D6.1 – Updates of the End-Users and Stakeholder Requirements

Deliverable D6.1	
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Executive Summary

While the main user requirements were provided by WP2 (task 2.1), the Living Lab infrastructures offer the possibility to constantly and iteratively 'update' these requirements via comparisons across different settings. In this deliverable, we trace and update the requirements for the development in e-VITA. We use a qualitative empirical approach where we confront older adults with usage scenarios for coaching machines to elicit further thoughts about different requirements. We carried out focus groups in Germany, France, Japan, and Italy where participants discuss diverging and shared sentiments about using coaching machines in everyday life.

Our insights show how individual attitudes and technological features hinder or encourage the acceptance of coaching technologies. Specifically, we scrutinize 6 cluster of requirements which are self-determination, privacy protection, trustworthiness, conversational skills and abilities, motivation, sociability. It turns out that common buzzwords do not adequately capture the underlying multifaceted concepts that necessitate a more nuanced understanding. Based on the first-person perspective of participating older adults we derive some important implications for e-VITA, which are:

- Respecting older people's right to self-determination.
- Making privacy protection perceivable and easy to understand.
- Counteracting fears regarding coaching machines, like the devaluing of individual perspectives
- Addressing late adulthood as a life stage of personal growth and development
- Avoiding a medicalized view that reduces aging to the decline of biological functions.
- Understanding the qualities of meaningful social interaction in late adulthood

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Acronyms and Abbreviations

Acronym/Abbreviation	Explanation
D	Deliverable
WP	Work Package
GDPR	General Data Protection Regulation
APPI	Act on the Protection of Personal Information
P	Participant
AI	Artificial Intelligence
MoSCoW	Must, Should, Could Won't - Have
IT	Italy
FR	France
DE	Germany
JP	Japan

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Definitions

Requirements. Requirements for a system are the description of what the system should do, the service or services that it provides and the constraints on its operation.

Living Lab. Open innovation ecosystems in real-life environments using iterative feedback processes throughout the e-VITA project.

Self-Determination. The process by which a person controls their own life. Possessing self-determination is characterized by free choice of one's own acts or states without external compulsion.

RASA. Rasa provides flexible conversational AI software for building text and voice-based assistants. In e-VITA the software is used to define conversational prompts and scripts for coaching machines.

ReDesign. Second design iteration in the e-VITA project, taking feedback from a previous pilot study with an earlier version of the system into account.

Active and Healthy Aging. Healthy ageing, like active ageing, emphasizes the need for action across multiple sectors and enabling older people to remain a resource to their families, communities, and economies.

Positive Aging. The concept of positive ageing is about making the most of the benefits of being old and keeping a good attitude about life. It is about keeping a growth mindset throughout older age just like any other phase of life, regardless of challenges or opportunities.

1 Introduction

Requirements help to guide the development of technological systems. In the e-VITA project we use different living lab sites to continuously update the requirements for our coaching system. The coaching system includes various devices, such as coaching machines, a social platform, and smartphone apps as well as web applications.

In the living labs we ask older users to test the technologies under development to obtain feedback and derive basic goals for the development. This user-centered approach allows us to understand the requirements firsthand and tailor the system to our target group of older adults.

1.1 Objectives of the Deliverable

The deliverable compiles all necessary specifications for the e-ViTA system to enable traceability. Further, it keeps them up to date through recent research with end users. Thus, we compile an updated list of requirements that have been validated together with focus groups at our cross-cultural living labs.

1.2 Overview of Contents

In **chapter** *Error! Reference source not found.* we trace the requirements that were obtained through earlier research and documented in previous deliverables. At the same time, we cluster the requirements into 6 groups that address aspects of interacting with coaching machine.

Subsequently, we created vignettes for each cluster based on dialogues that had been written for the coaching machines. We paid attention in the selection of dialogues to make sure they address tensions in the respective cluster of requirements. Afterwards we conducted focus groups at four different living lab sites (DE, FR, JP, IT) where the vignettes were discussed among older adults.

- *Chapter 3* summarizes the results obtained in two sessions with a total of 7 Germans.
- *Chapter 4* summarizes the results obtained in a session with 5 French participants.
- *Chapter 5* summarizes the results obtained in a session with 4 Japanese participants.
- *Chapter 6* summarizes the results obtained in a session with 4 Italian participants.

Thereafter, we compare the results from different living lab sites in **chapter 7**. More specifically, we look at the reasons that people find for using a coaching machine, the expectations that they have, and the concerns that discourage them from using a coaching machine.

Finally, we conclude **chapter 8** with some major implications for the further development of the e-VITA coaching system. In the end, we present our updated list of requirements in **chapter 9**.

2 Traced Requirements

Requirements engineering consists of sensemaking and problem structuring, although one could say that the former is the most important (Ralph & Mohanani, 2015). Hence, we trace and re-analyse our existing requirements to make sense of what older adults expect from a coaching machine.

2.1.1 Self-Determination

Self-determination is the idea that a person or a group has the right to make choices and decisions for themselves without interference from others. It's about having control over your own life and being able to decide how you want to live, what you want to do, and who you want to be.

In simple terms, self-determination means that individuals and groups should have the freedom to decide their own fate and pursue their own goals without being forced or coerced by others. It's an important concept in human rights, and it's about respecting people's autonomy and giving them the power to shape their own lives. Consequently, coaching machines should not be imposed on older adults. A common concern is that the use of coaching technologies quantifies our lives and may reduce or invalidate the user's personal experiences and choices (Westberg & Jingar, 2020).

Table 1 Traced Requirements Self-Determination

What	How	Where	Documented in…
The coach should consider individual circumstances and abilities	Users should have the ability to decide which functions they want to use or not use.	Use Case Configurator	Deliverable 2.1
The coach should fit to the individual self-concept of older adults	Engage with older adults as thriving individuals rather than as a stereotypical group	RASA dialogues	Deliverable 2.1
Retain autonomy and the control over devices	Allow users to decide over the use and non-use of features. Ensure controllability through usability.	Interaction Concept, RASA dialogues	Deliverable 2.1

2.1.2 Privacy Protection

The right to privacy is the right to be left alone and to have control over your personal information. It means that you have the right to keep certain things private and to decide who can access them. In essence, the right to privacy is about protecting your personal autonomy and allowing you to maintain control over your personal information and physical space. It's an important human right that is recognized and protected by many countries and international agreements. The GDPR governs data protection in Europe, while the APPI governs personal information protection in Japan.

Especially the use of sensing technology makes privacy protection a pressing requirement for e-VITA. Data usage is a frequent concern for the use of technology due to its complex functionality and intangibility. Lack of transparency often causes older adults to be more cautious and refrain from using the devices. As a result, the requirement includes not only actual privacy, but also matching perceived privacy.

Table 2 Traced Requirements Privacy Protection

What	How	Where	Documented in…
Adhere to principles of the European GDPR and the Japanese APP	Processing of the personal data that the coaching devices will collect under specific conditions.	e-VITA platform backend	Deliverable 1.12
transparent and comprehensible use of personal data	give an overview of service providers and data usage	Privacy dashboard	Deliverable 2.1
Data privacy issues and need data safety (What will be done with the data, that is important to know)	give an overview of service providers and data usage	Privacy dashboard	Deliverable 6.1
phrasing chosen is crucial for comprehensibility and should be suited for laypeople	Identify suitable phrasing through co-design and implement this in localization	Privacy dashboard	Deliverable 6.10

2.1.3 Trustworthiness

To be trustworthy, technology should be designed to operate in a way that is consistent with human values, such as fairness, transparency, accountability, and safety. This means that the system should be developed with a clear understanding of its purpose, the data it uses, and the potential impacts it may have on people and society.

Table 3 Traced Requirements Trustworthiness

What	How	Where	Documented in…
The e-VITA coach must explain why something is happening	Disclose reasoning for algorithmic thinking or data-based conclusions	RASA Dialogues	Deliverable 2.1
The e-VITA coach must be able to disclose intending actors at any point	Disclose the source of information and the purpose of motivation	RASA Dialogues	Deliverable 2.1
The e-VITA coach should provide information about intentions and intending actors	give an overview of service providers and involved institutions	Privacy Dashboard	Deliverable 2.1
Provide and filter serious and relevant medical information	Functions that educate users (i.e., health literacy) should provide balanced and reliable information	Knowledge Base, RASA Dialogues	Deliverable 2.1

2.1.4 Conversational Topics and Skills

Conversations with a machine are conventionally fact oriented. However, socially assistive robots also afford self-disclosure about more intimate topics. Overall, a virtual coach for active and healthy aging should cover a range of relevant topics that older people would want to discuss with a machine. Finally, cultural and societal factors also play a role in active and healthy aging. Societal attitudes and norms around aging can impact an individual's self-concept and expectations for aging, which can in turn influence their behavior and engagement in meaningful activities.

Table 4 Traced Requirements Conversational Topics and Skills

What	How	Where	Documented in…
The e-VITA coach must provide motivation for active and healthy aging	Motivational dialogues to do sports and healthy activities	RASA dialogues	Deliverable 2.1, 3.4, 3.2, 6.2
The e-VITA coach must offer contents that facilitate positive aging.	Conversations about experiences of aging, such as nostalgia, loneliness, grief	RASA dialogues	Deliverable 2.1, 3.4, 3.1, 6.2
The e-VITA coach could talk politely	Match relevant social and cultural norms	RASA dialogues	Deliverable 2.1
The e-VITA coach should have an audible voice	speech speed and articulation to be customized	RASA dialogues	Deliverable 6.3, 6.5
The user expectations for conversational abilities should match with actual functionality	Limitations of the coaching machines understanding should be clear, voice recognition and speech should be adequate	RASA dialogues	Deliverable 2.1, 8.2
Artificiality of conversations should not hinder the interaction flow	Turn-taking, delays and interaction modalities should be intuitive	RASA dialogues, Coaching Devices, Trigger Words and Actions	Deliverable 6.6
The e-VITA coach could offer entertainment or conversation topics of daily relevance	The coaching devices should be able to talk about daily topics (e.g., weather, news) or provide other forms of entertainment (e.g., games, music)	RASA Dialogues	Deliverable 2.1, 6.4, 8.2
The e-VITA coach could offer assistive function	The coaching devices could provide convenience functions, such as reading out books or reminder of appointments	RASA Dialogues	Deliverable 6.2

2.1.5 Motivation

Technology-mediated motivation refers to the use of technology to enhance or promote motivation in individuals. This can be achieved through various means such as the use of gamification, feedback, social influence, and personalization. Technology can provide feedback on progress, personalize content to match individual preferences and learning styles, create social interactions and accountability, and offer rewards and incentives that can increase motivation levels. The use of technology in this way can enhance individuals' motivation to achieve their goals and sustain their efforts over time.

Table 5 Traced Requirements Motivation

What	How	Where	Documented in…
Enable to self-motivate	Motivational dialogues that are not prescriptive, but rather aim at self-regulation	RASA Dialogues	Deliverable 2.1
Instructions and feedback need to be motivating for laypeople	The wording should not be overly medical or abstract	RASA Dialogues	ReDesign
The coach should suggest physical movements/ exercises according to the person's needs.	tailored dialogues based on contextual variables to achieve personal relevance	RASA dialogues	ReDesign

2.1.6 Sociability

Sociability, or the tendency to seek out and enjoy social interactions, is an important aspect of life in late adulthood. As people age, their social networks may change, as friends and family members may move away or pass away. However, maintaining social connections remains crucial for overall health and well-being. Sociability can also provide a sense of purpose and meaning in later life. Engaging in social activities, such as volunteering or participating in community groups, can help older adults feel like they are making a valuable contribution to society and maintain a sense of purpose in life. In addition, social relationships can provide emotional support and a sense of belonging. This can be particularly important in times of stress or loss, such as the death of a spouse or close friend. Overall, sociability plays an important role in promoting social connectedness, well-being, and overall quality of life in late adulthood.

Table 6 Traced Requirements Sociability

What	How	Where	Documented in…
The e-VITA coach must facilitate interpersonal relationships	facilitate social connectedness, awareness about social events, expand social networks	RASA dialogues, social platform	Deliverable 2.1
The e-VITA coach should not be detrimental to sociability	The coaching devices must not act as a substitute for social relationships	RASA dialogues	Deliverable 2.1

3 Requirements Update Germany

3.1 Participants and Methodology

In Germany, we conducted two focus group sessions to discuss the requirements with older adults. In total, 7 participants from our living lab were invited to join the discussion. All of them were already familiar with the e-VITA project.

The aim of the session was to discuss the requirements based on a variety of scenarios. We showed them different vignettes (Finch, 1987) one after another and prompted related questions . Differences and commonalities in the replies where then discussed in the group. Further, the discussion clarified a shared understanding of the associated requirement.

Table 7 German Focus Group Participants

Pseudonym	Age	Gender	Living Situation	Former Occupation	Group Session
P1	80	Female	Cohabiting with life partner	Judge	#1
P2	79	Male	Cohabiting with life partner	Judge	#1
P3	68	Female	Cohabiting with life partner	Care worker	#1
P4	71	Male	Cohabiting with life partner	Electro engineer	#1
P5	72	Male	Cohabiting with life partner	Industrial Clerk	#2
P6	75	Female	Living alone	Office Clerk	#2
P7	81	Male	Cohabiting with life partner	Industrial Clerk	#2

3.2 Findings

3.2.1 Self-Determination

The participants acknowledged that external pressures could influence individual decision-making. Such external pressures became a subject of discussion when the participants talked about the scenario in which different test sites compete. P7 rejected the idea of entering into competition: "*I don't want to have to enter a contest or feel obligated to do so. I don't have to anyway, and I don't like the idea.* Other participants discussed how such a competition might influence behavior. For example, "*the ambition to keep pace with the Japanese group and avoid falling behind*" (P1) could lead to a decision to exercise more than one had originally planned. P3 emphasizes that the pressure would increase if the contribution of individual participants became transparent: "*I think it depends on transparency, whether there is peer pressure and how he feels about it. Nevertheless, he can still say I don't want that, or I do want that.*" P4 elaborates further "*I do see a certain peer pressure. Psychologically subliminal. When the steps are tallied in the competition with the Japanese and in one's own group, the other participants might sneer a little and say, 'He stayed on the couch and didn't contribute to the result.' Although it's more subliminal, I agree that he still has complete control in that regard.*" P1-P4 agreed that incentives could become influencing factors, but do not take away a person's self-determination.

P7 feels a more general aversion against unsolicited advice: "*I don't want to feel pressured by suggestions 'Do this, do that'. Usually, I already have an idea of what I could do, or otherwise I would ask for input. (P7)*" P6 also emphasizes that she does not want to be influenced by a machine: "*I live my life as I see fit (P6).*" P5 argues that the dosage matters: "*If he were to ask me ten times now, every time I walk past it, then I would eventually throw the thing in the corner or unplug it. If he were to ask me once during the morning, then I would be happy to take note of it.* (P5)*"

3.2.2 Privacy Protection

P2 explains that comprehensibility is an important prerequisite to make informed decisions about the collection of data. *"Such instructions are often written in legal language. Many people are afraid to even look at them. It would be best if the most crucial details, like the explanation of the data collection's scope, necessity, possibility of inspection, and possibility of objection, were emphasized and presented in a clear manner. (P2)"* P4 agrees and suggests that a privacy dashboard should offer customizations like "simple language" to minimize thresholds: *You should develop a software that can be individually adjusted to meet user requirements. This implies that fit individuals who decide "this is enough for me" will progress through it fairly quickly, but there are also concepts like accessibility in simple terms. So that you can easily explain it to someone who is having trouble.* (P4) The topic also came up in the second focus group where P6 complains about the way digital products present their terms of use: "*What is particularly serious is that the conditions are extremely long, and no one reads them.*" (P6)

P5 is wary of unwanted transmission of data to third parties after he had some bad experiences: "*Three examples. Selling of data. Wrongful acts of staff. And the feedback from my antivirus program.*" This led to a general attitude of distrust. P7 replies to that and emphasizes that we need to differentiate between malicious intent and unregulated use: "*I understand that it is impossible to fully protect oneself against criminal activities. However, I would like it to be a rule that it is clearly stated that such activities are not allowed. If there is a hack, the provider cannot be held responsible for it. They must ensure that the system is properly protected, but there is no 100% guarantee. I just want to make sure that the door is not opened for legal use.*" P6 notes that she has the suspicion that data are handed to third parties anyway: "*I also see a difficulty there. For example, I have an Alexa device where I can manage my data. However, sometimes I feel that the data ends up somewhere at Google because I receive notifications or see ads for certain products.*" Notably, the bad experiences of the participants occurred with different products, however, generalize their judgements for any digital device. Thus, it seems that perceived privacy and generalized distrust are a major obstacle for acceptance. Consequently, a dashboard that grants control is nice but it cannot counteract a lack of perceived privacy or general distrust.

3.2.3 Trustworthiness

P5 and P6 agree that proper functioning is a prerequisite for any further engagement with a coaching machine: *"The biggest problem with chatbots was that they mostly didn't work at all. This makes you not even want to bother dealing with them."* P7 adds that it is important that older adults can understand the meaning behind words, sentences and should be able to interpret utterances of devices correctly: "*That [feedback from activity trackers] basically just unsettled me. But that may also be because I don't know how to interpret values properly. When you become unsure, I find it stressful. (P7)*" P4 compares trust in coaching machine with the trust that people put in other technological products, such as a car navigation system. "*When you buy a navigation system for your car, you trust that it has been professionally developed and that the data on the map material is correct. Such a coaching machine would also have to be manufactured according to the relevant technical guidelines and with CE marking, so that certain quality requirements are considered. (P4)"* P3 picked up on this idea and

mentioned that blind trust also entails risks: "*There are also those who blindly rely on the navigation system, and there have always been incidents in which people drove their cars into rivers after being instructed to turn left which they did despite better knowledge. (P3)*" Together they agree that specific certifications for coaching machines could help to establish trust, but sound judgment of end-users should also be encouraged.

3.2.4 Conversational Topics and Skills

Participants were surprised that the machine tries to "medicalize" their everyday situations, such as the expression of nostalgic feelings. "*I'm surprised that the machine wants to send me straight to a therapist when I have nostalgic feelings. It's not necessarily something pathological (P2)*." Consequently, he cannot imagine talking with a machine about his feelings. P4 agrees that the conversational approach lacks openness to everyday topics. "*I could imagine that it is an interesting opportunity for older people to talk about the things that they have experienced, but it should be in an open conversation. I have the feeling that the user is being pushed into the therapeutic corner. There is a deficit, and it needs to be fixed. I would feel patronized* (P4). ". He concludes "*I would discuss nostalgic feelings with a machine, but not as a therapeutical problem. (P4)*" P3 could imagine talking with a machine about her emotions, but the machine's conversational abilities would have to improve. "*If I imagine I am alone at home and there is no one I can contact, then I would talk to the machine about it. Maybe it could help me. Of course, not with this conversational approach, but there should be the possibility of a positive dialogue. That means no pathology and no therapy. (P3)*"

Participants were divided over a second scenario in which a user talks to a machine about his or her grief experience. P1 found the answer unsatisfactory because the machine did not provide any help but only refers to other resources. *"The answer is only general advice. These are only hints on how I can get help elsewhere, but I don't get any help from the machine. (P1)"* P2 argues that during times of grief, people may forget what otherwise appears simple and self-evident. *"If someone is in this situation and finds it difficult to talk to others about their grief, and they can then ask a machine this question and get the appropriate advice, I would consider that very helpful (P2) ".* P3 adds that the opportunity to talk about grief is valuable in itself: *"I agree that this is a unique situation. Especially with older people, which I have observed in my professional and personal life, some withdraw significantly, and loneliness threatens. I believe in the ability to release emotional baggage by speaking out loud. Just saying things out loud can help you get them off your chest. (P3)"*

Participants of the second focus group found it strange to talk with a machine about their emotional state: "*The first part, where I gather information, is okay with me. However, I wouldn't want to use the device for coaching. I can't imagine being in a situation where I would engage in such a dialogue*." (P7) Further, he argues that the lack of empathy and automation involved in an artificial conversation would make it feel alienating or strange: *"He can't really empathize with my situation. He can only spit out preconceived things, and I don't feel like I'm being seen as a person, as an individual. (P7)"* P6 follows up on this and explains her disbelief that conversations with an AI could be meaningful for older adults: "*We are still a bit skeptical about all of this because we cannot really imagine that it would be a proper solution for an elderly person. The best solution would, of course, be personal conversations with people, not with AI. (P6)*" Part of her critique is that she cannot imagine that these conversations are non-exclusive, or put differently, she fears they replace human contact or harm sociability.

P5 on the other hand, offers a more nuanced perspective: „*I interact with people almost every day, and sometimes it's very pleasant, but other times they can also annoy me. The responses I get from people are not always favorable or something that I can enjoy, nor are they always purposeful. I would be*

curious to see what kind of response a machine would give me." (P5)" Furthermore, he elaborates that he could imagine that such a device could be useful for widowers or widows: *"If I get older, I could imagine having such a device around me, either for myself or for my wife. One of us will be the first to go, and then usually you fall into a hole, or you must be really good to pick yourself up quickly and start again. I would probably be more suited for it than my wife, given our personalities. I think my wife could use something like that well, considering her personality. (P5)"*

3.2.5 Motivation

P4 emphasizes that knowledge about healthy living alone is not enough to enable behavior change. He emphasizes the difficulty of changing habits formed over a lifetime. "*I imagine that this is difficult. I speak from my own experience. It's difficult to leave long-established paths and change something. You always intend to do it, but relatively little happens*. (P4)"

P3 believes that addressing positive changes rather than threatening people with negative consequences is more effective. "*I think it's good when the machine presents it positively. It is critical to always have a goal in mind. You can, for example, restore and maintain your fitness, as described here. It is critical that you visualize how things could improve. It is critical to project a positive image without creating stress or a negative scenario. (P3)*"

P4 also mentions that motivation is also a matter of dosage. "*I eventually ignore my smartwatch when it reminds me for the tenth time that I need to do this and that. If you overdo it, it will be ignored or cause fatigue.* (P4)" Consequently, a coaching machine needs to be sensitized for the scope of action that people have In their daily life.

P7 clarifies*: "I accept gathering information. Then it is also a good opportunity to address such questions and receive answers. This "coaching" is practically "entering into a dialogue". This is something completely different for me than just informing myself."* He is reluctant to enter dialogue with a coaching machine because he is concerned about opinion-shaping and prefers to form his own opinion. P6 agrees with his statement and elaborates that some diets are enforced too vehemently: "*I actually have to motivate myself. What bothers me are these religious-like things that are being forced upon us today. For example, if someone doesn't eat vegan. I don't see how the things being forced upon us are healthy*."

P5 explains that advice regarding nutrition typically contradicts his own life experience and consequently would not blindly accept it. "*I would partly accept it, but always reconsider it for myself. I have already expressed my opinion on this, for example regarding the issue of nutrition. [...] I certainly eat incorrectly according to the whole scenario that is being offered. I eat fatty foods. In earlier years, I ate a lot of sweets. [...]But I am not going to change my diet if I have been so healthy throughout my life. If I change my diet for the sake of healthier living, then I will probably get sick. (P5)*" In reply to a question from the moderator, P5 further explains that his diet consists of a traditional cuisine that has proven to be good for him and activity level: *"So, actually, it's a traditional, hearty, and healthy diet. It happens that I eat a hearty soup with plenty of pork mince balls in it. Experts would say that it is very unhealthy. But I burn it with my sports activities anyway. (P5)"* P6 endorses the value of traditional diets and feels uncertain about modern cuisine: "*People have eaten normally for decades, centuries, with food that was grown. And now suddenly we are supposed to eat all this artificial stuff. I don't see any sense in it.*" P7 joins in and even suspects a hidden agenda*: "I can be a bit heretical and say that the nutrition advice today, which aims to eat less meat and so on, could also be a packaged campaign for environmental protection. (P7)"*

P7 adds that the willingness to change behaviors also depends on goals that people have for later life*: Everyone has their own philosophy of life, and it also depends on whether they aim to live to a very old age or whether they say that they prefer to enjoy their life as they have lived it so far and are satisfied with it. If it eventually reaches a point of no return and becomes sick and dies - in quotation marks – relatively 'early', then that's okay with me." (P7)."* Consequently, some older adults might be comfortable with their choices and priorities and are willing to accept the consequences of those choices. "*Whether or not I need to give up chocolate now depends on it. I eat a small bar of chocolate every day after lunch. I am not supposed to do that because I have a histamine intolerance and I know that chocolate is harmful to me. However, I still eat it. I am willing to accept the consequences of my actions. (P7)*"

3.2.6 Sociability

P7 explains that older adults may generally have reduced social contact for a variety of reasons: "*Contacts have become less because some of the contacts that one used to have are no longer available. They were partially due to work or other things such as sports. In addition, some of the people with whom one had contact are no longer there. Some of them may have passed away or changed somehow. (P7)*"

P6 explains that group activities can trigger a chain reaction that causes people to be more sociable: „*The people who come to our different groups get to know other people there. It has now reached a point where they also meet each other privately or go on an outing together (P6). "*P7 adds that small-scale events are better suited to establish contacts*: "There is a room full of people where one can talk to their table neighbors, but this is not a platform for making contacts. Above all, it needs to be quieter, not a concert or anything like that. I don't need that. Above all, there also needs to be a conversation. (P7)*

P1 compares the suggestions that a machine can give to impulses that she used to get from the local newspaper. "*I can see how this would be beneficial. When I think back on the activities I've done in retirement, they were all suggestions from the newspaper. People who are interested in this and that are needed. Then I realized this might be something for me. That is how I became involved in such social activities. That is also what the machine would advise me. (P1)*". She believes that suggestions from a coaching machine could even replace the announcements in a newspaper. P6 also thinks that a machine could give the right impulse to overcome inhibitions: "*It's often a challenge at the beginning to muster the courage to go there, but once you do, you end up enjoying it. (P6)*"

P4 is less convinced that a machine can persuade him to attend social events. Due to his wheelchair, it is more complicated to take place in all events. P3 also tells us to not underestimate the multifaceted reasons why older people avoid social events. "*It is often the case that there are limitations. Not only limitations in mobility, but many suffer from pain or other illnesses that prevent them from sitting for long periods of time. Earlier, the topic was urinary incontinence in old age. Many older women I know say "but I always have to go to the toilet, I'd rather not take part in events*". P7 also emphasizes the need for a more nuanced understanding: "*This is not just a question of motivation, but it is more complex as there can be various reasons why someone withdraws or retreats. (P7)*"

Further, the participants raise the point that solitude can be a choice that does not necessitate loneliness. They believe that a machine should only offer impulses if it becomes clear that a person has less social contact than they desire. "*I believe it is critical for such a machine to perform a self-*

assessment of the person. Some people prefer to be alone, and even if you make numerous suggestions, it is difficult to persuade them to participate in something. (P1)"

4   Requirements Update France

4. 1 Participants and Methodology

In France, we conducted a focus group session to discuss the requirements with older adults. In total, 5 participants from our living lab were invited to join the discussion. All of them were already familiar with the e-VITA project.

The aim of the session was to discuss the requirements based on a variety of scenarios. We showed them different vignettes one after another and prompted related questions. Differences and commonalities in the replies were then discussed in the group. Further, the discussion clarified a shared understanding of the associated requirement.

Table 8 French focus group participants

Pseudonym	Age	Gender	Living Situation
FR01	82	Male	Alone
FR02	76	Female	Alone
FR03	82	Female	Alone
FR04	89	Male	With someone
FR05	75	Female	Alone

4.2 Findings

4.2.1 Self-Determination

Some people found the way the information was presented, by showing the negative effects of behavior, to be guilt-inducing. For participants, the notion of pleasure and encouragement essential for behavior change is missing. "*P2: I find that it is enough to make you sad, it is enough to make you depressed"*. These people preferred the information given to be more nuanced and positive "*P2: Before saying bedridden, he could say 'you might have a sore knee'*" or "*P4: there is a person waiting downstairs to walk with you"*. However, for one person this is still a good way to stimulate "*P3: No, it stimulates us. It's good to hit harder, just to become reasonable"*. Concerning the idea of a competition on the number of steps between the countries, this is not well received "*P1: There is a* competition not in relation to oneself in the last one, but it is a competition in relation to others, a group, and I find that it is not simple". Finally, it seems essential to personalize the coach's discourse to adapt to the user's abilities *"P2: Someone who wants to go for a walk and then has osteoarthritis in her knees and suffers from a divine pain, how do you want her to go for a walk? Even with two crutches, even with two canes."*

4.2.2 Privacy Protection

Participants are rather apprehensive about the idea of data collection. They want to know what kind of data is collected. "*P5: Yes, that's another question, but in this case it's what kind of data is collected"*. For one participant, this question should not even be asked: "*P1: It should remain only on our device and not be exploited by others"*. Some participants are worried about the possible commercial exploitation of this data and that it is sensitive to hacking *P1: whatever we say to you "it will be secure"*

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we realize nowadays [...] we can hack any information". Participants do not feel that their privacy is guaranteed or that they are able to control their data.

4.2.3 Trustworthiness

The participants highlighted translation errors, particularly in medical terms such as "Stomach" instead of "belly" "*P3: The translation should be revised anyway*". They were concerned about poor transmission of information. They believe that all the information given by the coach should be verified by medical personnel and a translator to adapt the information to the culture of the country. *"P2: That's why it should be adapted to the interpretation that each population can make according to its culture"*. Moreover, this information should be updated regularly to keep up with the latest scientific discoveries. When reading this scenario, an ethical questioning is raised, it concerns the replacement of Human "*P1: I wonder if in any case, behind all the studies in which you asked us to participate, in the background, there is still the will to reduce the intervention of human beings with people who need it ".*

4.2.4 Conversational Topics and Skills

The information given by the coaching device seems to put the participants off. Indeed, for them, it is only words "*P5: I would say that it is blabla*" ; "*P2: It is basic, it is really basic*". The coaching system does not respond to the user's request, which is to speak "*P2: Yes, that's it! Try to talk, just talk*".

4.2.5 Assistance and Reminders

Some participants think it is a good idea "*P5: Yes, I need it, because now I have to take medicine at lunchtime, I never take medicine at lunchtime and I always forget it, so it would be useful for me*" while for other participants, it gives them the impression of being assisted and therefore ultimately losing their autonomy "*P3: We become a little assisted anyway, eh, if we ... ".*

4.2.6 Motivation

The way in which the information is given by the coaching system appears to be infantilizing "*P1: It's infantilizing, because we give things that are so obvious that we wonder how it can be that an elderly person to whom we are addressing does not know all that! And if they don't know it, and if they don't apply it, is it by reminding them that it will be effective? Is this the right way?*", this participant also questions the writing of such a scenario "*P1: And again, we come back to the basics: who made this kind of uh.... There can't be many older people who participated".* Some participants also questioned the interest of such a device for people in good health, as obeying the advice of a coaching system would lead to major problems and a loss of autonomy "*P2: Personally, if I am an elderly person, let's say in 10 years, if I start coaching like this to stimulate myself, frankly, if it stimulates me because I obey the machine, then I really think that I would be either Alzheimer's or cognitively impaired !"* However, some participants believe that the coach could help them to reflect on a change of behavior "*P5: Yes, because it makes us think a little ",* but the behaviors would only change in the short term "*P3: At the beginning maybe but we will quickly lose steam".*

4.2.7 Sociability

Participants struggled to imagine what the coach could do for John. Indeed, for some participants, John's inhibition is a psychological problem "*P2: yes but is the coach enough? It's not sure either, if psychologically, I think it's a question of psychology, if someone doesn't go towards others, doesn't want to talk towards others, the problem may be elsewhere. And I'm not sure that a computer coach, a database".* Moreover, according to some participants, John is supposed to know what exists around him, so the coach could not bring him new information "*P5: There is still information. It's like there's*

nothing around him, so you need a coach to give him information". However, the participants understand that this can encourage them to go out *"P2: Let's say it can be it can push it can give motivation".*

One participant concluded by saying that we try to do too many things, but the needs are varied and are not expressed in the same way by everyone *"P2: I think we can summarize a lot of things on a coach, we should split it up, there are many different things in reality. We want to make a single entity, but I think it is perhaps not possible. I think that's what it is. And at that point we're forced to have a generality and at that point we won't respond to the specifics."*

5 Requirements Update Japan

5.1 Participants and Methodology

A focus group discussion was held with four participants at Tohoku University. Three of the participants were not familiar with the e-vita project. Each topic was introduced together with the discussion questions, both on a handout and on a projector slide. Participants were allowed to freely discuss and share their opinions, with the moderator bringing the discussion back to the topic themes and questions when relevant.

Table 9 Japanese focus group participants

Pseudonym	Age	Gender	Living Situation	Education Level
JP01	67	Female	With spouse	University
JP02	78	Male	With spouse	University
JP03	80	Female	With spouse	University
JP04	76	Male	With spouse	University

5.2 Findings

5.2.1 Self-Determination

Thought that the user described doesn't know what he wants to do and may have his own reasons for why he doesn't follow the exercise suggestions or perform by himself.

He may be trying to decide what to do, and participants thought that the user in the scenario was not deciding what to do by himself if he listened to the coach.

Rather, it seemed to them, and they could imagine themselves as doing the same - for now to just listen, think of the coach's suggestion as one possible path of many, and might try it out if it suits them.

Regarding a self-determined life, participants did not feel that the user was being led, as to the user, the system may still lack credibility, until real changes have been seen, or a deeper relationship has been formed.

Participants thought of such a life as taking responsibility: to decide by oneself based on the available and gathered information, and to be satisfied that the decision was one's own and made on the information available. Then, one could enact and implement, later reflection on either a positive or negative outcome of the decision. The important point was that one had decided by oneself, and so could analyse one's own decision (test and improve one's competence).

5.2.2 Privacy Protection

Participants were not concerned with what data is collected, or how data would be shared. They highlighted that their hospital was already collecting and storing lots of their medical information, and so did not feel particularly concerned with the data collected by such a smart device, as in e-ViTA. They

thought a privacy dashboard would be a good thing to have, if possible, but were not overly concerned with managing their data, and wanted to avoid needing to check their smartphone regularly to do so.

5.2.3 Trustworthiness

The participants felt that they could trust what the system said to them, as the contents had been designed by research teams. Rather than generic answers such as "talk to a therapist", they wanted to know where exactly they could consult (with real information), as far as possible within the technological limits. This would likely increase the sense of trust and connection with the system.

5.2.4 Conversational Topics and Skills

Participants highlighted that even though they could search the internet and find medical information, they couldn't easily find a good 'answer' of how this could actually be applied in their daily lives and routines. From a system such as e-ViTA, they would like not only evidence-based medical information, but for such information to be linked to real examples, that they could practically perform or follow. One participant stated that 'Only having medical answers result in a reliance on drugs and the medical model', and that he wanted 'answers that work' and could lead to a visible change. If the response from the coach is too long and wordy, participants said they would not want to use it. Also, if the coach's response did not display sufficient variation, they may feel bored. They also were concerned about the capabilities of the content, and what would happen if they wanted to talk about topics that were outside the scope of the system.

Regarding heavy topics such as the passing of a loved one, they were not at all satisfied with the answers presented in the scenario. They didn't want such answers. They also thought what the user was saying to the machine was unlikely, and that in everyday conversation, users would not use difficult words or complex sentences. They thought the system would be good for people who are living alone.

5.2.5 Motivation

Participants thought that people who have decided to do things by themselves, probably don't need this system. However, the participants thought it would be useful for people who need to clarify the direction of their activities. For people who need an impetus, or a small push, they thought it is ideal.

They thought the suggestions made by the coach were too direct. The system needed to better attract the interest of the user. There needed to be more of a construction of dialogue to build up to recommending, more rapport building, that would also enable the user to better enact the advice of the coach.

5.2.6 Sociability

Participants were not keen on being pushed to be more social by the coaching system; rather, they envisioned older adults being content with the close social contacts they already had by that age, and not wanting to be burdened with the effort of making new contacts. They thought it is more tiring to have new friends and have to take care of them. They foresaw a difference between men and women,

expecting that women would prefer a community around them, compared to men who would prefer to spend their time alone.

6 Requirements Update Italy

6. 1 Participants and Methodology

In Italy, a focus group session was conducted to discuss the requirements with older adults. In total, 4 participants were invited to join the discussion. Since one of the participants was unable to move from home due to logistical problems, we decided to meet at her home and conduct the focus group there. All of them were already familiar with the e-VITA project, having been previously involved in other phases of the project. As the participants were already knowledgeable about the project, the presentation phase was rather short and specifically we showed them the website (https://www.e-vita.coach/) so as to recapture the main concepts and answer any questions they might have. At this point, we showed/described the different scenarios of each main topic. After each topic, we opened a discussion, starting with the reference questions, but leaving the participants free to express any thoughts. Finally, before moving on to the next topic, we summarized to the participants what had emerged from their responses, highlighting commonalities and differences, to make sure we understood their views correctly and leave them the opportunity to correct or add something else.

Table 10 Italian focus group participants

Pseudonym	Age	Gender	Living Situation	Former Occupation	Group Session
IT01	82	Female	Cohabiting with life partner	Seamstress	#1
IT02	90	Female	Alone	Factory worker	#1
IT03	67	Female	Cohabiting with life partner	Accountant	#1
IT04	71	Male	Cohabiting with life partner	Pharmacist	#1

6.2 Findings

6.2.1 Self-Determination

The first important finding is that participants agree that freedom and self-determination come through the coach's advice, rather than through describing the negative consequences one faces if one does not move enough, which seems more like a threat than advice. For example, IT01 reports "I don't like to be reminded of the negative things about being elderly, I am already elderly, I know perfectly well what my current health problems are and what the future will be", with which other participants also agree, such as IT02 who says "I wouldn't like to feel forced to do something either, I would rather be advised and not imposed in the form of a threat or comparison to other elderly people." On the other hand, there were mixed views on the issue of comparison with other users, IT03 in fact stated that "the coach could offer us daily challenges that we could freely participate in"; IT01 and IT02 remained firm on their position, stating that comparison with other people would make them feel forced to do something. Instead, IT04 admitted that indeed sometimes "it is good to put us older people in front of challenges.". Finally, thanks to IT04's input, the participants discussed the concept of "freedom of choice," agreeing that actually deciding to use this kind of device is in itself a personal choice, "In my opinion, it is important to remember that having this kind of device in the home is a personal choice and at the time we make this choice we also have to be aware that we will be asked to do something"

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(IT04), and that one must then be willing to follow the advice, without of course losing the freedom not to do so.

6.2.2 Privacy Protection

On this topic, participants showed understandable difficulties. The two oldest participants, IT01 and IT02, stated that they had no knowledge about data protection, "if I have to be honest I didn't understand much, but I'm not very good with this kind of stuff" (IT01); "on this topic I don't think I can be very helpful, I don't understand any of it" (IT02). IT03 agrees on the difficulty of understanding certain topics, suggesting "making this information as easy as possible, using non-technical and non-specialized language." IT04, although more knowledgeable than the other participants on the subject, also agrees that it is a topic that is not within everyone's reach. Regarding privacy, IT03 says "As far as privacy is concerned, I have to say that I am constantly concerned, but not only about this device, in general also about cell phones, computers, etc. However, I realize that now to be included in the world it is necessary to adapt to technology and technology works with our personal data, so I accept the trade-off," agreeing with IT01 that it is sometimes necessary for technological devices to collect personal data, in order to function properly and offer better services, "I realized that this device works using my data and therefore it is important that it has it and that is okay, if it serves my well-being and health" (IT01). IT04 agreed with this statement, noting that he does not feel too much concern, as he believes that "these technologies comply with all data protection laws."

6.2.3 Trustworthiness

In this case, participants' opinions are divided. IT01 and IT04 report that they trust the coach, that they have no problem asking for advice: "It would be nice to be able to ask this machine. I think I would trust it" (IT01), "I think turning to the coach is the exact same thing as googling and we all do that. So I don't see why trust Google and not this machine, also because I think it gets its information directly from the Internet" (IT04). Both also agree on the need to use simple language, without too many technicalities "...some terms I don't know, so I would like something that would speak to me in a simple way and especially give me practical advice" (IT01). The other two participants, on the other hand, describe themselves as more reluctant to trust the coach, especially in the area of health. For example, IT02 says "...I could trust if it wasn't about important or health-related information: if for example, I asked for some information about recipes, then I could trust, but I wouldn't ask for things related to pains I have or concerns about health." This statement is also shared by IT03: "it is okay to ask something about air ventilation, as in the example, because it is not urgent or serious matters, but for anything else, I would go directly to the doctor." Thus, two important points emerge: the need for language that is within everyone's reach and the idea of using the information given by the coach as a starting point, but always followed by a consultation with a medical professional.

6.2.4 Conversational Topics and Skills

All participants agreed that coaches should not recommend a therapist when faced with feelings of nostalgia or the like, as IT03 states, for example, "The problem is not the therapy itself, the problem is for a machine to tell me to do it just because I am nostalgic about something. The nostalgic feeling is not necessarily a negative emotion, why do you have to devalue it by telling me to get treatment?". What they think such a device should do is offer comfort, perhaps ask the person to talk about something, as IT01 argues "...I would like this machine to be able to lift my spirits, for example by asking me to talk about something, so I could distract myself." In addition, suggesting that an elderly person talk to friends or family members could increase the sense of loneliness if the person has no one to turn

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to "besides, some elderly people are really lonely and telling them to call someone if they have no one to call would make them even sadder" (IT04). Thus, they all agreed that a conversation with the coach should be light, and comforting. In contrast, one participant stated that he would not feel comfortable talking about emotions with a machine, "...I would then rather watch a movie or pray than talk to an electronic device" (IT02). On the other hand, this lightness and simplicity are found by the participants in the second scenario, e.g. IT01 states, "On the other hand, as for the cooking suggestions, I like them and would gladly follow them," IT04 agrees with this statement, claiming that "talking for example about cooking is a nice way to have a conversation, it is light and also useful." IT02, as in the previous scenario, emphasizes her distrust of a conversation with a machine "I don't see it as a bad thing, I agree with the first lady on that, however, the way I'm used to it, it's not a function I would enjoy."

6.2.5 Assistance and reminders

Participants unanimously stated that the coaching feature is a good thing. Although all participants said they were very precise and organized, especially with regard to medications, having a coach to remind them of certain things or commitments is always a security, as IT01 says "This is a useful feature, I mark all the medications I have to take on a sheet and I never get it wrong, however, it always comes in handy to have extra security." They also stated that they would not feel their autonomy would be affected and that they would not feel controlled by the coach, "I don't see how a simple reminder would affect my autonomy, I would still not stop marking my things on the calendar, I would use the device as a helper" (IT03). Furthermore, IT04 adds that even if one were to somehow go through a minimal reduction in independence, it would still be for good: "Even if I became, as it were, dependent, on the coach's medication reminders, it would be for my health, so it would be worth it.". A final positive side of the assistive function is emphasized by IT01, who says, "It would also allow my children and grandchildren to have more peace of mind, knowing that I have this device to remind me of my medications, so they don't have to call me every day just for that."

6.2.6 Motivation

On this specific aspect, the participants are divided. IT01 and IT02 argue that their habits are too ingrained to be changed, IT01 for example says "I don't think at my age certain habits can be changed. I give a personal example, I know I don't eat properly and I need to do more exercise, even if it's just a walk, but my husband needs 24-hour care, I can't be absent from home and leave him alone," an idea also supported by IT02 "It's useless for the machine to tell me to change and eat something different because I wouldn't listen to it, unfortunately, advice about nutrition is advice I don't tolerate." They also agree that the coach should give very personalized suggestions to the user, "Surely the machine's advice is useful, however, it should understand that not all people are the same and not everyone has the same opportunities to go out and exercise, or to engage in cooking" (IT01). This thought is also supported by IT03: "I would like it to focus on the individual person in order to offer advice; for example, in the first scenario the machine asks the person if they think eating healthy can improve their fitness: I personally am not interested in fitness, so the coach should ask the question in a different way." IT04, on the other hand, believes that using a coach could motivate him to change his habits, acting as a stimulus "I think the coach could help me change my habits: actually I know what would be good for my health, first and foremost proper nutrition and good physical activity, but I lack the stimulus. Instead feeling something that reminds me of that, that makes me see the positives, could be that push I need." A common element among all participants that emerges is the importance of personalization and of being able to build the suggestions on the person, taking into consideration not only the needs (health, movement, nutrition), but also the person's true desires and possibilities, being able to offer various

options from which to choose: "I would like it if he could also give me alternatives: for example, if I can't exercise because I have pains, he could recommend something else" (IT04).

6.2.7 Sociability

IT01 reflects that given her living condition, going out and participating in social events would be impossible, so the machine should suggest other activities: "For example, the machine could help me make a video call with my family members; I only have a landline phone, I don't know how to use smartphones or other similar devices. However, if this coach could initiate a video call, without the need for me to intervene, that would be great." This thought is also shared by IT02, according to which the coach should be adjusted to the individual person, "I think the machine should make suggestions based on the person, it cannot for example suggest me to do something away from home, because precisely I do not have a license. It should know my habits and possibilities." She suggests, for example, that she could push her to call a friend "we often talk on the phone, sometimes I would like to invite her over for coffee and to exchange books, but then I don't, I don't know why. If this machine said to me "why don't you invite your friend?" maybe I would eventually do it.". IT03, on the other hand, reiterates the concept that being pushed to seek professional help is not what she would expect or what she would like to hear, "I don't like the machine to recommend professional help, for the same reasons as before. Loneliness is a normal feeling as you get older." Instead, she appreciates the advice on activities to do, saying that "sometimes we older people feel lonely, but we also don't know what opportunities there are in our country, sometimes we are afraid to do new things, sometimes we are too lazy. In these cases, a coach to stimulate us is good." Of the same opinion is IT04: "I think this coach could stimulate me to go out and do new things. In fact it is true that sometimes we are not aware of what social opportunities there are, I personally have a lot of free time and I still feel very fit, I would like to use my days constructively, avoiding staying at home watching television." Participants therefore agree that the coach could be a stimulus for a person's social life, but it is essential that he or she tares on the person himself or herself, thus knowing his or her needs and, above all, his or her real possibilities, which is therefore extremely customizable ("Obviously, as said by all the others, not everyone can be given the same advice and the same activities can be proposed" - IT04).

7 Cross-Cultural Comparison

In this section, we make a cross-cultural comparison between the results at different living lab sites. To begin with, we want to provide some context so that readers can correctly interpret the obtained results. Obviously, we conducted the same focus group at different locations with participants who had varying cultural backgrounds. However, there is no way to unscramble the cultural influences of the country and a globalized world. We cannot guarantee that the participating individuals possess geo-cultural traits, and it is not desirable to reduce population groups to such stereotypes.

Instead, we understand the results as a melange of individual positions of researchers and participants in a sociocultural setting. In that way, they reflect the continuous discourse at local living lab sites out of which different topics are addressed and emphasized. Or, put differently: each living lab site constitutes a sociotope as a collective lifeworld and its meaning in a specific group of participants and researchers. This means that the results are not representative of what German, Italian, French, or Japanese people want, but rather show individual perspectives within a culturally embedded discourse. The significance and tonality of topics can be interpreted as a reflection of cultural attitudes, concerns, and customs. Additionally, it can be insightful to understand how the discourse at different living lab sites is tinted by historicity, cultural values, and future orientations.

7.1 Technology Acceptance

All in all, it can be considered a minimum requirement to meet a certain degree of acceptance. Otherwise, older adults will quickly abandon the e-VITA coaching devices.
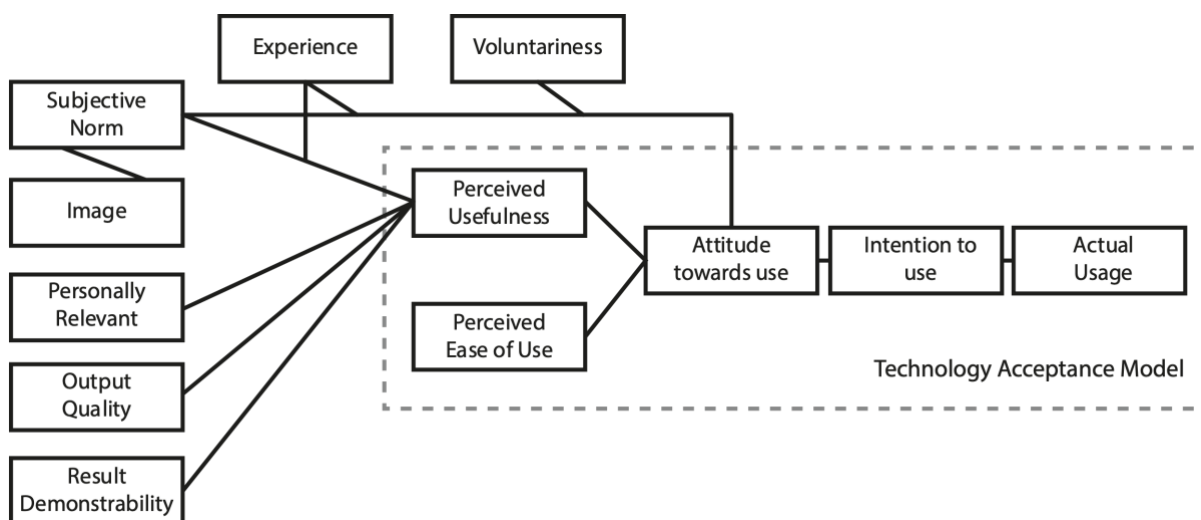
Figure 1 Technology Acceptance Model

The technology acceptance Model proposes that two primary factors influence technology acceptance: perceived usefulness (PU) and perceived ease of use (PEOU). According to the model, people are more likely to adopt and use technology if they believe that it will be useful and that it will be easy to use. Additionally, it includes several other variables that can influence technology acceptance. These include subjective norm, image, relevance, quality, and experience. With these factors in mind, we look at the focus group statements, technology acceptance and expectations of older adults.

7.2 Hygiene Factors, Motivators, Demotivators

In the following, we collect and compare different views and discussion points regarding coaching machines. We distinguish between hygiene factors, demotivators, and motivators to provide actionable insights for future development. Subsequently, we refer to the technology acceptance model to further contextualize the requirements.
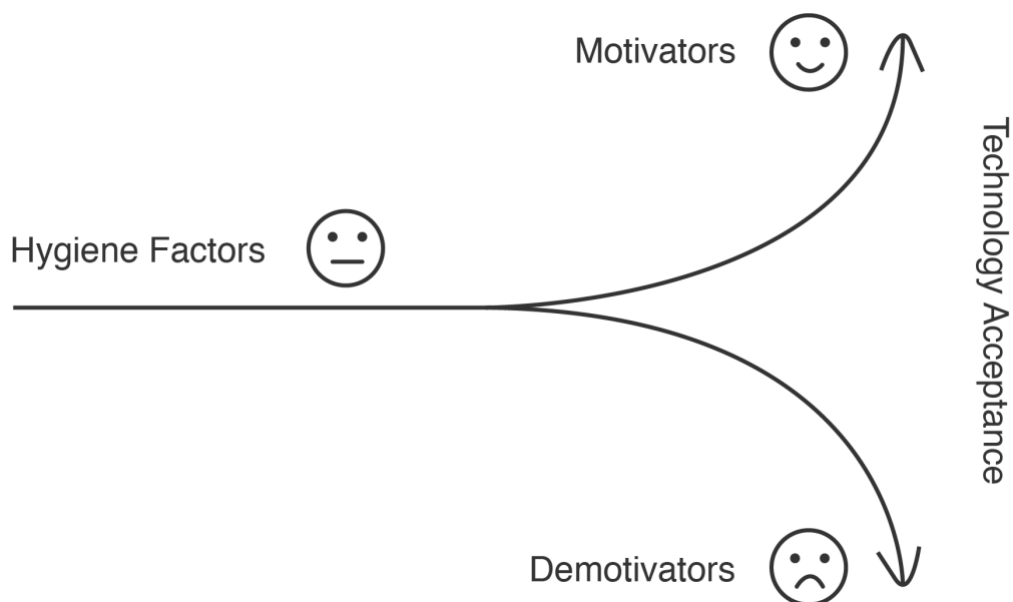
Figure 2 Hygiene Factors, Demotivators, Motivators

7.3 Hygiene Factors for Usage

Hygiene factors are basic features or boundary conditions that are necessary for a product or service to meet user expectations and prevent dissatisfaction. These factors are considered the bare minimum for acceptance and do not necessarily contribute to user satisfaction.

Table 11 Hygiene factors for usage

Country	Symbol	Hygiene factors
Italy	IT	• Retaining choice, voluntariness of usage • Comprehensible terms of use, privacy policy • Perceived compliance with laws and quality standards • Simple language and practical advice • Personalization regarding abilities and circumstances
France	FR	• Personalization regarding abilities and circumstances • Transparency and data collection and usage • Meaningful replies, profound knowledge, in-depth understanding
Japan	JP	• Retaining choice, decision-making powers • Practical advice
Germany	DE	• Retaining choice, voluntariness of usage • Certified compliance with laws and quality standards • Practical advice and Meaningful replies • proper functioning, no malfunctions

Central boundary conditions for acceptance were quality assurance, usability, and personalization.

Voluntariness and Personalization. People have the right to control their own lives and make their own decisions about how they use technology. Thus, it is essential that the use of coaching machines or specific features can only happen on a voluntary basis. Consequently, users should be able to choose not to use certain features. Coaching machines should acknowledge that different people have different needs, abilities, preferences, and values. What works for one person may not work for another. Thus, it should be possible to adjust the coaching system in ways that fit to individual circumstances. The more the system can address individually significant experiences, the more likely it will be accepted.

Functionality and Perspicuity. Participants agree that advice from a coaching machine must be meaningful and comprehensible. For example, the French participants disliked superficial responses that do not go beyond common knowledge. Participants also mentioned that the devices should talk in a comprehensible way. This important for all aspects of the e-VITA system. For example, the terms of use or privacy regulations should be formulated in a clear and comprehensible way.

Regulatory Compliance. Users expect that coaching devices meet the legal and regulatory requirements in respective countries. This can include compliance with data privacy laws, transparency in data collection, and other regulations that relate to the quality of interventions. At the same time, participants noted that there are no established regulatory standards for coaching contents from machines.

7.4 Demotivators for Usage

Demotivators are design elements or social sentiments that lead to a negative attitude towards a technology or decrease in motivation to use a particular system. Demotivators can be thought of as the opposite of motivators.

Table 12 Demotivators for usage

Country	Symbol	Demotivators
Italy	IT	• Devaluation/medicalization of personal feelings, preferences, habits • Paternalism/Imposition about daily habits and behavior
France	FR	• Negativity, as in emphasizing negative consequences of behavior • Fear of replacing or reducing human encounter
Japan	JP	• Medicalization of personal feelings, preferences, habits • Long and wordy responses
Germany	DE	• Fear of surveillance • Fear of other-directedness (i.e., being manipulated by others) • Overdose of unsolicited advice, annoying and relentless reminder • Devaluation/ medicalization of personal feelings, preferences, habits

Notably, major demotivation stems from fears that are grounded in uncertainty about living with coaching technologies. These fears might be without any reason or come true after using the technology for some time. Either way, they should be addressed since they bear the risk of triggering resistance or opposition. Furthermore, some fears might be culturally dependent and embedded into respective belief systems.

Fear of Medicalization. Healthcare is centered around diseases rather than people, which means it is, by definition, out of touch with human experience. In the context of aging and coaching technology, medicalization can occur when certain normal aspects of aging are defined as medical problems requiring treatment or prevention through technology. By framing aging as a problem that needs to be solved, these approaches can contribute to the medicalization of the aging process. The e-VITA coaching machines may prioritize biomedical approaches to aging over social and cultural factors that contribute to health and well-being in later life, such as social connections, meaningful activities, and cultural identity. This narrow focus on medical solutions to aging can overlook the broader social and environmental factors that contribute to health and well-being in later life and may lead to a reductionist view of aging as a purely medical problem to be solved through technology and coaching. The French participants also mentioned that a focus on the negative consequences of unhealthy behavior reinforces a negative view of aging.

Fear of Surveillance. Every country has a complex history with surveillance, and the sentiments towards it have been shaped by various historical events and political regimes. The rise of digital technologies has brought about new challenges to privacy rights and countries had to grapple with issues such as mass monitoring, data breaches, and the role of tech companies in collecting and using personal data. In recent years, there has been increasing concern about the risks posed by surveillance capitalism and the potential misuse of personal data by corporations and governments. This widespread fear is reflected by the statements in our cross-cultural focus groups that emphasize the importance of privacy. At the same time, it becomes clear that privacy is contextual, and it depends on the justification of whether data collection is met with resistance or acceptance. For some, it is sufficient to know that the technology needs data to function. For others, it was important to know which kind of data is collected, what it is used for, and that is stays on the device. Additionally, people expressed a resigned acceptance that data is never truly safe because systems can always be hacked. Notably, the sample sizes are too small to generalize, yet it is worth mentioning that the 4 Japanese older adults and the 4 Italian older adults were indifferent about the specifics of data collection, whereas older adults from France and Germany inquired about it. Overall, the irrevocable, invisible, and spaceless data flow of digital devices has given rise to extra cautiousness propelled by fear of surveillance as a cultural phenomenon.

Fear of Other-Directedness. Participants of the German living lab viewed the coaching machines as influencers. Hence, the machines were never viewed as the content creator, but rather as a playback device. Thus, participants were wary about the sources and hidden agendas. Indeed, coaching machines could be seen as influencers in the sense that they can influence the opinions, attitudes, and behaviors of their users. Through multiple instances they could address segments of the population and are seen as experts in their respective fields or niches. They use the reach of their influence to promote services, or ideas and can sway their users' decisions through their recommendations or endorsements. Thus, they can significantly impact their users' choices and actions. Some participants fear becoming other-directed, which is evident in their distaste of imposed instructions. In Germany, this was paired with the suspicion that such machines pursue the interests of hidden others.

Fear of Losing Human Contact. People fear that the increased use of coaching technology will lead to a loss of human contact. This is because coaching technology relies heavily on algorithms and data analytics to provide personalized coaching, which can lead to a lack of emotional connection between the coach and the individual being coached. This in turn, could lead to a sense of isolation and disconnection from the human element of coaching. The participants who formulated such critiques did not consider human coaches in the process, which might have changed their perception.

7.5 Motivators for Usage

Motivators are design elements or social sentiments that encourage user engagement and positive emotional responses. Motivators can vary depending on individual preferences, needs, and circumstances. Furthermore, the relative importance of these motivators can also change over time and across different contexts.

Table 13 Motivators for usage

Country	Symbol	Motivators
Italy	IT	• Subjective normalcy of digital connection • Light and comforting conversations • Sense of security and peace of mind
France	FR	• Sense of security and peace of mind
Japan	JP	• Concrete and Actionable Advice about Opportunities
Germany	DE	• Retaining autonomy with increasing age • Obtaining a positive image of aging

After listening to the usage scenarios, participants also mentioned some motivations to use a coaching machine. The fact that technology use among older adults has become a societal normal or at least normalized turned out to be a reason to try out coaching technologies. Additionally, the opportunity to compensate for age-related decline in autonomy or security was frequently mentioned. Participants of the Japanese living lab also looked forward to receiving more concrete and practical advice than what they could get through current means. Finally, participants also imagined that conversations with a coaching machine could be pleasantly light or even convey a more positive image of aging.

8 Main Outcomes and Further Implications for e-VITA

In this deliverable we contextualize our requirements by discussing them with older adults. It turns out that frequently used buzzwords, such as privacy, trustworthiness, social connectedness, or self-determination, are multifaceted concepts that require a more nuanced understanding. In general, we suggest that motivators for usage need to be further exploited, while demotivators should be addressed. A coaching system that offers a distinct and fresh perspective on aging is more likely to show be well received. The involvement of older adults shows that we cannot consider aging only as a societal and medical concern but need to take a view from the inside of human experience. A fundamental wish of older adults seems to thrive in authentic and situationally appropriate ways. Thus, we suggest rethinking coaching technologies for aging through the lens of personal development. Hence, it will be crucial for coaching machines to understand subjectively meaningful experiences, individual resources, and personal aspirations for the late years.

8.1 Summary of Implemented End-user Studies

In this deliverable, we trace the requirements for coaching technologies that emerged throughout the e-VITA project. To re-analyse and validate our list of requirements we conduct 4 end-user studies with a total of 20 older adults. Specifically, we discussed vignettes about the e-VITA system in focus groups at different living lab sites in Italy, France, Germany, and Japan. Primarily, we re-analysed cluster of requirements to make sense of older users' expectations and concerns. Specifically, we looked at self-determination, privacy protection, trustworthiness, topics of conversation, motivation, and sociability.

8.1.1 Self-Determination

Older adults often have a clear idea of who they are as an individual and want to act accordingly. Of course, coaching entails to question and challenge oneself. This can be in tension with prior habits, preferences or even conception of oneself. To alleviate the unease associated with change, it should be self-determined. Thus, older adults should be able to choose and endorse the changes they want to make. In the context of coaching machines this means that they should feel a sense of control when they engage in dialogues or pursue interventions (Yang & Aurisicchio, 2021). Consequently, conversations scripts should be written in a way that allows older people to make their own decisions and set goals for themselves. It would be demotivating if the conversations turn out to be patronizing, prescriptive, or manipulative.

8.1.2 Privacy Protection

Overall, participants concern about privacy varied. For some, it was not important while others saw it as a central issue of the technology. Generally, they understood the attempts in the e-VITA project to empower older adults to control their privacy. In general, they understood the e-VITA project's efforts to empower older adults to control their privacy. Research in Human Computer Interaction already showed that a graphical privacy dashboard is perceived as more attractive, stimulating, novel and transparent compared to a standard policy long text (Reinhardt et al., 2021). However, it also turns out that visual representation has no effects on conversion rate, perceived control, or perceived trust. This is consistent with our findings, in which some participants remained sceptical even though the privacy dashboard in the scenarios offered some control. Based on their statements the control assured by such a privacy dashboard remains intangible, illusionary, or at least uncertain.

8.1.3 Trustworthiness

Trust is a frequently used buzzword that refers to various efforts aimed at convincing users to engage with a system despite initial reluctance. There are different factors that are conducive to trust, such as understanding the system, having control over the system, or trusting the creator of the system(Edwards & Sanoubari, 2019). These also became apparent in our end-user study. Overall, trustworthiness was more important for those who were concerned about negative consequences, such as surveillance, medicalization, other-directedness, or losing human contact. For them trustworthiness was often typified through regulatory standards and quality control.

8.1.4 Conversational Topics and Skills

Active and healthy aging is a central piece of the "new gerontology," an effort by scholars and others to view aging in a fresh, positive light (Belgrave Linda and Sayed, 2013). However, it can come across as reductionist, medicalized, and geared towards productiveness. There is a possibility that the glorification of activity and health could cause self-blame for those who are less fortunate and face diseases or other unpleasant experiences of aging. Thus, older adults will be frustrated with the coaching machines that unnecessarily reduce this important life task to a medicalized view of aging. Positive aging focuses on healthy and fulfilling ways of aging, characterized by a positive outlook, personal growth, and a sense of wellbeing, instead of merely avoiding illness. Whereas the active and healthy aging discourse mainly consider old age from a third-person perspective, as a societal and medical concern, the growing older discourse focuses on the experience of aging in the first- and second-person perspective (de Lange, 2020). Considering aging as growing older and recognizing the existence of "negative" experiences, existential questions, and identifying positive coping strategies makes coaching more relatable and brings it closer to lived aging experiences.

8.1.5 Motivation

Our conversations with participants showed that a lack of motivation must not be equated with a lack of health literacy. In many cases, participants knew that some behaviours are unhealthy but chose to indulge in those anyway. Thus, it would be a futile strategy to simply point towards negative consequences. Instead, goals for late adulthood need to be better understood and operationalized as an aspiration. In this respect it will be crucial to understand late adulthood through the lens of a positive aging process with room for self-actualization despite declining capacities and life changes (Crăciun, 2023b). For this, we should focus on different developmental areas, including positive emotions, positive social relations, and having a purpose in life. This could be an individualized approach that focuses on promoting positive subjective experience, as well as discovering and augmenting positive individual traits or character strengths.

8.1.6 Sociability

The present approach to sociability in the e-VITA project relies heavily on facilitating connectedness. This assumes that when approaching old age, people tend to withdraw from society and their social roles. However, such generalizations can be discriminating for older adults, because not all older individuals disengage from social life. A more nuanced understanding shows that older adults are motivated to invest their time and resources more selectively. For example, older people may prefer to meet their close friends for a comforting chat (i.e. emotional goals) than to start new activities to make novel acquaintances (i.e. informational goals) (Crăciun, 2023a). Rather than blindly advocating for increased social connectedness, it appears worthwhile to further investigate which social interactions are subjectively meaningful to older adults.

8.2 Main Implications for the e-VITA project

Based on our findings we can deduce some implications for the re-design of the e-VITA coaching system.

- Check conversation scripts for coaching in terms of a _right to self-determination_.
- Find ways to _make privacy protection more perceivable_ and easier to understand.
- Take _countermeasures regarding demotivators_ like medicalization or losing human contact. This includes to better address the lived experience of aging and emphasizing the role of human coaches.
- Include conversations that holistically _address late adulthood as a life stage of personal growth_ during which older adults' phase certain developmental tasks, such as accepting the life lived, adapting to changes, and planning their later years.
- Revise conversation scripts for coaching in terms of a _positive tonality that embraces aging as an opportunity_ rather than a time of decline.
- Incorporate a _more nuanced understanding of sociability_ that acknowledges the quality of social exchange rather than the frequency of contacts.

8.3 Relation to Other Deliverables and WPs

We have traced requirements back to earlier deliverables, such as _D2.1 Description of the End Users and Stakeholder Requirements_. In this sense, the present deliverable builds on extends our previous understanding of end-user requirements.

8.3.1 Relation to Prior and Further Work in WP6

The present deliverable expands on co-creation processes that take place in the cross-cultural living labs. The living labs enable a continuous design process together with older adults. At this point, some of them have been involved in the project for more than 2 years and are familiar with the aims and discussion points. Some of them have already used earlier versions of the e-VITA coaching system during our pilot study. This allows for more in-depth discussions and the acquisition of more nuanced and concrete feedback.

8.3.2 Relation to Other Work in WP4, 5, 7 and 8

The present deliverable informs the re-design phase of the e-VITA project. Eventually, the identified requirements must be considered during the system development (WP4, WP5, WP7). The final proof of concept study will show how end users perceive and accept the coaching machines and re-designed dialogues (WP8).

9 Updated List of Requirements

In the following, we present an updated list of our requirements. In doing so we use the Moscow Method as a prioritization technique to prioritize requirements or features for the project. We use the acronym "MoSCoW" to describe:

- "Must have" requirements that are critical for usage and continued engagement.
- "Should have" requirements that are critical for acceptance and trust.
- "Could have" requirements that are desirable but not essential.
- "Won't have" requirements that describe unwanted effects that should be avoided

9.1 Must Have

Table 14 Must Have Requirements

What	How	Where
Self-Determination		
The e-VITA coach **must** respect individual choices about personal aspirations and goals for late adulthood.	Motivational dialogues that are not prescriptive, but rather aim at personal growth while respecting personal preferences	RASA dialogues
Privacy Protection		
The e-VITA coach **must** adhere to principles of the European GDPR and the Japanese APPI	Processing of the personal data that the coaching devices will collect under specific conditions.	e-VITA platform backend
Trustworthiness		
The e-VITA coach **must** provide information about intentions and intending actors	give an overview of service providers and involved institutions	Privacy Dashboard
Motivation		
The coach **must** foster motivation and development in midlife and older age	Motivational dialogues that facilitate a positive aging process, including self-actualization despite declining capacities and life changes	RASA Dialogues
Conversational Topics and Skills		
The e-VITA coach **must** address the lived experience of aging and the associated challenges	Conversations about lived experiences of aging, such as nostalgia, loneliness, loss, late years, or existential questions	RASA dialogues
Sociability		
The e-VITA coach **must** facilitate social interactions are subjectively meaningful to older adults	Create space and promote social exchange that is meaningful (e.g., finding peers), facilitate reflection on desired social interactions	Social Platform, RASA dialogues, Recommender System

9.2 Should Have

Table 15 Should Have Requirements

What	How	Where
Self-Determination		
The activation of features **should** be voluntary	Users should be able to decide over the initial configuration and able to switch off	Use Case Configurator, e-VITA

	certain features. Users decide over the use and non-use of features.	platform, coaching devices
The coach **should** suggest physical movements/ exercises according to the person's needs and personal preference	tailored dialogues based on contextual variables to achieve personal relevance	RASA dialogues
The e-VITA coach **should** be usable and controllable	Ensure controllability through usability. For example, it should be comprehensible which keywords trigger certain dialogues or what certain actions entail.	Interaction Concept, RASA dialogues, Smartphone App, Privacy Dashboard
Privacy Protection		
The privacy dashboard **should** make privacy more perceivable and concrete	Instead of very detailed settings it should be easy to shut data flows down	Privacy dashboard
The e-VITA coach **should** be transparent and comprehensible use of personal data	give an overview of service providers and data usage	Privacy dashboard
The e-VITA coach **should** phrase terms of usage and privacy policies in simple and easy to understand terms.	Identify suitable phrasing through co-design and implement this in localization	Privacy dashboard
Trustworthiness		
The human coaches **should** alleviate the fear of losing human contact	The coaching devices must not act as a substitute for social relationships	Human Coaches, RASA dialogues
The user expectations for conversational abilities **should** match with actual functionality	Limitations of the coaching machines understanding should be clear, voice recognition and speech should be adequate	RASA dialogues
The e-VITA coach **should** be able to explain why something is happening	Disclose reasoning for algorithmic thinking or data-based conclusions upon request.	RASA Dialogues
The e-VITA coach **should** be able to disclose information sources at any point	Disclose the source of information and the purpose of motivation upon request	RASA Dialogues
Conversational Topics and Skills		
The e-VITA coach **should** give concrete and actionable advice that considers local opportunities and limitations	Recommendations for activities are combined with local events and offers from regional service providers	Social Platform, RASA dialogues
Instructions and feedback **should** be motivating for laypeople	The wording should not be overly medical or abstract	RASA Dialogues
The e-VITA coach **should** have an audible voice	speech speed and articulation to be customized	RASA dialogues
Motivation		
The motivational dialogues **should** have a positive tonality	Motivational dialogues should focus on positive outlooks instead of negative	RASA Dialogues

that embraces aging as a meaningful period of life	consequence (i.e., abilities instead of avoiding illness)	
Sociability		
The e-VITA coach **should** facilitate social connectedness	facilitate social connectedness, awareness about social events, expand social networks	RASA dialogues, social platform

9.3 Could Have

Table 16 Could Have Requirements

What	How	Where
Conversational Topics and Skills		
The e-VITA coach **could** talk politely	Match relevant social and cultural norms	RASA dialogues
Artificiality of conversations **could** be minimized to make sure it does hinder the interaction flow	Turn-taking, delays and interaction modalities should be intuitive	RASA dialogues, Coaching Devices, Trigger Words and Actions
The e-VITA coach **could** offer entertainment or conversation topics of daily relevance	The coaching devices should be able to talk about daily topics (e.g., weather, news) or provide other forms of entertainment (e.g., games, music)	RASA Dialogues
The e-VITA coach **could** offer assistive function	The coaching devices could provide convenience functions, such as reading out books or reminder of appointments	RASA Dialogues
The e-VITA coach **could** provide and filter serious and relevant medical information	Functions that educate users (i.e., health literacy) should provide balanced and reliable information	Knowledge Base, RASA Dialogues

9.4 Won't Have

Table 17 Won't Have Requirements

What	How	Where
Conversational Topics and Skills		
The e-VITA coach **won't** devalue individual preferences for aging	The dialogues should be though-provoking rather than prescriptive. It is therefore the responsibility of the older adult to follow up on advice for positive aging	RASA Dialogues
Sociability		
The e-VITA coach **won't** replace social contact	Interplay between coaching technologies and human coaches, technological focus on conversations that are difficult or time-consuming with humans	Human coaches

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11 Appendix

11.1 Study Protocol

Focus Groups to Discuss Requirements for Coaching Machines with Older Adults
Participants: 4-6 Participants
Data Collection*: Qualitative
Duration: ca. 120 Minutes
Moderator: Researcher with sound Knowledge about e-VITA
* Take notes during the discussions and ideally record the meeting

Introduction

Short explanation of e-VITA, contextualize coaching technologies in the broader history of technology, e.g., *"you might already use technological tools like smartphones, or the internet to retrieve information. Talking machines are different since they are proactive, make suggestions, and try to positively influence you."*

Thematic Blocks

- Self-Determination
- Privacy Protection
- Trustworthiness
- Topic of Conversation
- Motivation
- Sociability

The moderator introduces the topic and explains its relevance for e-VITA and our end-users. After the introduction the moderator reads out the related vignette and prompts the related questions. Ideally, the vignette and questions are displayed to the participants at the same time (e.g., ppt or handouts).The moderator should encourage all participants to state their own opinion and engage with the opinions of other participants. The guiding questions should facilitate the discussion. After all vignettes have been discussed the moderator closes the topic with a summarizing debate about our new understanding of the requirement. Summarizing questions could be:

- What does it mean to lead a self-determined life?
- What does it mean to have control over your data?
- What does it mean to trust a machine?
- Which topics would you discuss with a machine?
- How can a machine motivate?
- How can a machine improve the sociability of older adults?

11.2 Presented Vignettes / Usage Scenarios

Autonomy / Control / Self-Determination

Scenario #1

Paul recently got a coaching machine that sits on a shelf in his living room. When he passes by the coaching machine tries to catch his attention. *"I have 3 new recommendations for you. Do you want to hear them?"* When he is busy, he usually ignores the voice. When he engages the coach starts to read a list of recommendations. Coach: *"It is time to exercise outdoors. Have you already exercised today?"*

Paul replies:*" I do not like to do exercise, but I want to be healthy. Is there any simple activity that I can do?"* The coach suggests: *"Even a 10-minute brisk walk every day is a great workout."* On the same day, Paul decides to go for a walk.

Scenario #2

Paul recently got a coaching machine that sits on a shelf in his living room. Recently he has not been very active and whenever he passes by the coaching machine it asks questions like "*What disease do you think you will get if you do not exercise?*" In theory, Paul knows that exercise is important, but the machine makes it very clear to him every day: "*You will become bedridden if your muscles and joints deteriorate. Imagine you become bedridden in the future. How does that make you feel?*" Paul starts to become worried about the future and decides that he will exercise more.

Scenario #3

Paul was lying on the couch all day and watched TV. Then the coaching machine on the shelf next to the TV notified him: **"***Japanese older adults are 515 Steps ahead of you at the competition. Take a walk to increase your step count***."** Paul gets up to do his laundry. The sensors in his apartment pick up the steps and the step count for the German group increases. On his smartphone app he can see that there are still more steps required. He decides to take a walk outside and his smartphones continues to count each step. At the end of his walk the German group has the highest step count.

I feel that Paul is in control of his actions and decides what to do

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

---

I feel that I can decide over the use and non-use of the coaching machine

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

---

I feel that I am in control of the coaching machine

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

---

Data Protection

Scenario #1

Luca takes part in a scientific study and uses a coaching coaching system that uses data to track his progress. Luca can access and decide what data he wants to be shared. To get additional information he asks the coaching device.

Luca: *"I would like to know what kind of data is collected?"*

Coaching Device: "You have asked what kind of data is collected. Several data are collected such as your connections to the coaching system, nutritional information, or data related to your physical activity. You can find all the data collected via the privacy dashboard. The data collected is necessary to provide you with adapted features"

Scenario #2

Luca takes part in a scientific study and uses a coaching system that uses data to track his progress. To see what data the device is using he must open a website on his computer or tablet. Under the Data Management tab, he can log in to his personal privacy dashboard. On his homepage he sees a pie chart where each segment represents a specific type of data, such as identifying information, place of residence or gender. By clicking on "identifying information" he can see that a "Chatbot" and "Dialogue Manager" are using this information. When he clicks on Dialogue Manager the Website provides settings to remove or grant the right to access specific types of information.

I feel that the use of personal data is transparent and comprehensible

☐ Strongly Disagree   ☐ Disagree   ☐ Agree   ☐ Strongly Agree

---

I feel that my privacy is not violated by the coaching machine.

☐ Strongly Disagree   ☐ Disagree   ☐ Agree   ☐ Strongly Agree

---

I feel in control of the data usage

☐ Strongly Disagree   ☐ Disagree   ☐ Agree   ☐ Strongly Agree

---

Trustworthiness

Scenario #1

Paul: "I was wondering if you could tell me about home ventilation?"

Coach: "In terms of home ventilation, it's important to make sure that fresh air is circulating throughout the home to prevent the build-up of harmful pollutants and allergens. This can be achieved by opening windows and doors on a regular basis, using exhaust fans in bathrooms and kitchens, and ensuring that your HVAC system is functioning properly.If you are not able to open windows and doors, especially during the cold weather, you can use air purifiers to help filter the air and remove any pollutants. Additionally, it's a good idea to dust and vacuum regularly to keep the air clean. It's especially important for older adults, as they may be more susceptible to the effects of poor air quality. Regular maintenance and cleaning of your HVAC system can go a long way in improving indoor air quality. If you have any concerns, you can contact a professional for an inspection."

Scenario #2

Clemens recently read in a newspaper that incontinence is common among older adults. He noticed that he needs to pass urine many times during the day and night. He wonders whether this could be a sign that his bladder is getting weak. To get more information he decides to ask the e-VITA coach: "What is the cause of urinary incontinence?" The e-VITA coach replies with a long explanation: "The bladder is a part of the urinary system that is located in the lower part of the stomach. When the muscles in and around the bladder don't work the way they should, urine can leak, resulting in urinary incontinence. It may be caused by an easily treatable medical condition, such as urinary tract infection and constipation. It can be a persistent condition caused by underlying physical problems or changes, including aging,

menopause, enlarged prostate, especially in older men, and prostate cancer. Damage to nerves that control the bladder from diseases such as multiple sclerosis, diabetes, or Parkinson's disease. People in the later stages of Alzheimer's disease often have problems with urinary incontinence."

I feel that I can trust the coaching machine.

☐ Strongly Disagree   ☐ Disagree   ☐ Agree   ☐ Strongly Agree

---

I feel that the coaching machine is capable to advise me about this topic.

☐ Strongly Disagree   ☐ Disagree   ☐ Agree   ☐ Strongly Agree

---

I feel that the coaching machine has good reasoning and sound knowledge.

☐ Strongly Disagree   ☐ Disagree   ☐ Agree   ☐ Strongly Agree

---

Conversational Abilities
Scenario #1

Coaching Machine: Hello, how are you today?

Kaito: I've been feeling quite nostalgic lately, thinking about the good old days.

Coaching Machine: Nostalgia can be a powerful emotion, but it's important to find ways to cope with it. Have you considered talking to a therapist or counselor to work through your feelings?

Kaito: I haven't, but that might be helpful.

A therapist or counselor can help you explore your feelings and gain a new perspective on the past. Additionally, you can try to focus on the present and engage in activities that bring you joy and fulfillment. You can also try to connect with friends and family and share your memories with them.

Scenario #2

Coaching machine: Hello, how are you feeling today?

Kaito: I'm feeling a bit down.

Coaching machine: I'm sorry to hear that. Is there something in particular that's been making you sad?

Kaito: Yes, I lost my spouse recently and it's been hard to cope with the loss.

Coaching Machine: I understand that losing a loved one can be very difficult. Have you been talking to anyone about your feelings or getting support?

Kaito: Not really, I mostly keep to myself.

Coaching Machine: It can be helpful to talk to someone about your feelings, whether it's a friend, family member, or therapist. They can offer support and help you work through your grief. Additionally, you can also seek for professional help or support groups for people who are going through similar situations.

Kaito: I'll consider it, thank you.

Coaching Machine: Of course, take care and let me know if there's anything else I can do to help.

I would discuss this topic with a machine

☐ Strongly Disagree   ☐ Disagree   ☐ Agree   ☐ Strongly Agree

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Ministry of Internal Affairs and Communications, JAPAN

I have the feeling that the coaching machine understands the topic and my situation

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

I feel that the coaching machine can give useful advice

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

Motivation
Scenario #1

Lisa recently got a new coaching machine. She placed it in the kitchen to get cooking inspiration. Occasionally the machine asks: *Do you think healthy eating may improve your physical fitness?* The answer seems obvious to Lisa, and she replies: *I think it could.*

The coaching machine continues with a suggestion: "*You can try to find alternatives to two of the harmful foods for a week and monitor your progress*." To find out more Lisa responds: "*I might try it*." The coaching machine investigates further: "*Which products you could change?*" Lisa thinks for a while and then propose: "*Maybe I could start eating whole-wheat pasta and stop eating those canned soups*." The coaching machine seems satisfied: "*I will ask your first impression tomorrow*."

Scenario #2

It had never been Andrea's lifestyle to exercise regularly. Since her retirement she enjoys a carefree life with lots of delicious food and good company. She hasn't yet considered how this behavior might impact her aging body and future. However, her children had gifted her a coaching machine that challenged her thoughtless daily life. The machine made very clear that additional exercise would be good for her: "*Walking is an effective way to improve and maintain muscle weakness. Furthermore, walking improves blood circulation because it uses all the muscles in the body, not just the legs. It is also effective in improving coldness, stiff shoulders, and lower back pain*." The machine also encourages her to think about the positive change that could happen: "*Imagine a 'reborn' Andrea who has continued to exercise. What good things do you think will happen to her when she is regularly exercising?*"

The coaching machine could motivate me to change my behavior

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

I feel that the coaching machine expects me to change my behavior

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

After the conversation I would want to change my behavior because it is good for me

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

Connectedness
Scenario #1

John lives in a mountainous area and wants to interact with people. However, as a farmer who has been farming alone for many years and living alone for a long time, he is hesitant to participate or interact with others even when opportunities present themselves. The virtual coach supports him to overcome his inhibitions by encouraging him to participate in upcoming events. "*Why don't you set one goal to participate in a social activity that you can do and make a "declaration of effort"?*" One day, John sees on a social platform that there is an event for older adults nearby. Still, he is afraid to take the step because he is not comfortable with crowds or interacting with people. On the same day, the coaching machine encourages him to make a step forward: "*Why not ask your family and friends to support you or participate in social activities with you?*"

Scenario #2

Coaching Machine: Hello, how are you today?

John: I'm feeling a bit lonely today.

Coaching Machine: I'm sorry to hear that. Can you tell me a bit more about why you're feeling lonely?

John: My family lives far away and I don't have many friends nearby.

Coaching Machine: Loneliness can be a difficult feeling to cope with, but there are ways to address it. Have you considered joining a club or group that aligns with your interests? You can also look into volunteering opportunities or taking a class to meet new people.

John: I haven't really thought about that.

Coaching Machine: These can be great ways to connect with others who share your interests and to make new friends. Additionally, you can also seek professional help to talk through your feelings and explore options for coping with loneliness. Also, there are online communities and social media platforms that you can use to connect with people and virtually meet new friends

John: That's a good idea, thank you.

Coaching Machine: I'm glad I could help. Remember, you are not alone and there are ways to address loneliness. Don't hesitate to reach out for support if you need it.

The coaching machine could motivate me to engage in more social activities.

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

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The coaching machines could have an impact on social connectedness and aging

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree

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The coaching machines could help to reduce social isolation.

☐ Strongly Disagree | ☐ Disagree | ☐ Agree | ☐ Strongly Agree