability** to handle such a technology (mainly explained by the general belief that older staff aren't skilled enough with technology). They mentioned the initial effort for staff training, but at the same time imagined situations in which their staff could benefit from the system as an information source. Furthermore, the **availability and documentation of information** was imagined to have a positive impact on internal communication. However, some of the required information to improve internal communication and services was sensible data. The municipality and fitness company elaborated on the legal aspects and need for consent. Making useful data available for secondary stakeholders, while considering **legality and privacy**, is one of the main advantages that many participants saw in the e-VITA platform.

While some secondary stakeholders see the potential in the availability of certain data, others (I.e., NGO that supports digital literacy of older adults) are more reserved. A great concern about **obscure data policies**, potential misuse and vulnerability to fraud has been voiced by the representative of an NGO and others. At the same time the need for **easy to use and easy to learn** interfaces has been emphasized. When it comes to using the virtual coach independently, many stakeholders considered the older adults' **lack of digital literacy**, as a barrier and usability or external help (e.g., by family, community) as the answer.

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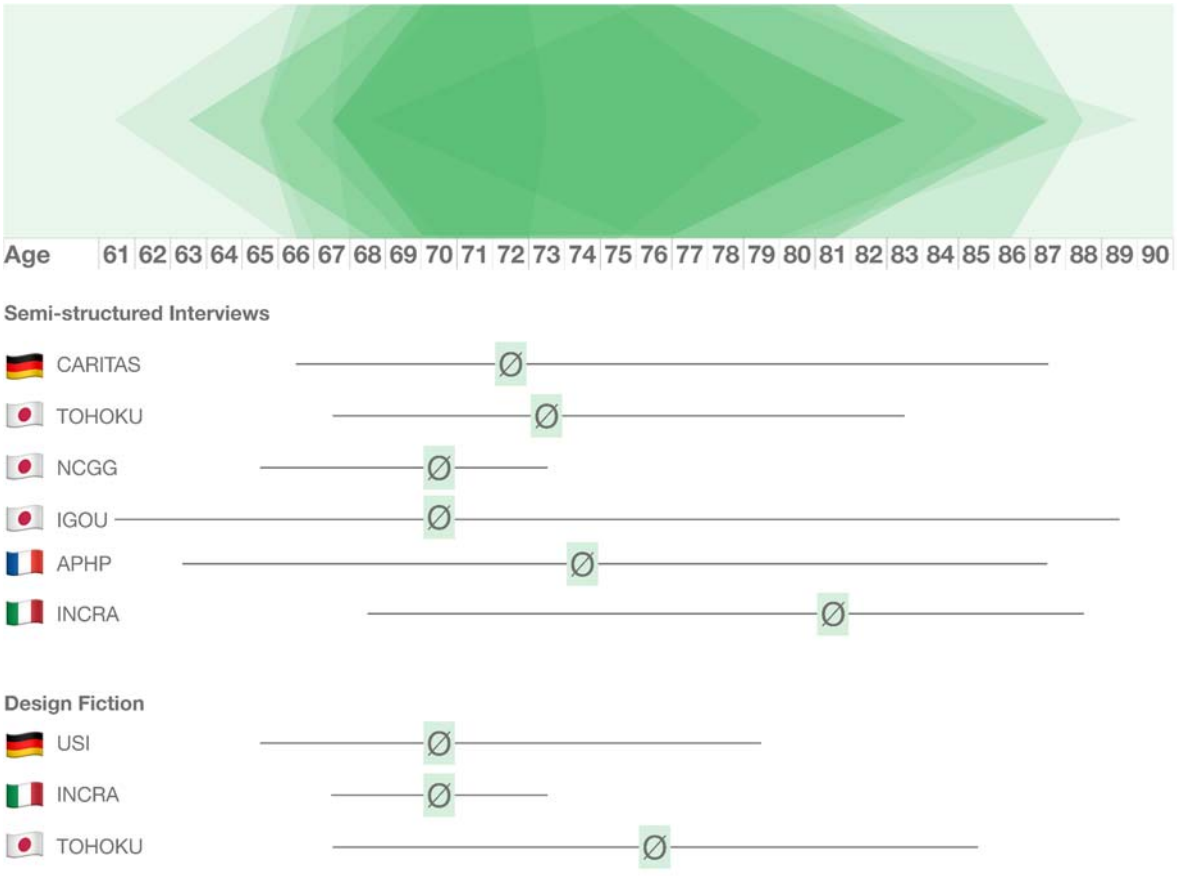
6 Main Outcomes and Implications for e-VITA

6.1 Summary of Implemented End User and Secondary Stakeholder Studies

End user and stakeholder data has been gathered in various studies to guide the design and development of an innovative coaching system based on the needs and wishes of older adults. Studies have been implemented on various sites in all participating countries to obtain an intercultural perspective on the requirements of older adults and secondary stakeholders. Three main approaches have been followed to gain insights. Firstly, interview studies with end users have been conducted. Secondly, a design fiction has been created to speculate together with end users and stakeholders about the requirements and consequences that arise with the daily use of a virtual coach in the near future. Thirdly, interviews and workshops with associated stakeholders (care takers, hospitals, community, family etc.) have been conducted to contribute to a holistic perspective of the design space and complex overall system needs.

All end user activities focused on the requirements of older adults around 65 years and older who were living independently and not in need of care.

Table 6.1 Average age of older adults who participated in our empirical studies



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End User Interview studies have been conducted by the following partners:

- CARITAS (Germany) remote interview (n=8, age: 66 < Ø72 > 87),
- TOHOKU (Japan, Sendai) face-to-face interview (n=12, age: 70 < Ø74 > 83),
- TOHOKU (Japan, Sendai) remote interview (n=5, age: 67 < Ø71 > 75),
- NCGG (Japan, Nagoya) mixed interview (n=5, age: 65 < Ø70 > 73),
- IGOU (Japan, Tokyo) mixed interview (n=8, age: 61 < Ø70 > 89),
- APHP (France) remote interview (n=12, age: 63 < Ø74 > 87)
- INCRA (Italy) remote interview (n=8, age: 68 < Ø81 > 88)

End Users have been confronted with the design fiction by the following partners:

- USI (Germany) remote end user confrontation (n=8, age: 65 < Ø70 > 79)
- INCRA (Italy) remote end user confrontation (n=5, age: 67 < Ø70 > 73)
- TOHOKU (Japan, Sendai) end user confrontation (n=5, age: 67 < Ø76 > 85)

Secondary stakeholders have been involved by the means of a design fiction and interviews by the following partners:

- TOHOKU (Japan, Sendai) interviews with family members (n=6)
- TOHOKU (Japan, Sendai) confrontation of family members (n=2) with the design fiction
- USI (Germany) confrontation of secondary stakeholders (n=5) with the design fiction (Representatives of an NGO, a fitness company, care facilities and a municipality).

6.2 Main Implications for the e-VITA Project

The implemented studies paint a holistic picture of the design space and allow us to derive first implications for the design of a virtual coach. In the following, we list the most important implications for the e-VITA project that have been derived from our empirical work.

6.2.1 Implications from the Design Fiction

Beyond the implications already mentioned in chapter 3, the following most important implications can be derived for the e-VITA project:

1. **The e-VITA coach must not substitute existing relations, but complement and enable interpersonal relationships.** Generally, older adults assigned a higher value to relationships with humans, animals or nature. They often imagined using the coach in ways that would enable them to interact more with other people.

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2. **Social use of the e-VITA coach should utilize technology's inherent qualities.** Participants who imagined to have social conversations with the voice coach itself, often mentioned the inherent advantages of engaging in a conversation with technology (e.g., no need for social rules and norms). Others who imagined the coach to mediate conversations with other people mentioned advantages of mediation through the technology (e.g., people would be easier to reach or be more open via the voice coach).

3. **The e-VITA coach must acknowledge different ways of relating to a voice coach, as well as accompanying affordances, expectations and requirements.** The relations to technology that became evident through the design fiction described in chapter 3 have an impact on the use of the voice coach. For example, assistive use cases work well when relating to the voice coach as a tool or task performer. Use cases that aim at self-improvement and self-reflection work well when relating to the voice coach as a counterpart.

4. **The e-VITA coach must aim to restore autonomy and avoid adverse effects on autonomy.** Older adults fear to lose autonomy. For those with age-related autonomy deficits it becomes a trade-off. This has a direct impact on the permitted agency. The coach must only be as proactive as users allow it to be.

5. **The e-VITA coach should not impose interventions on older adults, but enable to self-motivate.** Older adults who described situations where they would accept advice from the voice coach, usually imagined that the voice coach would trigger self-reflection that leads to motivation. A commanding tone was always perceived negatively. For sustainable interventions the e-VITA coach should make use of intrinsic motivation (e.g., encourage activities in accordance with one's own values, emphasize the joyful moments of an activity).

6. **The e-VITA coach should fit to the individual self-concept of older adults, to increase its acceptance.** In the design fiction (see chapter 3) we found that a mismatch between the perceived purpose of the voice coach and the self-concept results in rejection. For older adults who see themselves as independent and active, the e-VITA coach must provide enabling functions, rather than assistive functions.

7. **The e-VITA coach could adapt to the changing self-concept of ageing adults.** Older adults are aware of their ageing process and expect the voice coach to adapt to their changing and future needs.

8. **The e-VITA coach should differentiate itself from existing task performing technologies or outcompete them.** When older adults are already using existing technologies for certain tasks (e.g., fitness training), they are reluctant to give it up.

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9. **The e-VITA coach must be able to provide information about intentions as well as intending actors at any time.** Older adults expect the voice coach to be transparent about services offered through the device, as well as the device itself (i.e., AI). Trust in the voice coach as a platform is equally important for secondary stakeholders who imagine to offer services.

10. **The e-VITA should be able to inform end users about the impact and consequences of use.** Older adults expect to be informed about the goal of interactions with the voice coach (e.g., health benefits of intervention). It must be comprehensible enough to reflect about it during and after use (e.g., enable to make an informed decision about the processing of personal data).

6.2.2 Implications from the End User Interviews

Beyond the implications already mentioned in chapter 4, the following general implications can be derived for the e-VITA project:

1. **The e-VITA coach must support existing social contacts and encourage the establishment of new ones.** For example, new networks could be created in the neighbourhood or even across national borders. However, it must also be taken into account that people have different needs for social contacts.

2. **The e-VITA coach must be transparent and comprehensible in its use of personal data.** What happens with personal data must be described in an understandable way and the users should be in control to decide which data they want to share (or not).

3. **The e-VITA coach should consider different concepts in the practice of religion and spirituality.** The e-VITA coach must take into account that spirituality is a personal issue with the tendency that in Europe social aspects play a major role in the practice of religion whereas in Japan it is more an individual component.

4. **The e-VITA coach should provide serious and relevant medical information.** Since the internet is used to gather information on health-related topics, the e-VITA coach should support the user in filtering out serious information from the masses. Not everyone can access prior knowledge.

5. **The e-VITA coach must consider the heterogeneity of the user group.** The e-VITA Coach is confronted with a very heterogeneous group of users who bring very different resources with them. Therefore, the users must be picked up and supported where they are with their individual abilities.

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6. **The e-VITA coach must put users into a position where they have full control over its usage.** The users must have control over all functions of the coach. This also means that they can decide for themselves what they want to use and what they don't want to use (e.g., consult the coach about intimate topics) and that they decide how far the coach is integrated into their everyday life.

7. **The appearance of the e-VITA coach could have a big influence on acceptance.** Due to the different preferences, this should be investigated in more detail in the further course of the project, also with regard to cultural differences.

8. **The financing of the e-VITA coach should be clear.** It is important to that the e-VITA coach is accessible to everyone and avoid a situation where, when the coach comes on the market, only privileged people with sufficient wealth have access to the technology.

9. **The e-VITA coach could take climate change into account.** Climate change is relevant across national borders and affects everyone's lives. One Participant referred to the environmental impact of production and use in this context (e.g., energy consumption). Therefore, sustainable solutions must be sought.

10. **The e-VITA coach must provide cultural and individual adaptation possibilities of the user interface.** The user interface should be adapted to the cultural and individual needs of the users (e.g., reading direction of the font, font size, icon size, etc.).

6.2.3 Implications from Secondary Stakeholder Involvement

Even though, it is up to the older person to make the decision to use the e-VITA platform, the use also affects family members and other secondary stakeholders. Consequently, implications for the design can also be derived from the requirements of family members, service providers, NGOs, businesses and other associated stakeholders. While the activities in WP2 shed some light on different secondary stakeholder perspectives, a more extensive stakeholder analysis will be done in WP9, D9.8 in September 2020. The already conducted activities with secondary stakeholders allow us to derive first implications for the design of the e-VITA coach. Beyond the implications already mentioned in chapter 5, the following most important implications can be derived for the e-VITA project:

1. **The e-VITA platform must make use of its potential to connect people and to facilitate exchange and social activities.** The e-VITA coach should be able to organize events and social exchange for the clientele of a secondary stakeholder.

2. **The use of the e-VITA coach must be user friendly and easy to learn with the ultimate goal of enabling independent use.** Family members and other secondary stakeholders emphasized the importance

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of putting older adults in a position where they can use the coach independently. Some also mentioned the need for a scaffolding approach (i.e., support with the goal of becoming self-reliant) involving social contacts (I.e., family members, organization members, intergenerational exchange).

3. **The e-VITA platform must be transparent about the use of personal data. The use of personal data must be secure and trustworthy.** Secondary stakeholders emphasized the importance of older adults entrusting their personal data to the e-VITA platform. Next to legal requirements, they also referred to the prevention of potential misuse (e.g., fraud).

4. **The e-VITA coach should make use of its potential to promote a feeling of safety and security.** Family members (e.g., children) mentioned that the presence of the virtual coach would reassure them of their relatives' safety. This is especially the case when the family, that is normally there, is away. At the same time, they imagine it to have a reassuring effect for older adults.

5. **The e-VITA coach should be easy to integrate into existing environments.** This includes integration into the domestic setting, but also the organizational setting. The integration requires decision makers to support the idea, staff training and technological infrastructure.

6.3 Relation to Other Deliverables and WPs

This deliverable provides important insights about end user and secondary stakeholder requirements for the subsequent research and development of the individual WPs. The data gathered, will be used, reviewed and updated by means of the living lab phase in WP6 and the perspectives on well-being in WP3. An additional stakeholder analysis will be done in September 2020 as part of WP9, D9.8. Furthermore, the achieved results inform other deliverables in WP2, such as the use cases in D2.2.

6.3.1 Relation to WP3 and WP6

In WP3 we will try to gain a deeper understanding of everyday practices that improve subjective well-being. The data that was collected to learn more about the end user requirements can be taken up in WP3, since it already points towards positive practices. The design fiction already produced end user narrations of situated use of the virtual coach, in which the participants made plenty of comparisons to their current routines and practices. Following up on these leads, provides a good starting point for a deeper investigation into everyday practices. Similarly, the everyday activities reported by older adults in the interview studies can be used as clues for a deeper investigation.

In WP6 we will put older adults into the focus via a participatory approach. The co-creation in living labs aims to integrate all relevant stakeholders into the design process of the e-VITA platform. Thus, the holistic picture of the design space obtained in D2.1 provides a good starting point for all co-creation activities in the living lab phase. Furthermore, the deeper insights into daily situations in real-life environments in WP6 offer the possibility to constantly and iteratively compare and update the requirements we identified in this deliverable. While the data gathered in D2.1 can provide some ideas on the acceptance of the e-VITA coach and early-stage adoption of such a technology, WP6 adds some additional insights about long-term involvement with the coach. Having a substantial and growing understanding of end user and stakeholder requirements is crucial for the development of the e-VITA platform.

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6.3.2 Relation to Other Deliverables in WP2

The requirements identified in this deliverable have informed the design of smart-living support systems as described in D2.2. In particular, the use cases have been evaluated from an end user and stakeholder perspective. Through the results of this deliverable, new use cases could be generated, existing ones changed or assessed in terms of their acceptance and necessity. We have seen, that different ways to relate to the e-VITA coach afford different use cases. By taking these different relations into account, we were able to develop more consistent use cases for selected target groups. Furthermore, the empirical work has shown that older adults that are living an active and independent life are reserved towards using the e-VITA coach as an assistant. They often preferred to use the technology as an enabler, supporting their personal goals and needs. Consequently, use cases that helped them to reach individual goals were more accepted.

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7 Conclusions and Outlook

The main goal of this deliverable was to provide an overview over the complex user requirements structure of the e-VITA platform. In order to gather empirical evidence for user requirements, various empirical studies have been implemented in all participating countries, namely in Germany, Italy, France and Japan. The empirical data contains cross-cultural insights about older adults in early and late ageing, as well as secondary stakeholders associated with the target group (e.g., care takers, hospitals, community, family etc.). Consequently, we have obtained a richer and more fruitful perspective on the life of older adults than stereotypical views of them as a homogenous group of weak and passive people. We got a glimpse into the everyday life of a **diverse group** with various values, personal goals and practices. **Interpersonal relationships** and accompanying **activities** turned out to be a central aspect in the daily life of older adults. We found empirical evidence for the **importance of sociability** in all implemented studies, including secondary stakeholder interviews.

Furthermore, there is strong empirical evidence that interventions need to offer **autonomy**, **encouragement** and **empowerment** instead of patronizing and instructing older adults. This has direct implications for the proactivity of the voice coach, as well as the level of control older adults expect to have over the voice coach.

Another central topic appears to be the **transparency** about intentions, intending actors and the use of personal data. This topic has been brought up by older adults regardless of cultural background, as well as secondary stakeholders who were concerned with **data security** and **legal implications**.

Given the diversity of the target group, it becomes apparent that there is a need for personalization with regard to cultural and personal preferences (e.g., religion). Consequently, use cases and interfaces (e.g., tone of voice) are subject to the appropriation by individuals. The e-VITA platform must provide reasonable defaults, but also offer enough modularity to allow customized experiences. It is notable that older adults were also aware of their own ageing process and expected the coach to adapt to their changing needs. Our conversations with older adults show that the e-VITA coach will be judged by its situated, contextual ability to support individual activities and goals. At the same time, secondary stakeholders of various organizations referred to the benefits of reaching a particular target audience in a particular situation and context.

Last but not least, a variety of observed relations to the technology hints at individual and cultural differences in the appropriation of the e-VITA platform. In the design fiction, we were able to observe links between the imagined use of a fictional voice coach and the relation to it (e.g., tool, counterpart). Consequently, each relation appears to have its own design space with requirements and affordances, although there were overlaps with other relations. Keeping these relations in mind while designing functions of the e-VITA platform helps to provide a consistent experience and improves acceptance.

In our upcoming and future work packages we expect to find more links between the needs of older adults resulting from age, habits, life experiences, values and daily routines and the interaction with the e-VITA coach. In particular, we will deepen the understanding of the role that culture, gender, daily practices and the domestic setting play in the use of the e-VITA coach. At the same time, we integrate all stakeholders into the development of the e-VITA coach with co-creation approaches. These activities will broaden, deepen, verify and complement our understanding of end user and secondary stakeholder requirements. Thus, the results of this deliverable provide a solid groundwork for the development of the e-VITA platform in the course of the e-VITA project.

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9 Annex

Annex 1 Pre-study Germany

Annex 2 Pre-study Japan

Annex 3 Coding Scheme Interview Study

Annex 4 Demographic Questionnaire

Annex 5 Design Fiction Information

Annex 6 Interview Guideline

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What future voice assistants for active and healthy ageing for seniors should look like

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1 ABSTRACT

Robots are not only used in industry, surgery but there are now also initial studies that use assistants in social, such as nursing homes. Robots with different looks have already been used in this context. From robots that look like neutral to animal-like, to human-like robots. However, there is a lack of studies showing which appearance of a robot is preferred. This paper aims to answer this very question. Telephone interviews were conducted with eleven seniors still living in their own homes to answer the questions of what an assistant should look like, what capabilities it should have, and what topics the participants could imagine talking about with it. Also, the goal is to identify the end-user group, what concerns and dangers are seen in using it with a robot, and whether the pandemic could have an impact on the decision to use a robot. A needs profile for an assistant is then derived from the interviews. It was found that assistants that look like animals or a picture score the lowest. A human-looking robot is most preferred, followed by a plant and a hologram. In addition, the use of robots, for people who are lonely or dealing with mental or physical disabilities, is seen as particularly helpful by the participants.

2 KEYWORDS

Robot; seniors; need profile; appearance assistant

3 INTRODUCTION

In Germany, the population is getting older and older. According to the Federal Statistical Office, there were 18 million people in Germany aged 65 or older in 2019. This accounted for approximately 22% of the total population [27]. This is true not only in Germany, but also in other countries, such as Japan. There, there is a steady increase in people who are over 65 years old, and as of 2019, it is about 28% of the total population [32]. Due to the growing group of older people, the question comes closer, how the everyday life and activities of older people can be supported. One example of this is the use of social robots.

The goal here is for older people to become more independent, cognitively enhanced interact socially more frequently through the use of such technologies [2, 12].

4 RESEARCH STATUS

Nowadays, research is increasingly being conducted into how robots can be used to facilitate and mentally support the everyday lives of senior citizens. A distinction can be made between the following different types of robots.

4.1 Robot types

In old age, physical, but also cognitive or social limitations may occur, among others [20]. Rehabilitation robots and assistive social robots ("social robots") can be used for support. Rehabilitation robots are those that are intended to provide physical support to individuals and are not used for social aspects [5]. Social robots, on the other intended to support both social and psychological needs[2]. According to Góngora Alonsorobots can be divided into four categories: "Pet robot", "Humanoid robot", "Social assistive robot" and "Telepresence robot". A "Pet robot" is a zoomorphized robot that exhibits characteristics of an animal [30], such as AIBO [10] or PARO [17]. A "Humanoid robot" is an anthropomorphized robot that has characteristics of a human, such as Kasper [35] and NAO [16]. Robots such as PaPeRo [23] or Casper [21] belong to the so-called "Social assistive robot", which provides social interactions as well as can physically interact with a person [25]. The last category is the "telepresence robot". This robot is mostly mobile, is remotely controlled and uses e.g. a tablet, for audio and video transmission [1], like the robot Giraff [6].

4.2 Anthropomorphism and zoomorphism

Many of the social robots developed to date use assign human [24] (e.g., Kasper [35]) or animal (e.g., Aibo the dog [10] and Paro the seal [17]) characteristics to the robots [30]. This has been shown to be effective, as it makes robots perceived as less scary, thus creating more trust and higher acceptance [24], as in the study by Moro et al. (2019). In this, participants preferred Casper, an anthropomorphized robot, over robot named Ed, a robot with only a small degree of anthropomorphization [21].

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4.3 Robot acceptance

Since psychological and social needs, among others, are important for the elderly [33], social isolation is a major problem, especially during times of pandemic. This can lead to negative effects in the physical, mental, and psychological domains [24]. Social robots have been successfully used in previous studies to meet cognitive and social needs [21, 34]. In this context, acceptance of robots is an important issue. Acceptance is an individual attitude of an end-user towards a product, method, etc. This person agrees to use the product or to recognize the resulting uses as an advantage [8]. Previous studies show that acceptance is related by experience with technologies [7, 28], demographics (age, gender, family status) [18, 28], degree of anthromorphization [13], and their general attitude towards social robots [15, 26].

The capabilities of an assistant also influence whether and to what extent the robot is used [3]. Furthermore, the behavior is also not insignificant. What personality it has and whether it can respond individually to the user has an impact on its use [3]. For example, if the robot is similar in personality, to the user, this will lead to a higher interaction time [29]. Furthermore, according to Broadbent et al. (2009), gender customization could increase user satisfaction [4].

4.4 Verbal communication

The robots considered so far mostly do not use text input, but use voice as the sole or central interaction medium, sometimes supported by nonverbal communication, such as movements[22]. Many of the social robots interact with the user via voice. The advantages of voice assistants for the elderly, over the use of text input, are mainly, contactless operation, intuitive, increases independence, and handling is straightforward [19].

4.5 Research gap

As already mentioned, there are many different types of robots. Thereby, the appearance of an assistant also varies. There are only a few researches comparing different types of assistant robots, such as 3D holograms (e.g. Gatebox or HoloEra [11]), zoomorphic [10, 17], humans [21, 35], person with religious background [30, 31] or objects, such as a customizable egg (e.g. Tessa [34]). The preferences of the seniors will be verified in the following with the help of interviews.

5 METHODOLOGY

To find out how the target group imagines an assistant telephone was conducted with eleven participants between December 2020 and February 2021. All of the participants still live in their homes. The youngest participant is 65 years old and the oldest is 89 years old (mean: approximately 75 years old). The school degrees are also diverse, ranging from no degree, due to World War II (P03), to a PhD (P09). Furthermore, four of the eleven participants are male and seven are female (see Figure 1.). On average, an interview went on for about 46 minutes.

Through these interviews, interests of the target group and limitations in everyday life were examined in more detail, as well as previous technological experiences. Subsequently, likes and dislikes of different looks of assistants were queried and determined. It was also asked what capabilities it should have and how the pan-

Person	Age	Gender	Highest degree	Lives alone	Marital status	Children & Grandchildren
P01	74	W	Elementary school	No	Married	Yes
P02	72	M	Study	Yes	Single	No
P03	89	W	None	Yes	Widow	Yes
P04	75	W	Study	Yes	Widow	Yes
P05	75	M	Study	No	Married	Yes
P06	76	W	Baccalaureate	No	Married	Yes
P07	76	W	Study	No	Married	Yes
P08	72	W	Elementary school	Yes	Widow	No
P09	76	W	Promotion	No	Married	Yes
P10	70	M	Study	No	Married	Yes
P11	65	M	Realschule	Yes	Divorced	Yes

Figure 1. Demographic data of the participants

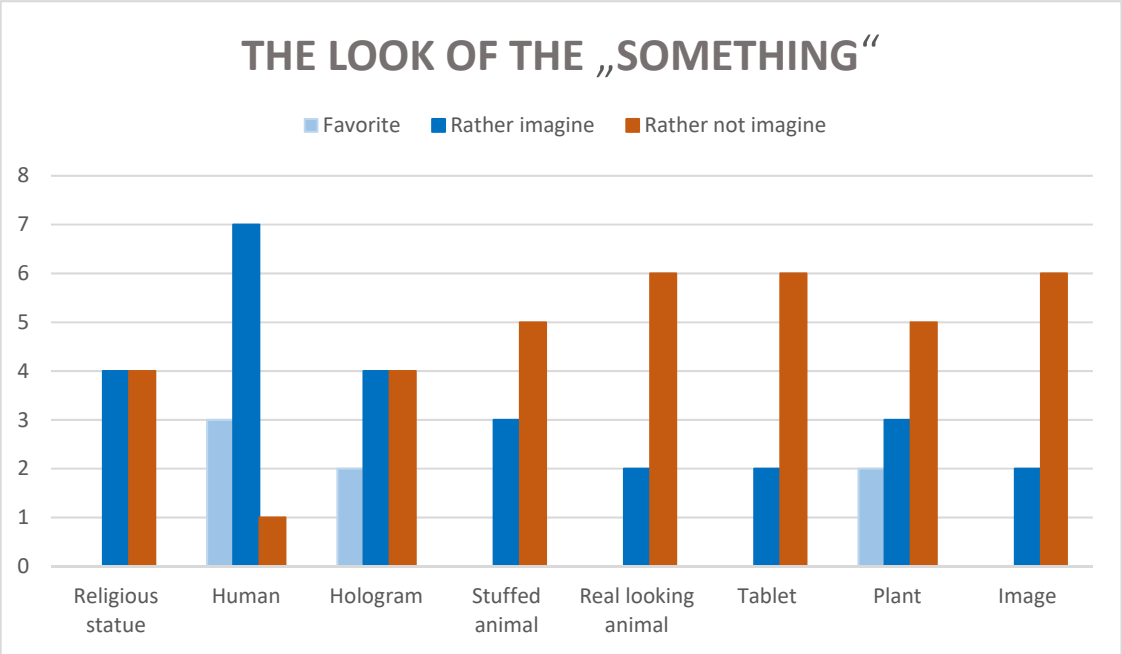

Figure 2. shows how many participants tend to imagine (dark blue) or cannot imagine (red) the appearance of the specified categories as an assistant. Light blue shows the number of people who favor the corresponding design. Three participants (P02, P06, P08) were not included in the graph because they could not imagine the scenario or completely rejected it.

demy influences everyday life and whether it makes sense to have such an assistant, especially Covid-19 times. The answers were recorded and subsequently transcribed and anonymized.

6 RESULTS

In order to find out which abilities and which appearance the participants would like to see, the following have towards such a robot (s. 6.3). Afterwards, the needs profile of a social assistant is created, which is analyzed based on Hassenzahl et. al (2010) (cf. 6.4).

6.1 Presentation assistant appearance

To find out what appearance an assistant should have so that it is as appealing as possible to users, the following fantasy question was asked. The test subjects were asked to imagine that they were sitting comfortably in their living room and talking to a "something". This something can answer questions and knowledge questions and also ask questions itself. Furthermore, it can remind them of activities, for example, and also suggest new activities, dishes and games. Now the participants should express how they imagine the "something". Four participants (P04, P05, P09, P11) imagine the something like a robot with human features.

In contrast, P07 is rather averse if the something would represent human or animal appearance. She rather imagines a neutral object in the form of a mushroom: "well, there I would also like it to be a neutral. So it shouldn't seem particularly friendly or off-putting [...] from the design either could not imagine this scenario or the "something" in more detail (P01, P03, P08) or were averse to it just by thinking about it (P02, P06).

It should be noted that some of the participants (P02, P04, P06, P09, P10, P11) have been in contact with or seen or heard about assistants before can also partly take over the function of care". P02 is also familiar with robots in the form of animals. I'm thinking now of the Japanese, who have artificial dogs and talk to them.

After the open question, a certain appearance was suggested to the individual participants, who were then asked to express their opinion on the individual suggestions and name their preferred version at the end (see Figure 2.). Three categories were distinguished. First category the "something", which looks like a human being. This included looking like a religious statue, a human robot, and a hologram. Secondly, from the category of animal, an assistant in the form of a stuffed animal or assistant in the form of a tablet, plant and a picture.

P08 could not imagine that objects could speak, and P02 and P06 were reluctant to imagine anything at all and thus could not indicate an inclination. Therefore, they will be omitted from the next consideration.

In the following, the worst-performing shown first.

All but P03 have had a pet in the past or currently. In the survey, the idea of interacting with a robot that resembles a stuffed animal (5) or a real-looking animal (6) came off worst. P09 says, "there would be an animal more to cuddle with, but not to talk to [...] there is a difference between humans and animals". This opinion is also P11: "Animal gives a lot, but I cannot imagine it

or I could imagine it better if I had a human figure there".

Four of the eight participants indicated that they were religious (P03, P04, P05, P10). Overall, four of the participants could not imagine conversing with a religious statue (P03, P04, P07, P09). These also could not imagine having a communication with a hologram. Five feel that a robot that looks like a plant is inappropriate (P04, P07, P09, P10, P11). P11: "That would be even worse than an animal. Because a plant doesn't even wiggle, it just shows its decay". Likewise, six of the participants cannot imagine talking to a picture or simply having a tablet as an assistant.

Of the design alternatives already mentioned, the following three design types were prioritized most often overall: An assistant in the form of a human-looking robot (P04, P09, P11), these envisioned a plastic robot with human features, but not "with skin and hair" (P04). P09 also referred to this as a "little legomensch."
P05 and P10 thought the idea of the assistant being a hologram was best and P01 and P03 preferred the plant. P07 still stuck with the shape of an object so that it "really just has to perceive as a technical device".

6.2 Capabilities of the "something“

During the survey, participants were asked not only about the appearance of the something, but also about the topics the subjects would use to converse with the assistant and what capabilities the assistant should possess.

Participants were given a choice of whether they would prefer to communicate with the something via voice, text, or both. None preferred text-only input. Two (P07, P11) would like a combination of text and voice interaction. However, the majority of six prefer voice-only as a medium of interaction. "As long as you can still hear, you'd rather do it via voice" (P09). P02, P06, and P08 abstained from the question.

Robots can help seniors with certain household chores in everyday life, especially when their own abilities are declining. This support from the assistant is definitely desiredthe participants, such as "doing small repair jobs where I feel insecure" (P04) or cleaning (P04, P09). Also searching or fetching things (P05, P06) or finding out knowledge (P04, P07, P09, P10, P11) could be done by the robot. Also showing the clock or serving as an alarm clock (P10). Also the simplification of bureaucratic matters, such as the pharmacy a "prescription that send as a photo to them there" and then get delivered (P11). P07, for example, it is also important that in case of problems or in an emergency, like if the person would "lie on the ground, then he should also be able to call or contact my husband or sons" (P07). Cognitive games (P11) and occupation, such as board games (P04, P11) or playing music (P07, P10) are also desired.

It was not possible to narrow down the topics of what the subjects would and would not talk about with the assistant, as P09 aptly describes: "I couldn't rule out anything at the moment that I wouldn't talk about. There is much more interaction and questioning out of the situation (P06, P09, P10, P11). A frequently mentioned topic is current political and worldly events (P03, P07, P09, P11). The subjects could imagine talking about this. Moreover, it is not only about talking about one's own feelings and thoughts (P11), but also about getting information about the assistant (P01, P03, P11).
Another possible consideration would be that the robot addresses topics that the persons are interested in or like to do. For example, five of the respondents like to go hiking or go on excursions (P01, P03, P04, P07, P09). Thus, the assistant could suggest new routes for hiking. Also, some) work in the garden. Accordingly, the robot could give tips on planting according to the season, suggest new plantable plants, or even help in the garden, which P04 considers helpful. Ten of the participants like to watch news. Nature documentaries (5) or thrillers (6) are also high on the list.

6.3 Attitudes towards assistants

The attitude towards such an assistant varies. For example, two subjects (P02, P06) directly reject such assistants or have problems imagining the scenario (P08). The other eight participants can mentally imagine such a scenario. Overall, four of the eleven participants would currently use such a robot (P03, P04, P05, P11). Nevertheless, a total of seven currently reject such support. One of the main reasons is that "robotics, [...] is not that developed yet. I don't have any information yet that this is actually so human-like that it could be a replacement for something human" (P06). That the robot cannot replace humans or prefer aagreed by three people (P02, P06, P07). Another reason is that the participants have people to talk to (P02, P04, P06, P09, P10) and thus see no or limited benefit in the robot, as P02 describes: "insofar I don't need a computer for something like that, I have that. [...] if I see that [the neighbor] is coming and I have a need to talk to someone then, I just go to the kitchen and do something and then we talk to each other". P02 and P10 perceive the robot as an additional burden, "because I am already bombarded with information at home" (P02).

During the pandemic, social contacts are reduced. Except for P01 and P02, they all miss personal makes sense above all to use such a robot for themselves in pandemic times, eight out of eleven people believe that there would be no difference in user behavior compared to before Covid-19. Only P01, P05 and P11 state that they would use the assistant more during the pandemic.

Although the majority would not use the assistant more during pandemic times, some feel that it may be helpful for others to have an assistant during such times. Especially for people who have little contact and are lonely (P04, P09) or have physical problems (P02) and so the robot can support one. Independent of Covid-19, five subjects each mentioned that the robot could reduce loneliness (P04, P06, P09, P10, P11) or help out when a person has physical or cognitive limitations (P02, P06, P07, P09, P10). Even if currently an assistant is not wanted, some subjects can imagine in relation to themselves that at an older age, if there are physical, cognitive or social limitations, it could be quite possible that they would use such an assistant (P02, P07, P09, P10).

However, there are also doubts about the use of such an assistant, e.g. in the area of data protection (5). In addition, there are also concerns that the robot could give inappropriate or even unethical answers, as in the area of politics (P11) or also in a general sense (P06). The subjects also expressed skepticism that a person is cognitively incapable of understanding the robot itself or that something like this would work in reality (P01, P03, P09, P11).

After being asked how the person might feel about it, P03 and P05 associate with this question: "relaxed". P01 and P09 would perceive the interaction as normal. P04 and P11 would also rate the feeling as normal after a period of adjustment. P10 says, "I would feel like I was screwing myself, which on the other hand I enjoy again."

6.4 Needs profile

The needs profile shows which needs are satisfied by the assistant and which of the needs are addressed most strongly, and thus also shows for what reason someone would use an assistant. The needs profile (see Figure 3) was created based on the participants' statements about the assistant. According to Hassenzahl et al. (2010), there are seven needs, such as safety, competence, popularity, stimulation, autonomy, connectedness, and meaningfulness [14]. In the following, these needs are related to the "something" and the expression of each category is shown.

6.4.1 Security

The security aspect is about the person protected from threats. The user knows what to expect and has certain routines [14].

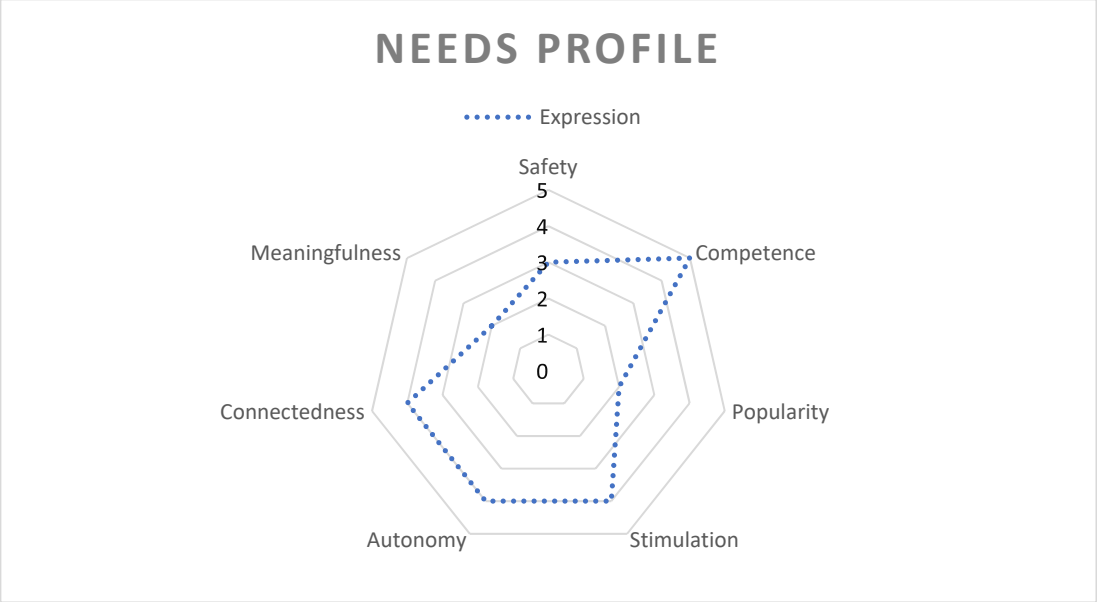

Figure 3. represents the characteristics of the individual needs of the assistant (adapted from Hassenzahl et al. (2010)). These characteristics were subjectively evaluated on the basis of the interviews.

Security in itself is important to the subjects in their daily lives. They all have a structured daily routine, which is usually repeated with minor deviations. They also pay attention to security when carrying out activities. Data protection, on the other hand, is perceived as rather unimportant by two of the eleven participants (P03, P07).

Most of the subjects were unable to say whether the assistant would be used regularly for certain activities, thus creating certain routines. There are a few exceptions, such as using the robot while eating (P09, P11). P09 could imagine that "if I were eating alone, I would sit down with the robot and ask it something.
Rather, the participants would use the robot spontaneously. Four of the participants would spontaneously ask

for things or use the robot when the person is bored (P01, P03, P04). Privacy is another aspect of security. Without dataP05 justifies this with the fact that "it can't access my computer or my other computers either, it's just a hologram.
The robot could also take over tasks that the user is not confident in (P03), so that the person feels safer and "that you are not quite so alone in some situations. That the robot gives you a sense of security" (P04).

6.4.2 Competence

Competence as a need is about being capable or good at what one does and having control over it [14]. The handling of technical devices in general is assessed by three as rather poor (P01, P05, P08), three average (P02, P09, P11) and five rather good (P03, P04, P06, P07, P10).
Although some consider themselves to be rather poor, none mention that there are problems communicating with the robot or that it might perform wrong actions. Concerns of loss of control are mentioned only by P07, who says, "I don't want to be directed or influenced by the "something" [...]. I want it to decide for itself what the thing does. I don't want it to decide on its own".

6.4.3 Popularity

Popularity is defined by the fact that one can influence others oneself and is thus valued [14]. Only two (P02, P08) do not share their experiences with technical devices. Of the eight who can imagine the scenario, five would use the robot when others are around (P04, P07, P09, P10, P11). For example, P04 would "show it off and show what it can do" or P11 says, "if the thing convinces me, then I'm proud as punch and would show that to others, what the possibilities are there." Thus, the assistant only moderately fulfills the need for popularity.

6.4.4 Stimulation

Learning about new activities and discovering new things are the characteristics of stimulation [14]. Seven of the eleven participants enjoy doing new activities or trying new things.
In the beginning, the assistant in itself offers the possibility to get to know something new, since some, as P11 aptly describes, the existence of robots is "partly also beyond one's own imagination" and thus can arouse curiosity, as is the case with P10, for example. Also, inexperience with the device can impact how one imagines the assistant, as P10 portrays, "If I'm into something new or want to get to know, the hologram would be the one where I have the least experience with." Also, the user can have the robot suggest, for example, new dishes (P04, P07), ideas for crafting), or cognitive games (P11).

6.4.5 Autonomy

Autonomy is about being able to do what and when the person wants something [14]. Five of the participants say that they are not bound to others in everyday life, but still take others into consideration, such as their partner or work colleagues (P04, P05, P06, P09, P10).
Three (P03, P08, P11) describe their physical condition and four their cognitive condition (P03, P10, P11) as rather poor. However, only one subject (P08) is dependent on others in everyday life, e.g., for shopping. Even if the dependency on the third person does not affect many of the test persons, some of the test persons (P02, P06, P07, P09, P10) see the robot as helpful, especially for persons with mental or physical limitations, so that they can become more independent from other persons or assistants or generally perform more activities again.

6.4.6 Significance

Realizing and understanding oneself are elements[14]. The assistant can serve as a substitute for a psychologist and thus reveal new insights about oneself (P11). Discussing with the social robot can also bring up new topics or points of view (P07), and users can thus develop themselves further and possibly understand themselves better. Overall, the subjects did not place a high value on meaningfulness.

6.4.7 Connectedness

The connectedness is defined by the fact that the user feels close or connected to the robot. Thus, one is not alone [14]. Slightly more than half (54%) of the participants live with his/her partner and are married. 81% have children and grandchildren themselves. Also, six out of eleven participants meet friends or relatives at least once a week (P04, P05, P06, P09, P10, P11). For most, the social contact they had before the pandemic is sufficient. P11, however, has "the problem of getting going, because it's no fun alone and then I sit on the sofa and say, what's the point now. I also miss the exchange afterwards, that one can also talk about it". P02 is no stranger to the feeling of being alone. He had "once thought in my apartment, so that I am not so alone, to put a mannequin and dress, with which I could then talk, but that was 30 years ago.
The exchange of private information with the assistant is desired by three participants (P01, P03, P11); this could establish a connection. Another indication of connectedness is anthropomorphization. For example, P11 already anthropomorphizes the robot during the introduction, with him the robot should "also definitely getname".
Some of the participation think that an assistant should be used especially with people who are alone or that those would benefit the most and feel less alone with it (P04, P06, P09, P10, P11).

7. LIMITATION AND DISCUSSION

With the previous statements, on the question of design, it should be reemphasized that the participants were not shown any pictures when presenting the design of the

assistant. It is based on their imagination and everyone can have imagined something different under the individual terms. Thus, P11 states that these are "yes things with which one actually does not deal so at all and which partly also lie outside individual powers of imagination". In addition, previous experience, whether and how intensively they have already come into contact with robots, can influence the answers.

When designing a robot, it should be noted that depending on the culture, the image of a religious person, animal, object, etc. could be a problem in itself. Even if this religious-looking robot statue answers questions, this might not be according to the user's values. One example is that nowadays it is quite common for spouses to get divorced. According to the Christian religion, the Bible says not to break marriage [9]. Depending on how religious the user is can lead to problems, for example, when asking what the religious-looking robot thinks about divorces. This can lead to conflicts especially with even more sensitive topics, such as homosexuality and how, e.g. if the robot looks like the Bible/Jesus etc., they feel about it. This problem is not only transferable to the religious sphere, but also e.g. to politics and moral and ethical questions, independent of the appearance. It is necessary to consider how to deal with such sensitive issues and differences of opinion, or what kind of opinion the robot represents, so that the user is also willing to use the robot. P11, for example, says that "if someone has "fascist ideas in him and he also communicates that, I don't talk to him. But I don't want to talk about such things with the medium either.

As already noted, the question arises whether a person still needs to cognitively understand the robot per se. From this, it would be concluded that objects or animals that cannot speak in reality should possibly be avoided, since they could possibly no longer be processed cognitively or the conversation would seem abnormal as a result. For example, for P03, a stuffed animal is "a dead object" or for P09, "humans and animals are different." An assistant with human features, on the other hand, could entail lower inhibitions, as P11 also underlines: "You can have an animal [...], you can complain about the suffering to it, [...] so an animal gives a lot, but I can't imagine it or I could imagine it better if I had a human form there". Again, it could be that like P07, persons generally dislike a robot that resembles a human or animal. Like P07, who prefers the robot to be "as little human or animal as possible, so that you really just have to perceive it as a technical device."

There is also the question of whether the robot would actually be used. The fields of application and topics mentioned, about which the participant would talk to the robot, could differ in actual use and possibly also reveal new areas of application.

In addition, there are other design issues that would have to be met, e.g., how to deal with different opinions or how big and heavy the assistant is. Its behavior, e.g., that it should not brag to the user (P03), speak the same language i.e., for example, not slur words (P11), or also have as clear (P04) and human a voice as possible (P05, P06). There may be different user preferences in these examples as well, which could be the subject of future research.

8. SUMMARY

Nowadays, there are all kinds of different looking robots, from animals to human-like robots to neutral-looking assistants.

This paper investigated what appearance seniors both prefer and dislike in a robot. What capabilities the robot should have and what the participants' attitudes towards such assistants are. For this purpose, a semi-structured telephone interview was conducted with eleven participants, all of whom are over 65 years old. It turns out that especially human-looking assistant were preferred by three participants. Two subjects each could most easily imagine the hologram and the plant as assistants. In contrast, the real-looking animal, tablet and a picture scored lowest. Furthermore, voice interaction is preferred by the majority. The assistant should be able to take over tasks in the household and talk about various topics, such as political and global current events.

Only four of the eleven participants would currently use such a robot. Two generally reject such an idea and one has problems imagining the scenario. Overall, however, the interview shows that even if not everyone can imagine using an assistant, they still consider the use of such assistants to be sensible, especially for people who have cognitive, physical or social limitations.

The needs profile derived from the interviews, adapted from Hassenzahl et al. (2010), shows that an assistant could primarily fulfill the need for competence, followed by stimulation, autonomy and connectedness. It should be noted that these were classified purely subjectively from the participants' statements.

9. LITERATURE

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ANNEX 2 of D2.1
Results from pre-Study Questionnaires and interview surveys from Japan

We conducted a questionnaire survey and interviews with 50 elderly people to understand the current situation of elderly people as part of the user needs survey for the system development of WP2 of the "Virtual Coaching System (e-VITA)" research project and for the organization of human coaches. The mean age was 71.68 years with a standard deviation of 3.966.

1． Results of the questionnaire survey, cross tabulation

The following is a cross tabulation of the responses by gender and generation. The bias of the distribution between sexes and generations was tested by chi-square test (***: significant at the 0.1% level; **: significant at the 1% level; *: significant at the 5% level; †: significant at the 10% level).

Age group

	Sex		Total
	Male	Female	
Under 70	6	8	14
	28.60%	27.60%	28.00%
Over 70	15	21	36
	71.40%	72.40%	72.00%
Total	21	29	50
	100.00%	100.00%	100.00%
	$\chi^2 =$	0.006	

28.0% were under 70 years old, and 72.0% were over 70 years old. There was no significant difference in the generational distribution by gender.

Social Activities

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
None	15	16	31	10	21	31
	71.40%	55.20%	62.00%	71.40%	58.30%	62.00%
Have	6	13	19	4	15	19
	28.60%	44.80%	38.00%	28.60%	41.70%	38.00%
Total	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$	1.366		$\chi^2 =$	0.734	

62.0% of the respondents did not participate in any social activities, while 38.0% of the respondents did. There were no significant differences in participation in social activities by gender or generation.

Highest educational level

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
High school	7	17	24	3	21	24
	33.30%	58.60%	48.00%	21.40%	58.30%	48.00%
University・Junior College・Vocational School	13	12	25	11	14	25
	61.90%	41.40%	50.00%	78.60%	38.90%	50.00%
Graduate School	1	0	1	0	1	1
	4.80%	0.00%	2.00%	0.00%	2.80%	2.00%
Total	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$	4.030		$\chi^2 =$	6.424*	

48.0% of the respondents whose last education was high school, 50.0% of the respondents whose last education was junior college/university/vocational, and 2.0% of the respondents whose last education was graduate school. There was a significant difference in the distribution

by generation, with 78.6% of those under 70 years old having a university/junior college/vocational education and 58.3% of those over 70 years old having a high school education.

Cohabiting Family

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
ひとり	0	9	9	2	7	9
	0.00%	31.00%	18.00%	14.30%	19.40%	18.00%
夫婦のみ	9	11	20	6	14	20
	42.90%	37.90%	40.00%	42.90%	38.90%	40.00%
その他	12	9	21	6	15	21
	57.10%	31.00%	42.00%	42.90%	41.70%	42.00%
合計	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$	8.568*		$\chi^2 =$	0.192	

18.0% of the respondents lived alone, 40.0% were married couples only, and 42.0% were others. There was a significant difference by gender, with 0.0% of men living alone and 31.0% of women living alone. The reason for the high number of women living alone may be due to bereavement of a spouse.

Cooking by oneself

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
No	12	0	12	3	9	12
	57.10%	0.00%	24.00%	21.40%	25.00%	24.00%
Yes	9	29	38	11	27	38
	42.90%	100.00%	76.00%	78.60%	75.00%	76.00%
Total	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$	21.805***		$\chi^2 =$	0.07	

Those who did not cook for themselves accounted for 24.0%, while those who did accounted for 76.0%. There was a significant difference by gender, with 42.9% of men and 100.0% of women cooking.

Drinking alcohol

	Sex		Total
	Male	Female	
No	9	24	33
	42.90%	82.80%	66.00%
Yes	12	5	17
	57.10%	17.20%	34.00%
Total	21	29	50
	100.00%	100.00%	100.00%
	$\chi^2 =$	8.642**	

	By age generation		Total
	Under 70	Over 70	
No	7	26	33
	50.00%	72.20%	66.00%
Yes	7	10	17
	50.00%	27.80%	34.00%
Total	14	36	50
	100.00%	100.00%	100.00%
	$\chi^2 =$	2.218	

66.0% of the respondents did not drink alcohol, while 34.0% did. There was a significant difference by gender, with 57.1% of men and 17.2% of women drinking.

The most consumed alcoholic drink

	Sex		Total
	Male	Female	
Beer	5	1	6
	41.70%	20.00%	35.30%
Japanese *sake*	1	0	1
	8.30%	0.00%	5.90%
Wine	0	4	4
	0.00%	80.00%	23.50%
Whisky, *shochu*	6	0	6
	50.00%	0.00%	35.30%
Total	12	5	17
	100.00%	100.00%	100.00%
	$\chi^2 =$	12.986**	

	By age generation		Total
	Under 70	Over 70	
Beer	2	4	6
	28.60%	40.00%	35.30%
Japanese *sake*	0	1	1
	0.00%	10.00%	5.90%
Wine	2	2	4
	28.60%	20.00%	23.50%
Whisky, *shochu*	3	3	6
	42.90%	30.00%	35.30%
Total	7	10	17
	100.00%	100.00%	100.00%
	$\chi^2 =$	1.174	

When the drinkers were asked to select one main type of alcohol, 35.3% each selected beer and whiskey/shochu, 23.5% selected wine, and 5.9% selected sake. There was a significant difference by gender, with more men choosing whiskey/sochu (50.0%) and beer (41.7%), while more women chose wine (80.0%).

Frequency of alcohol consumption

	Sex		Total
	Male	Female	
Less than 2x a week	3	3	6
	25.00%	60.00%	35.30%
Every other day	5	1	6
	41.70%	20.00%	35.30%
Everyday	4	1	5
	33.30%	20.00%	29.40%
Total	12	5	17
	100.00%	100.00%	100.00%
	$\chi^2 =$	1.908	

	By age generation		Total
	Under 70	Over 70	
Less than 2x a week	2	4	6
	28.60%	40.00%	35.30%
Every other day	4	2	6
	57.10%	20.00%	35.30%
Everyday	1	4	5
	14.30%	40.00%	29.40%
Total	7	10	17
	100.00%	100.00%	100.00%
	$\chi^2 =$	2.688	

When those who drink were asked how often they drank, 35.3% drank two or less drinks per week, 35.3% drank every other day, and 29.4% drank every day. There were no significant differences by gender or generation.

Use of medication

	Sex		Total
	Male	Female	
Not using	5	9	14
	23.80%	31.00%	28.00%
Using	16	20	36
	76.20%	69.00%	72.00%
Total	21	29	50
	100.00%	100.00%	100.00%
	$\chi^2 =$	0.315	

	By age generation		Total
	Under 70	Over 70	
Not using	2	12	14
	14.30%	33.30%	28.00%
Using	12	24	36
	85.70%	66.70%	72.00%
Total	14	36	50
	100.00%	100.00%	100.00%
	$\chi^2 =$	1.814	

Regarding medication, 28.0% of the respondents were not taking any medication and 72.0% were taking medication. There were no significant differences by gender or generation.

Presence of initiatives to prevent dementia and maintain health

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
Not doing	6	6	12	2	10	12
	28.60%	20.70%	24.00%	14.30%	27.80%	24.00%
Doing	15	23	38	12	26	38
	71.40%	79.30%	76.00%	85.70%	72.20%	76.00%
Total	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$	0.415		$\chi^2 =$	1.006	

With regard to efforts to prevent dementia and maintain health, 24.0% of the respondents did not do so, while 76.0% did so. There were no significant differences by gender or generation.

What would bother you the most if you got dementia or an illness?

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
Can't do things by yourself, become unable to understand	4	8	12	5	7	12
	19.00%	27.60%	24.00%	35.70%	19.40%	24.00%
Become a burden to family / friends in needing support and care	8	3	11	4	7	11
	38.10%	10.30%	22.00%	28.60%	19.40%	22.00%
Restriction of activities and behaviour	2	2	4	1	3	4
	9.50%	6.90%	8.00%	7.10%	8.30%	8.00%
Property, inheritance, and grave matters	2	1	3	0	3	3

	9.50%	3.40 %	6.00 %	0.00%	8.30 %	6.00 %
Money aspect	0 0.00%	4 13.80 %	4 8.00 %	2 14.30 %	2 5.60 %	4 8.00 %
Other	3 14.30%	4 13.80 %	7 14.00 %	1 7.10%	6 16.70 %	7 14.00 %
No response	2 9.50%	7 24.10 %	9 18.00 %	1 7.10%	8 22.20 %	9 18.00 %
Total	21 100.00%	29 100.0 0%	50 100.0 0%	14 100.0 0%	36 100.0 0%	50 100.0 0%
	$\chi^2 =$	9.832		$\chi^2 =$	5.565	

When asked what would bother them the most if they got dementia or an illness, 24.0% of the respondents said, "Not being able to take care of myself or not knowing what to do," and 22.0% said, "Being a nuisance to my family or others or being taken care of. There were no significant differences by gender or generation.

What would you hate most if you got dementia or an illness?

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
Can’t do what I want	6 28.60 %	7 24.10 %	13 26.00 %	3 21.40 %	10 27.80 %	13 26.00 %
Become a burden to family / friends in needing support and care	3 14.30 %	7 24.10 %	10 20.00 %	3 21.40 %	7 19.40 %	10 20.00 %
Forgetting family	0 0.00 %	2 6.90 %	2 4.00 %	1 7.10 %	1 2.80 %	2 4.00 %

Receiving assistance with toileting	3 14.30 %	2 6.90 %	5 10.00 %	0 0.00 %	5 13.90 %	5 10.00 %
Hospitalization	2 9.50 %	1 3.40 %	3 6.00 %	2 14.30 %	1 2.80 %	3 6.00 %
Other	4 19.00 %	2 6.90 %	6 12.00 %	3 21.40 %	3 8.30 %	6 12.00 %
No answer	3 14.30 %	8 27.60 %	11 22.00 %	2 14.30 %	9 25.00 %	11 22.00 %
Total	21 100.0 0%	29 100.0 0%	50 100.0 0%	14 100.0 0%	36 100.0 0%	50 100.0 0%
	$\chi^2 =$	6.024		$\chi^2 =$	6.792	

When asked what they would hate the most if they got dementia or an illness, 26.0% said "not being able to take care of myself or not knowing what to do" and 20.0% said "bothering my family or others or being taken care of.

Using cell phone

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
Not using	3 14.30%	1 3.40%	4 8.00%	0 0.00%	4 11.10%	4 8.00%
Using	18 85.70%	28 96.60%	46 92.00%	14 100.00%	32 88.90%	46 92.00%
Total	21 100.00%	29 100.00%	50 100.00%	14 100.00%	36 100.00%	50 100.00%
	$\chi^2 =$	1.944		$\chi^2 =$	1.691	

When asked whether or not they use a cell phone, 8.0% of the respondents did not use a cell phone, while 92.0% did. There were no significant differences by gender or generation.

Have experience of using computer

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
No	0	3	3	0	3	3
	0.00%	10.30%	6.00%	0.00%	8.30%	6.00%
Yes	21	26	47	14	33	47
	100.00%	89.70%	94.00%	100.00%	91.70%	94.00%
Total	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$	2.311		$\chi^2 =$	1.241	

When asked about their experience in using computers, 6.0% of the respondents had no experience and 94.0% had experience. There were no significant differences by gender or generation.

Concerns or doubts about the operation of cell phones or PCs

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
Do not have concerns	12	7	19	5	14	19
	57.10%	24.10%	38.00%	35.70%	38.90%	38.00%
Have concerns	9	22	31	9	22	31
	42.90%	75.90%	62.00%	64.30%	61.10%	62.00%
Total	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$	5.632*		$\chi^2 =$	0.043	

When asked if they had any concerns or doubts about the operation of cell phones or PCs, 38.0% of the respondents had none and 62.0% had some. There was a significant difference by gender, with 42.9% of males and 75.9% of females having concerns.

Presence of enjoyment, fun

	Sex		Total
	Male	Female	
No	4	1	5
	19.00%	3.40%	10.00%
Yes	17	28	45
	81.00%	96.60%	90.00%
Total	21	29	50
	100.00%	100.00%	100.00%
	$\chi^2 =$ 3.293†		

	By age generation		Total
	Under 70	Over 70	
No	4	1	5
	28.60%	2.80%	10.00%
Yes	10	35	45
	71.40%	97.20%	90.00%
Total	14	36	50
	100.00%	100.00%	100.00%
	$\chi^2 =$ 7.451**		

When asked whether or not they had any fun or enjoyable activities, 10.0% of the respondents had none and 90.0% had some. There was a significant difference by generation, with 71.4% of the respondents under 70 years old and 97.2% of the respondents 70 years old and over having fun. There was also a significant difference by gender, with 81.0% of males and 96.6% of females reporting having fun.

不安や危険を感じることはあるか

	Sex		Total
	Male	Female	
なし	12	15	27
	57.10%	51.70%	54.00%
あり	9	14	23
	42.90%	48.30%	46.00%
合計	21	29	50
	100.00%	100.00%	100.00%
	$\chi^2 =$ 0.144		

	By age generation		Total
	Under 70	Over 70	
なし	9	18	27
	64.30%	50.00%	54.00%
あり	5	18	23
	35.70%	50.00%	46.00%
合計	14	36	50
	100.00%	100.00%	100.00%
	$\chi^2 =$ 0.828		

When asked if they ever feel anxious or unsafe, 54.0% said no, and 46.0% said yes. There were no significant differences by gender or generation.

If there is someone who will listen to concerns, worries

	Sex		Total
	Male	Female	

	By age generation		Total
	Under 70	Over 70	

There is none	4	5	9	2	7	9
	19.00%	17.20%	18.00%	14.30%	19.40%	18.00%
There is someone	17	24	41	12	29	41
	81.00%	82.80%	82.00%	85.70%	80.60%	82.00%
Total	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$ 0.027			$\chi^2 =$ 0.182		

When asked if there was someone who listened to their concerns, 18.0% said there was no one, and 82.0% said there was. There were no significant differences by gender or generation.

A spouse is included as someone who will listen to your concerns and worries.

	Sex		Total	By age generation		Total
	Male	Female		Under 70	Over 70	
No	4	18	22	8	14	22
	23.50%	75.00%	53.70%	66.70%	48.30%	53.70%
Yes	13	6	19	4	15	19
	76.50%	25.00%	46.30%	33.30%	51.70%	46.30%
Total	17	24	41	12	29	41
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$ 10.602**			$\chi^2 =$ 1.154		

Those who have someone who listens to their anxiety and worries were asked to list if their spouse listens to their anxiety and worries. The results showed that 53.7% of the respondents answered no and 46.3% answered yes to whether or not their spouse was included in the list of people who listen to their worries and anxieties. There was a significant difference by gender, with 76.5% of males and 25.0% of females saying yes. This may be due to the gender difference in the presence or absence of a roommate as seen above.

Children are included as someone who will listen to your concerns and worries.

	Sex		Total
	Male	Female	
No	13	19	32
	76.50%	79.20%	78.00%
Yes	4	5	9
	23.50%	20.80%	22.00%
Total	17	24	41
	100.00%	100.00%	100.00%
	$\chi^2 =$	0.042	

	By age generation		Total
	Under 70	Over 70	
No	8	24	32
	66.70%	82.80%	78.00%
Yes	4	5	9
	33.30%	17.20%	22.00%
Total	12	29	41
	100.00%	100.00%	100.00%
	$\chi^2 =$	1.283	

Regarding whether or not the person who listens to their anxiety and worries includes their children, 78.0% said no and 22.0% said yes. There were no significant differences by gender or generation.

Siblings are included as someone who will listen to your concerns and worries.

	Sex		Total
	Male	Female	
No	14	15	29
	82.40%	62.50%	70.70%
Yes	3	9	12
	17.60%	37.50%	29.30%
Total	17	24	41
	100.00%	100.00%	100.00%
	$\chi^2 =$	1.895	

	By age generation		Total
	Under 70	Over 70	
No	8	21	29
	66.70%	72.40%	70.70%
Yes	4	8	12
	33.30%	27.60%	29.30%
Total	12	29	41
	100.00%	100.00%	100.00%
	$\chi^2 =$	0.135	

Regarding whether or not siblings are included among the people who listen to one's anxiety and worries, 70.7% said no and 29.3% said yes. There was a significant difference by gender, with 17.6% of males and 37.5% of females reporting yes.

Friends are included as someone who will listen to your concerns and worries.

	Sex		Total
	Male	Female	
No	11	6	17
	64.70%	25.00%	41.50%
Yes	6	18	24
	35.30%	75.00%	58.50%
Total	17	24	41
	100.00%	100.00%	100.00%
	$\chi^2 =$	6.464*	

	By age generation		Total
	Under 70	Over 70	
No	5	12	17
	41.70%	41.40%	41.50%
Yes	7	17	24
	58.30%	58.60%	58.50%
Total	12	29	41
	100.00%	100.00%	100.00%
	$\chi^2 =$	0	

Regarding whether or not friends are included in the list of people who listen to one's anxiety and worries, 41.5% said no and 58.5% said yes. There was a significant difference by gender, with 35.3% of males and 75.0% of females saying yes.

Anyone else is included as someone who will listen to your concerns and worries.

	Sex		Total
	Male	Female	
No	17	23	40
	100.00%	95.80%	97.60%
Yes	0	1	1
	0.00%	4.20%	2.40%
Total	17	24	41
	100.00%	100.00%	100.00%
	$\chi^2 =$	0.726	

	By age generation		Total
	Under 70	Over 70	
No	11	29	40
	91.70%	100.00%	97.60%
Yes	1	0	1
	8.30%	0.00%	2.40%
Total	12	29	41
	100.00%	100.00%	100.00%
	$\chi^2 =$	2.477	

Regarding whether or not "others" were included in the list of people who listen to one's anxiety and worries, 97.6% said no and 2.4% said yes. There were no significant differences by gender or generation.

Who I mainly eat meals with

	Sex		Total
	Male	Female	
Aline	0	9	9
	0.00%	31.00%	18.00%
Only spouse	14	14	28

	By age generation		Total
	Under 70	Over 70	
Aline	2	7	9
	14.30%	19.40%	18.00%
Only spouse	9	19	28

	66.70%	48.30%	56.00%	64.30%	52.80%	56.00%
Other	7	6	13	3	10	13
	33.30%	20.70%	26.00%	21.40%	27.80%	26.00%
Total	21	29	50	14	36	50
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$\chi^2 =$ 8.002*			$\chi^2 =$ 0.544		

When asked who they mainly ate with, 18.0% of the respondents ate alone, 56.0% ate only with their spouses, and 26.0% ate with others. There was a significant difference by gender, with 0.0% of men and 31.0% of women eating alone.

2． Survey results, logistic regression analysis

2 - 1 Results of logistic regression analysis with the presence or absence of a consulting partner as the dependent variable

	Regression coefficient	Standard error	Odds ratio	95％ C.I.			p value
Intercept	15.5105	8.188	5.E+06	0.584	~	5.1E+13	0.0582 †
Alcohol consumption	**-2.224**	**1.033**	**0.108**	**0.014**	**~**	**0.819**	**0.0313***
Social Activities	**1.9994**	**1.150**	**7.380**	**0.775**	**~**	**70.300**	**0.0821 †**
Eating aline	**-2.1589**	**1.086**	**0.115**	**0.014**	**~**	**0.971**	**0.0469***
Age	-0.1815	0.111	0.834	0.670	~	1.040	0.1034

Note: Variable selection is based on the AIC stepwise method.

Significance at the level of: *** : 0.1％； ** : 1％； * : 5％； † : 10％

A logistic regression analysis using the presence or absence of a confidant as the dependent variable showed that there was a significant tendency at the 5% level for those with drinking habits and those who usually eat alone to have no confidant (someone to listen to their worries and concerns). At the same time, there was a significant tendency at the 10% level for those who were socially active to have someone to talk to. These results indicate that people who eat and drink alone are less likely to have someone to ask for advice, and that it is possible to create a circle of

advice by including them in social activities.

2-2 Results of logistic regression analysis with the presence or absence of efforts to prevent dementia as the dependent variable

	Regression coefficient	Standard error	Odds ratio	95% C.I.	p value
Intercept	-4.682	3.511	9.E-03	0.000 ~ 9.020	0.1824
Alcohol consumption	1.7980	1.388	6.040	0.398 ~ 91.700	0.1952
Education level	**2.187**	**1.178**	**8.91**	**0.885 ~ 89.700**	**0.0635 †**
Enjoyment	**2.525**	**1.498**	**12.500**	**0.664 ~ 235.000**	**0.0918 †**
Social activities	1.68	1.140	5.370	0.574 ~ 50.100	0.1406
Eating alone	-1.756	1.208	0.173	0.016 ~ 1.840	0.1460
Gender	**2.223**	**1.257**	**9.240**	**0.786 ~ 109.000**	**0.0770 †**
Operation	**-2.565**	**1.255**	**0.077**	**0.007 ~ 0.900**	**0.0409***
Medicine	-2.169	1.382	0.114	0.008 ~ 1.720	0.1166

Note: Variable selection is based on the AIC stepwise method.
Significance at the level of: *** : 0.1% ; ** : 1% ; * : 5% ; † : 10%

Next, a logistic regression analysis with the presence or absence of efforts to prevent dementia as the dependent variable showed that people with higher education, those who have fun, and women are more likely to take steps to prevent dementia than people with lower education, those who have no fun, and men.

This suggests that those with less education (≒ less understanding of dementia?) and those with less enjoyment (≒ people who do not want to live longer?), and men are less likely to take steps to prevent dementia, and therefore have more room to grow.

The table above also shows that those who are anxious about using cell phones and PCs are less likely to take steps to prevent dementia than those who are not anxious. At first glance,

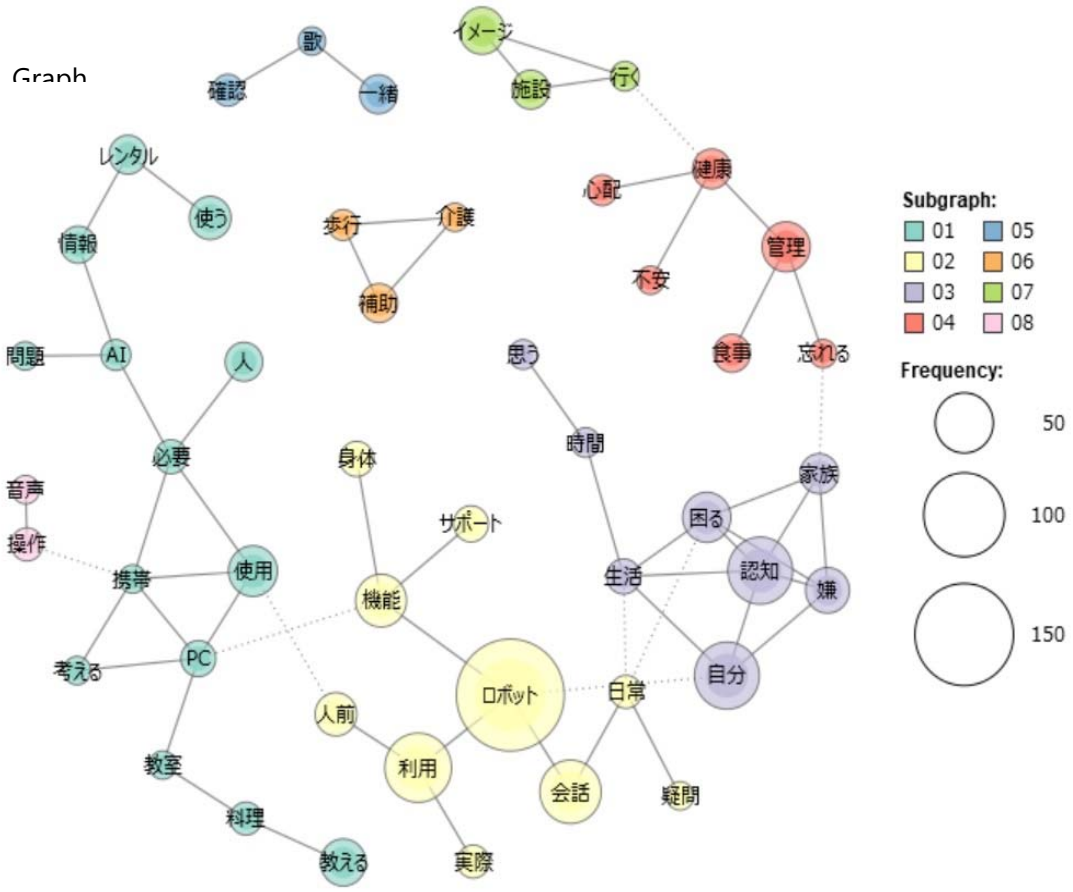
there seems to be no relationship between the operation of cell phones and computers and the prevention of dementia, but this may indicate that people who are included in the information circle obtain a variety of information, while those who are not are unable to obtain any information. Therefore, the results suggest that expanding the circle of information may help prevent dementia.

3．Results of co-occurrence analysis

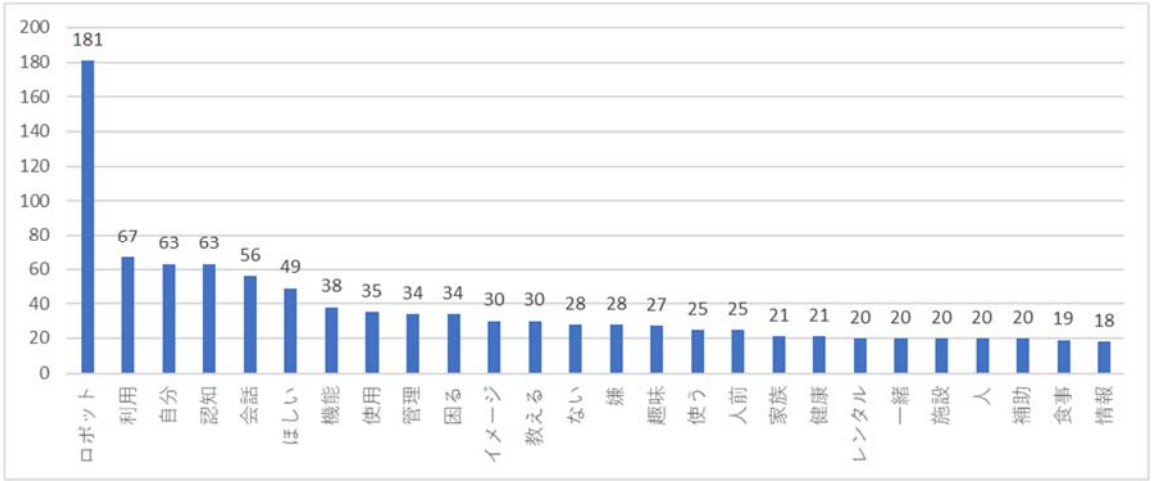
A co-occurrence network diagram (a network diagram showing the commonalities between individual comments) was drawn using the comments answered in the interview survey. In the interview, the respondents were asked about their daily anxieties and what they expected from the robot. The text mining software KH Coder was used for drawing.
In the diagram, words that appear in the document (extracted words) and have a co-occurrence relationship (words that tend to be used together) are represented by connecting lines. The thickness of the lines indicates the degree of co-occurrence as measured by the Jaccard coefficient, and the size of the circles indicates the frequency with which the words are used.

The size of the circles indicates the frequency of use of the word. To facilitate interpretation, words with low frequency were excluded beforehand. As a result of the analysis, the following eight groups of co-occurrence relationships were extracted.

3-1　Results of co-occurrence analysis, overall (minimum number of occurrences: 4)



Frequency distribution

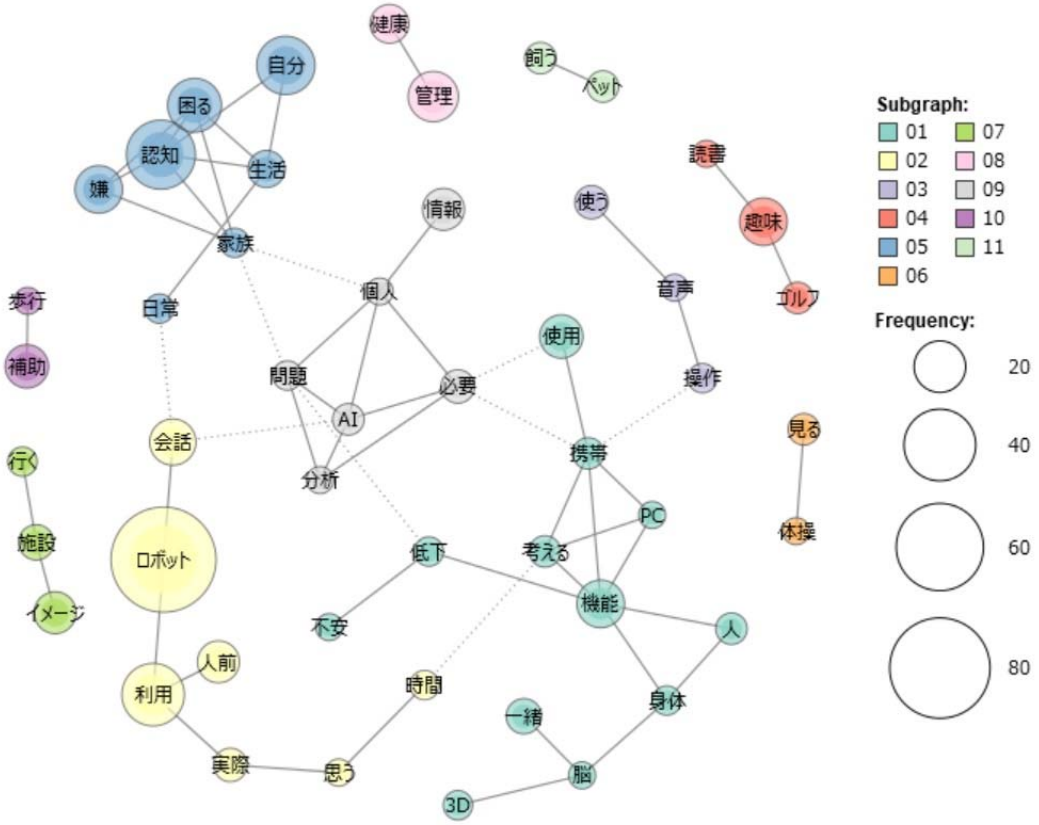


More detailed discussion is given in section, 4. Summary. Below the co-occurrence analysis diagram, a graph of frequency distribution is shown. In the frequency distribution graph, verbs B (e.g., do, become), negative auxiliary verbs (no), and adjectives B (good) were excluded. Because

some words were used redundantly in the same person's conversation, the frequency of some words exceeded 50 (as below).

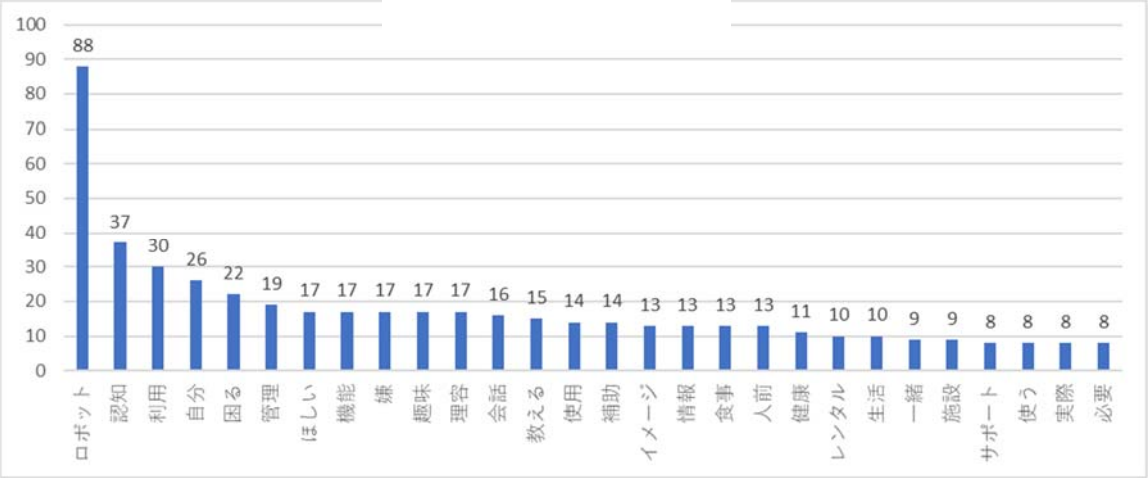
3 - 2　The results of co-occurrence analysis showed that males (minimum number of o

Graph



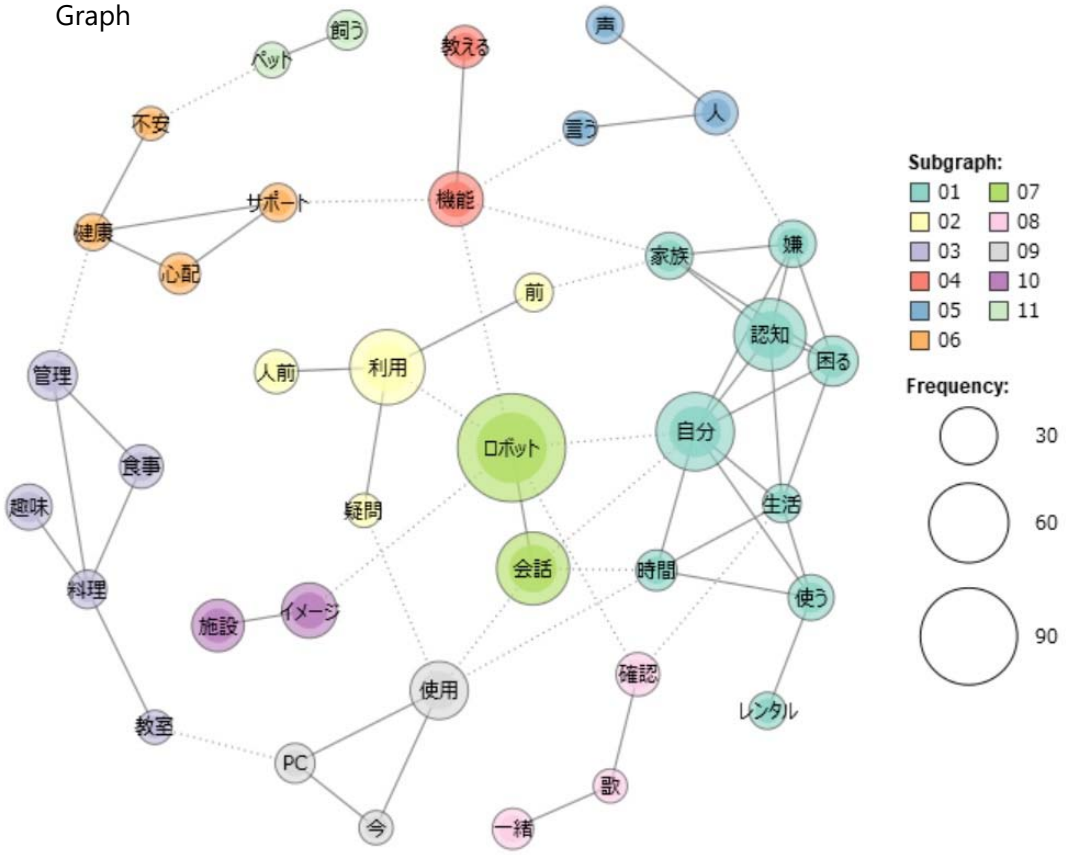
- The blue groups are comments about cognitive functioning, family and life. Example: "If I get dementia, my family will be burdened and I will be in trouble.
- The yellow group consisted of comments about the use of robots. Example: "I would like to use the robot when I feel lonely or have questions.

Frequency distribution



3 - 3 The results of co-occurrence analysis, females (minimum number of occurrences: 10)

Graph

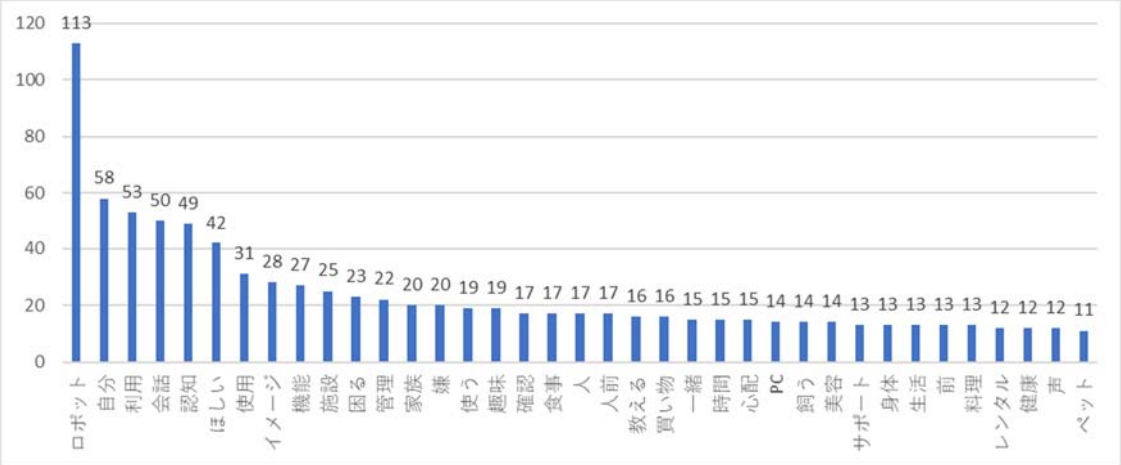


- The yellow-green group is the group related to the conversation with the robot. Example: "I

want to have a conversation with a robot that makes me feel good.

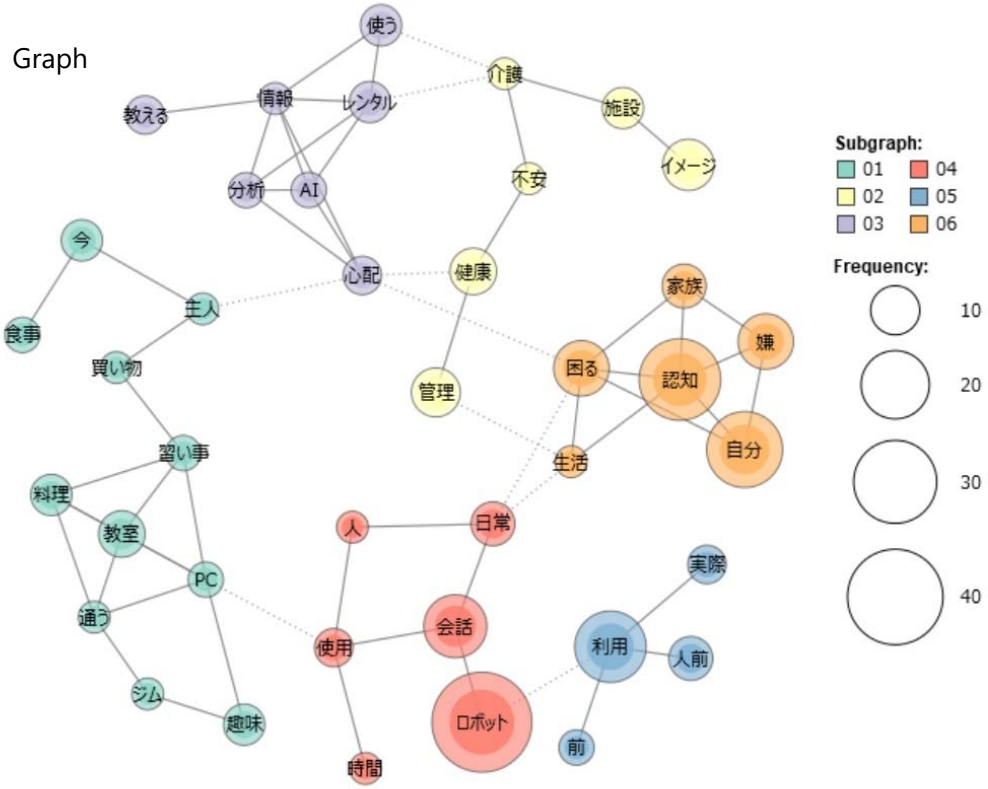
- The green group is the group related to the relationship between themselves and dementia. Example: "I don't want to lose track of myself when I get dementia.

Frequency distribution



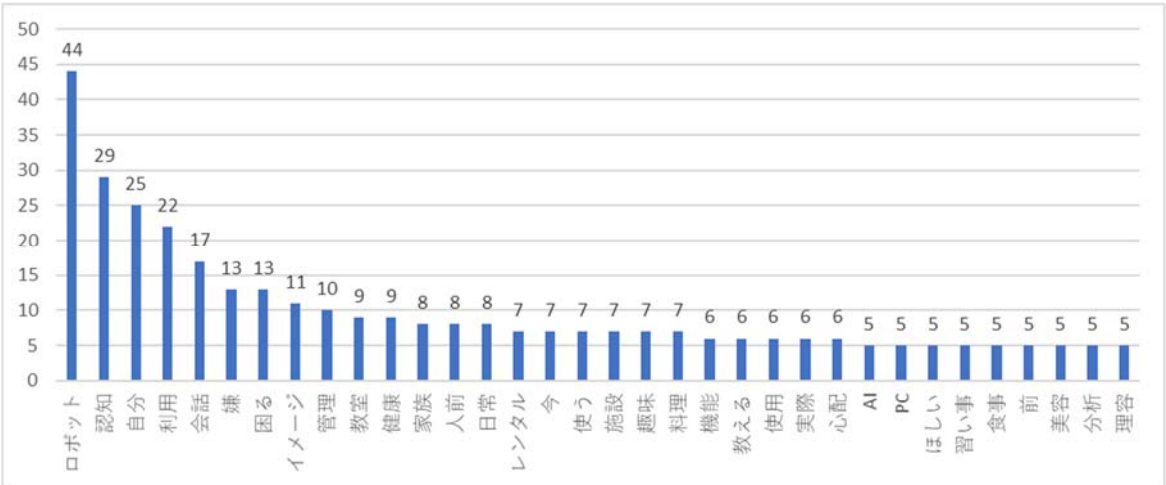
3-4 The results of co-occurrence analysis, for age of less than 70 years (minimum number of occurrences: 4)

Graph



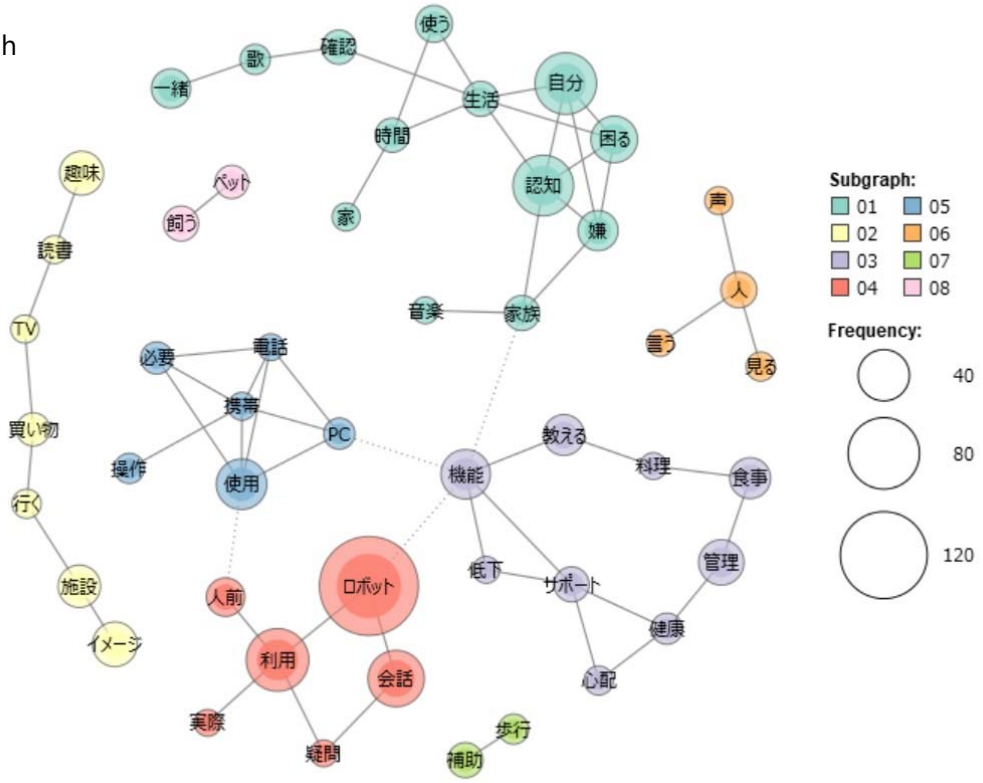
- The groups in red are those related to conversations with robots. Example: "I want a robot that can prevent dementia (conversation, motor assistance).
- The orange groups are those related to the relationship between themselves and dementia. Example: "I don't want to have dementia because I won't be able to do the things I like to do.

Frequency distribution



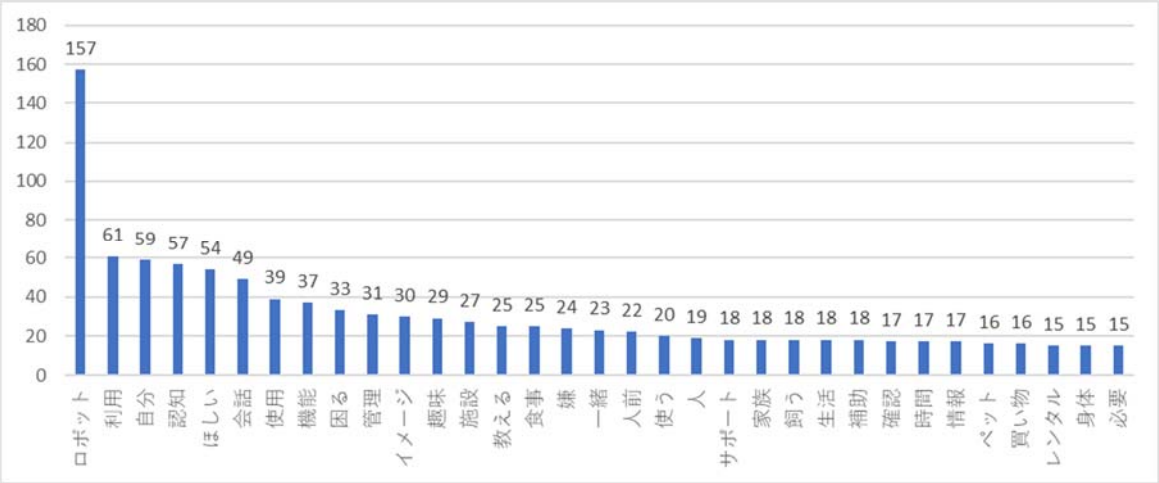
3 - 5 The results of co-occurrence analysis, for 70 years old or older (minimum number of occurrences: 10)

Graph



- The groups in red are the groups related to conversations with the robot. For example, "I want the robot to talk, sing, check my schedule, etc.
- The green group is the group related to the relationship between themselves and dementia. Example: "If I get dementia, I won't be able to take care of myself and I won't be able to live well.

Frequency distribution



4. Summary

4 - 1 To provide lonely elderly people with someone to talk to

- 18.0% of all respondents lived alone. There was a significant difference in this trend by gender, with 0.0% of men living alone compared to 31.0% of women. Relatedly, when asked who they mainly ate with, 18.0% of the respondents ate alone, 56.0% ate only with their spouses, and 26.0% ate with others. There was a significant difference by gender, with 0.0% of men and 31.0% of women eating alone. **Many women live alone and eat alone.**
- On the other hand, 58.5% of the respondents cited friends, 46.3% cited their spouse, 29.3% cited siblings, and 22.0% cited children as people who would listen to their worries and concerns (multiple responses). There was a significant difference in this trend by gender, with men tending to cite their spouses, while women tended to cite friends and siblings. **While men live with their spouses and therefore tend to focus on their spouses for advice, many women live alone and therefore tend to choose someone other than their spouses for advice.**
- The majority of respondents (62.0%) did not engage in any social activities. There was no significant difference in this trend by gender or generation. **Participation in social activities is in the minority, regardless of gender or generation.**
- Those who cook by themselves accounted for 76.0% of all respondents. There was also a significant difference by gender, with 42.9% of men and 100.0% of women cooking. On the other hand, those who drank alcohol accounted for 34.0% of all respondents. There was also

a significant difference by gender, with 57.1% of men and 17.2% of women drinking alcohol. **In terms of how they use their time, the difference between men drinking and women cooking is remarkable.**

- The results of the logistic regression analysis showed that those with drinking habits and those who ate alone had no one to talk to, while those who engaged in social activities had someone to talk to. **These results show that it is possible to include people who do not have anyone to talk to who would eat and drink alone in social activities, thereby bringing them into the circle of consultation.**

4 - 2 Spreading the word about efforts to prevent dementia

- As for the presence or absence of things to look forward to or enjoy, 90.0% of the respondents answered "Yes. By generation, 71.4% of the respondents under 70 years old and 97.2% of the respondents over 70 years old answered "Yes," and by gender, 81.0% of the males and 96.6% of the females answered "Yes," with significant and significant differences, respectively. **Women and people over 70 years old enjoy themselves more than men and people under 70 years old. The older the age, the more fun they have (regardless of gender), which is a surprising result.**
- Cell phones were used by 92.0% of the respondents, and computers by 94.0%. There was no significant difference in this trend by gender or generation. However, 62.0% of the respondents had concerns or questions about the operation of cell phones and PCs, and females were more concerned (42.9% of males and 75.9% of females). **Many people, regardless of gender or generation, have experience using cell phones and computers. However, women have more concerns than men.**
- Regarding anxiety and danger in daily life, 46.0% of the respondents answered "Yes". There were no significant differences by gender or generation. **Just under half of the respondents, regardless of gender or generation, feel anxious or unsafe in their daily lives.**
- As for efforts to prevent dementia and maintain health, the majority of respondents (76.0%) were doing so. The most common problems associated with dementia and illness were "being unable to take care of myself or not knowing what to do" (24.0%) and "being a nuisance to my family or others or being a burden to them" (22.0%). There was no significant difference in these trends by gender or generation. **In other words, the majority of people, regardless of gender or generation, were taking steps to prevent dementia and maintain their health in order to be independent and to avoid causing trouble for**

others.

- The results of the logistic regression analysis showed that more educated people, people who have fun, and women make more efforts to prevent dementia than less educated people, people who do not have fun, and men (this difference in gender is seemingly inconsistent with the previous paragraph). (This difference in gender, while seemingly contradictory to the previous paragraph, indicates that there are gender differences in efforts to prevent dementia when the effects of other variables are controlled for. **This indicates that people with less education (≒ people with less understanding of dementia?) and people who do not enjoy life (≒ people who do not want to live longer?) and men are less likely to take steps to prevent dementia, and therefore have more room to grow.**
- At the same time, the results of the logistic regression analysis showed that those who were anxious about operating cell phones and PCs were less likely to take steps to prevent dementia than those who were not anxious. At first glance, there seems to be no relationship between the operation of cell phones and PCs and the prevention of dementia, but this may indicate that those who are included in the information circle obtain a variety of information, while those who are not are unable to obtain any information. **Therefore, the results suggest the possibility of preventing dementia by expanding the circle of information.**

4 - 3　Anxiety about Dementia and Expectations for Robots

- Finally, the results of the co-occurrence analysis (3-1: Overall) show that there were eight major areas of concern for the participants. These were: 1) the use of PCs and cell phones (green: e.g., "I use my PC and smartphone to do research"), 2) voice and manipulation (peach: e.g., "It would be nice if I could control (the robot) with my voice"), 3) robot functions, conversation, and use (yellow: e.g., "I want to have daily conversations with the robot"), and 4) cognitive functions of oneself and one's family (purple: e.g., "If I get dementia, I don't want to be able to take care of myself"), 5) diet and health management (red: e.g., "It would be nice if the robot could manage my diet (check my food intake)"), (6) Image of the facility (yellow-green: e.g., "I have a good image of the facility because of the good response of the facility where my mother lives"), (7) Being together and confirmation (blue: e.g., "It would be nice if (the robot) sings with me"), and (8) Care and assistance (orange: e.g., "Based on my mother's care experience, it would be nice if there was assistance for my back and walking"). **In general, we were able to confirm that elderly people who are concerned about dementia have high expectations for robots.**

Main category	Subcategory 1. Level	Subcategory 2. Level	Content explanation
Everyday activities			**All statements that include concrete activities of the respondent are classified here.**
	During Week		All activities during the week
	Weekend		All activities at the weekend
	References		All statements that include particularly important aspects of everyday activities
	Under Corona		All statements that revolve around everyday life under pandemic conditions, including before/after comparisons
Health			**All statements that revolve around the topic of health**
	Importance in everyday life		All statements that provide information about the position that the topic of "health" occupies in the everyday life of the respondent.
		Conscious confrontation	All statements that imply that the respondent actively deals with his/her health in everyday life.
		No conscious confrontation	All statements that show that the respondent does not actively deal with his/her health or that this is not a high priority in his/her everyday life.
	Worries and fears		Worries/fears that the respondent expresses regarding his/her own health (e.g. fear of physical functional limitations in the future, ...)
	References		Expressed aspects that are particularly important to the respondent in their health (e.g. continuing to be independent in old age)
	Information gathering		Explanations of how the respondent informs him/herself about the topic of health
	Influence of Corona		Statements that include what impact the pandemic has had on the respondent's engagement with their own health
Technologies in everyday life			**All statements that provide information about attitudes towards/use of current technologies**
	Attitude towards technologies/digitisation		Statements that provide information about how the respondent views (new) technologies (e.g.: happy about new technical possibilities; rather sceptical about advancing digitalisation).

		Rather positive	Statements that indicate that the respondent has a rather positive attitude towards (new) technologies (e.g.: is happy about new technical possibilities).
		Rather negative/sceptical	Statements that provide information about the respondent's rather negative attitude towards (new) technologies (e.g.: is rather sceptical about the advancing digitalisation)
	Specifically used devices		Statements that include which devices the respondent is currently using
	Use scenarios		Descriptions of the situations in which the respondent uses specific devices
		Health-related	Descriptions of when the respondent uses specific devices in health-related areas
		Everyday life	Descriptions of when the respondent uses specific devices in everyday life
		Social life	Descriptions of when the respondent uses specific devices that affect his/her social life
	Advantages		Statements describing (possible) advantage of certain digital applications/devices
	Disadvantages		Statements describing (possible) disadvantages of certain digital applications/devices
e-VITA Coach			**All project-related statements that provide information about ideas for the planned e-VITA Coach**
	First unspecific ideas		First statements in response to the question of what "virtual" means
	Appearance of the coach		Statements that provide information about how the respondent imagines the coach to look like
	Possible use scenarios		Statements that describe concrete situations in which the coach could be used.
		Under Corona	Statements describing concrete pandemic situations in which the coach could be used
		Social life	Statements that describe concrete social situations in which the coach could be used.
		Everyday life	Statements describing general everyday situations in which the coach could be used.
		Health-related	Statements describing health-related situations in which the coach could be used.
	Concerns/barriers		Concerns expressed that would stand in the way of the coach being useful
	Requirements for use		Prerequisites that must be fulfilled for the coach to be used
Speech interaction			**All content that specifically deals with the topic of language interaction with the coach**
	First idea on interaction		Statements that provide information about how the respondent envisions the speech interaction with the coach

	References		Expressed aspects that are particularly important to the respondent in the speech interaction with the coach
	Barriers		Expressed barriers/obstacles that might occur during the speech interaction with the coach

Date: _____ **Participant-ID:** _____

Demographic questionnaire

□ male □ female □ diverse

Age: _____

Gender:

□ City □ Suburban □ Rural community

1. Residence:

□ Alone □ Shared apartment

2. Housing situation:

□ With (marriage) partner □ Family □ Other: _____

3. Marital status

□ single □ widowed

□ married / registered civil partnership □ divorced

□ solid partnership

4. Do you have children?

□ no □ yes → *if yes, how much:* _____

5. Do you have grandchildren?

□ no □ yes → *if yes, how much:* _____

5. Highest level of education:

□ No school degree □ High school □ Other: _____

□ Secondary school □ Specialized baccalaureate

□ Junior high school □ University degree

6. Are you currently employed?

□ no

□ yes → *if yes, please mark where applicable:* □ Full-Time □ Part-Time □ Minijob

7. Are you currently retired?

□ no □ yes → *if yes, since when:* _____ (Year)

8. Do you currently hold a volunteer position?

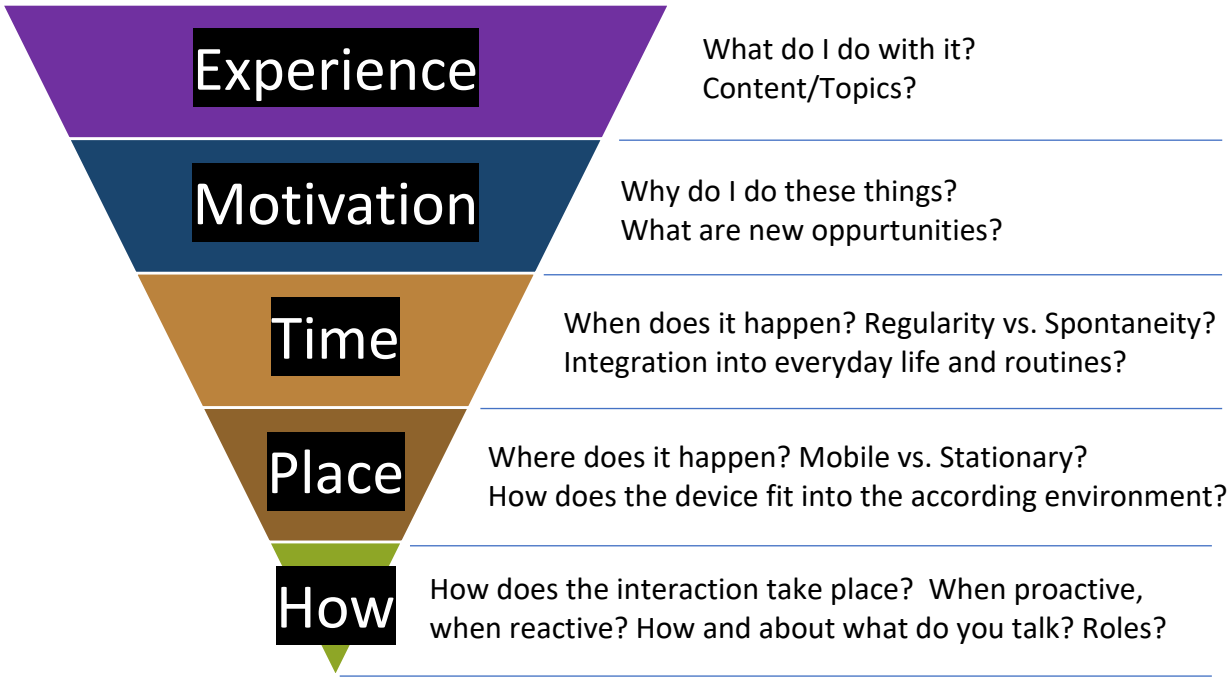
□ no □ yes

General approach to confrontation

The confrontation will take the form of a conversation. The goal is an open discussion about the presented technologies with participants. We make use of participatory design fiction in the sense that we encourage participants to tell their own everyday stories with Minu, set in the fictional world presented by the radio show. Based on our participant's narrative we gain an understanding of how much the chosen topics resonates with the participants and sparks imagination of everyday use. The generated fictional narratives contain requirements and inspiration for further designs.

General approach to collecting information about fictional encounters

While talking about a fictional encounter with Minu we want to get a vivid picture about the experience, motivation and interaction. The interviewer should try to cover all areas of interest. The order in which these areas are covered is not fixed. A fictional encounter could for example arise out of a particular time or place.



Introduction after listening to the radio show

The introduction helps us assess how much participants believe in the fiction and whether their disbelief in change has been suspended.

- Just to get an idea about your prior knowledge: Do you own a Minu from the company future age, or actively use one at home?
- Did you already listen to this radio show or hear about Minu, prior to our conversation?
- We want to generally explore what it is like to live together with a voice assistant. You may wonder know what the voice assistant can do our how it looks, but I would like you to simply imagine it the way it is in your mind

General prompts

The first half of the conversations focuses around open imagination. Interviewees can pick up topics from the radio show or come up with their own narrative of using Miro. The interviewer should not direct the conversation. Participants should bring up topics that resonate.

Experience: Imagine this device exists in your everyday life, what would you do with it?

Experience: Beyond those things we heard about Minu in the radio show… What are things you would like to do with a voice assistant like Minu?

Experience: Could you give me a vivid description of the scene? What is happening?

Motivation: What would be situations in which you imagine talking to Minu?

Motivation: Why do you do this? How does that make you feel?

Motivation: What are things that you value in your daily life. How do they change when you perform them with a voice assistant like Minu?

Time: Think about your daily routine, for example after getting up in the morning, when you prepare lunch… are there situations where you would use a device like this / situations where you don't want to use this device?

Time: When would you use it?

Place: Where would you use it?

Place: Where would it be if you are not using it?

Place: Is there someone else with you in that moment?

Place: How does Minu fit into this place? Where would you put it?

How: How would you talk with the device? How do you imagine it talks to you?

How: Try to imagine yourself in the situation. What do you say. What does the device say.

How: What are things the device shouldn't say. What would be inappropriate? What would be a good way of saying it?

How: How would you describe the kind of relationship that you and the device have in that situation?

How: How long would that conversation go. How does it end?

How: What is difference between talking to the device and talking to a human? What is the difference of interacting with this device or any other piece of technology?

Specific prompts

The second half of the conversations focuses around the features that have already been addressed in the radio show. The experiences will be explored as far as the participants imagination goes. If participants cannot imagine a use-case the reason behind it will be inquired.

Experience: In the radio show we heard one caller, who used Minu while cooking? How would it be in your Situation, if Minu was there to accompany your cooking?

Experience: In the radio show we heard that Minu is giving health advice. What advice would Minu give you? What would it be like to get this advice from a machine?

Experience: In the radio show we heard that Minu supports religious practices. What kind of support would that be in your case?

Experience: In the radio show we heard that Minu talks with people about deceased relatives or friends. What would that kind of conversation look like in your case?

Experience: In the radio show a representative of a local history museum, mentioned that Minu enables residents to share and experience the local history of their residential area. Can you imagine using an offer like this at your place of residence?

Experience: In the radio show we heard that Minu connects users with their relatives, by spontaneously getting them on the phone when both are free. Can you paint me a picture of a situation where Minu does this for you?

Experience: In the radio show we heard about a service that allows older adults to share their knowledge and offer help through Minu. Can you imagine using a service like this? What would you share or where would you help?

Pre-Study e-VITA

Semi-structured Interview Guideline End User (≥ 65 Years old)

Target group: healthy, independent persons living at home aged ≥ 65 years

Material:
Recording device + batteries, guideline + notes and pen, laptop, informed consent, demographic questionnaire (questionnaire is filled out by the interviewee **after** the interview)

Goals:

1. Information about the **everyday life** of the interview partner
2. Information about the **Meaning of Health and Health Literacy** for the interview partner
3. Information about the **use of** and **attitude towards** technologies
4. Information about the **acceptance** regarding interacting coaches

Introduction:

1. **Thank** the interviewee for agreeing to participate in the interview and briefly **introduce yourself**

2. Briefly explain again what **e-Vita** is about, that we are in a **first phase** of the project and clarify the **goals** of the interview.

"The objective of e-VITA is to improve well-being in older adults and thereby promote active and healthy ageing and encourage independent living of older adults in Europe and Japan. This will be possible thanks to an innovative virtual coaching system. It will consider the needs and wishes of older adults and provide personalized recommendations and interventions to improve the quality of life of older adults in Europe and Japan. Eventually, the virtual coach will support older adults in continuing doing what they value most and improve the quality of life of the users."

NB: Interviewers need to avoid any reference to negative stereotypes about older adults. The risk being that you reinforce and remind them about an internalized and unconscious negative stereotype they have about ageing.

3. Explain that the interview will take about **1 hour**, it will be **recorded** and then **transcribed** so that no conclusions can be drawn about the individual and that at the end they have to fill in a short questionnaire

4. Ask if the interviewee has any **open questions**

Privacy Policy:
Participation in the interview is voluntary and you have the option to stop the interview and withdraw your consent to record and transcribe the interview at any time.
In the following, you agree to give the interview and agree that it can be tape-recorded, transcribed, anonymized, analyzed and used in sequences in the context of the research project.

Start recording

Guiding questions (Initiation Storytelling)	**Topic-Check (ask if necessary)**	**Concrete questions**	**Maintaining**
1. Everyday Life			
We are currently in an unusual situation, but I would first be interested to know what a typical day looked like for you before Corona...	- During the week - During the weekend - Spontaneous activities	- How would you describe your social life? - What's especially important in your everyday life? - What is it like now under Corona?	- Can you describe *[said activity]* in more detail? - Then what is the next step?
2. Health / Health literacy			
Let's stay with your everyday life, to what extent do you deal with your health in the process?	- Subjective meaning of health - Procedure in the event of health problems	- How do you inform yourself about the topic of health? - What's especially important to you in your health? - What influence did the Corona pandemic have on your behavior?	- This component seems to be very important to you, why? - What problems did you encounter? What worked well?
3. Technology/Digitalisation			
Let's stay with your everyday life, what role do technical devices play in it?	- Use of technical devices - Advantages/Disadvantages - Barriers - Daily Life/ Social Life - Health Support	- How do you feel about the digitalization? - Why/why not do you use technical devices? - How do technical devices support you in your daily life/ social life / health (before/after Corona)?	- Why do you think X/Y could be an advantage/disadvantage? - Can you describe X/Y in more detail? - What was it like with device X/Y?
4. e-Vita Coach			
We talked at the beginning about the goal of the project to develop a personal, virtual coach. What does „virtual" mean to you in this context?	- First associations with the topic - Appearance of the consultant - Use (also under Corona) - Prerequisite for use - Trust - Concerns/fears	- How did you imagine the appearance of the coach? - What would be other useful/questionable situations in your everyday life / in health-related topics? - If the coach moves in with you, what would you need to know / be able to do beforehand? - What would the coach have to do to make you feel comfortable with it?	- What is important to you in component X/Y? - For example, you described situation X/Y at the beginning, how could the coach support it?
5. Speech Interaction			
Let's continue this scenario of having a personal virtual coach. Imagine that you really could have a normal conversation with him. How would that be for you?	- First state of mind on speech interaction	- How do you imagine the conversation with the virtual coach? - What is important to you in the conversation?	- What is particularly important to you on this point? - Can you explain this in more detail?
Closure: Thank you for participating in the interview! Is there anything else you would like to add or that is particularly important to you?			