D2.2   End-users' needs and stakeholder exploitation strategies

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[1] L = Legal agreement, O = Other, P = Plan, PR = Prototype, R = Report, U = User scenario

[2] PU = Public, PP = Restricted to other programme participants (including the Commission Services), RE = Restricted to a group specified by the consortium (including the Commission Services), CO = Confidential, only for members of the consortium (including the Commission Services)

Partner list

Nr.	Partner name	Short name	Org. type	Country
1	Dividat GmbH *(coordinator)*	DIVIDAT	SME	Switzerland
2	Fraunhofer AICOS	AICOS	R&D	Portugal
3	MIRALab SARL	MIRALAB	SME	Switzerland
4	ETH Zurich	ETHZ	R&D	Switzerland
5	Unie KBO	UNIEKBO	End-U	The Netherlands
6	Conforto em Casa, Lda.	CKEEPERS	SME	Portugal

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1	25.08.2016	ETHZ	First version	Manuela Omlin
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3	21.10.2016	UNIKBO	Revision	Ciska van Harten
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		Approved by (Partner)	

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Table of contents

1. Introduction

This document is part of *Task 2.2: Survey on end-user needs* and *Task 2.3: Analysis of the context* within *Work package 2: User Requirements and Specifications*. The lead partner of this work package and task is ETH Zurich (ETHZ). The document is structured in two parts: In the first part it describes the results of a survey with end-users held in Portugal, the Netherlands and Switzerland. In a second part it consists of the results of focus groups held in the three above mentioned countries with different gerontological experts.

The general purpose of this document is to describe the users' needs and requirements as well as attitude towards new technology-based training programs and summarize implications for the next phase of system development considering the opinion and recommendations of different gerontological experts.

2. Survey/Questionnaires with end-users

2.1 Introduction/Background

With growing technology needs in the 1970's, the user acceptance of technology became more and more important and also a topic in research. Many models have been proposed to explain and predict the acceptance and use of a system. The **Technology Acceptance Model (TAM)** of Fred Davis has captured a lot of attention. In 1985, Davis proposed that system acceptance/use is a response that can be explained or predicted by user motivation which, in turn, is directly influenced by external stimuli. Two aspects are really important for building attitudes toward using respectively behavior intentions for the actual use of a system: *perceived usefulness* and *perceived ease of use*. Both these beliefs were hypothesized to be directly influenced by external variables like system design characteristics etc.

Perceived usefulness: The degree to which an individual believes that using a particular system would enhance his or her performance.

Perceived ease of use: The degree to which an individual believes that using a particular system would be free of physical and mental effort.

Measurement scales for both aspects/concepts were developed. After empirical testing, Davis ended up in 1989 with an adapted version of the scales with six items per aspect. The model/questionnaires are used by giving participants for example a one-hour (time restricted) experience with a system and then asking them to rate their perceived usefulness and perceived ease of use for the system. Results show that both perceived usefulness and perceived ease of use have an influence on the final systems' acceptance and use. There are some other models but due to its simplicity and ease of implementation, TAM remained maybe the most attractive one.

Aligned with the TAM, in the conceptualizing/developing phase of a new system the beliefs and perceptions of future users should be considered. If a high perceived usefulness and ease of use can be reached, the system is supposed to be accepted and used. Unfortunately, TAM is not identifying the reasons behind the perceived usefulness or the perceived ease of use. Venkatesh and Davis (2000) provided more detailed explanations for the variables influencing users' beliefs and perception. Aspects suggested to influence perceived usefulness are for example subjective norm, relevance and output quality, aspects to influence perceived ease of use would be general beliefs about technology self-efficacy or technology anxiety but also beliefs that are shaped based on direct experience with the target system like **perceived enjoyment** and objective usability.

For the Active@Home project in the conceptualizing phase/developing phase it's obviously not possible to enable users the experience with a system which is not yet developed and designed. Notwithstanding the fledgling state of a new system it's important that the intended system has a high acceptance and will be used actively. For this reason the perceived usefulness and ease of use has to be considered. Based on the items of Davis, a questionnaire was developed to get as much as possible information from future users on what could be important and influencing their beliefs and perceptions of the new system. Moreover, knowledge should be collected about users self-evaluation concerning age/health, their experiences and attitudes towards technology, their willingness for training and their expectations, desires and fears concerning a technology based training program. The main goal is to describe a profile of an archetypical end-user with characteristics, attitudes and needs in order to develop a new system matching as closely as possible all the relevant aspects for the target population.

2.2 Methodology

2.2.1 Questionnaire

According to the TAM and based on the work of its developer (items of his questionnaire), ETHZ created a questionnaire with totally 66 questions with the title "Survey on the needs and expectations towards technology based training programs in elderly aged 65+" (see full questionnaire in the appendix). The questionnaire can be divided in eight subsections: personal information (demographic), self-evaluation concerning age/health, available devices at home, technology attitudes and expertise, aspects of the training program, desires/fears concerning the training program, willingness for training, Tai Chi and dance.

All partners were involved to review and revise the content of the questionnaire. After final agreement upon included topics and approval by all partners, the questionnaire was translated in the three languages Dutch, Portuguese and Swiss.

2.2.1 Participants

The sampling procedures were carried out on the basis of each partner's resources and of common criteria defined at the beginning of this investigation phase (see D2.1 Ethical roadmap). In every country, at least 50 healthy independently living elderly people aged 65 and older had to be recruited. The potential participants could be addressed in many different ways (face-to-face, advertising, publicity, homepage etc.). They had to be informed about research goals and methods/procedures. This information could be handed out in writing and/or orally. The researchers had to make future participants aware that their participation is completely voluntary. According to the D2.1 Ethical roadmap, no written informed consent was needed for the survey with end-users. Taking part in the questionnaire was anonymous. Thus, also any data transfer between the participating countries took place without personal data (names). The filled out questionnaires within the Active@Home project will be destroyed six months after the project has ended.

In the following paragraph an overview of some of the background characteristics of the participants will be given.
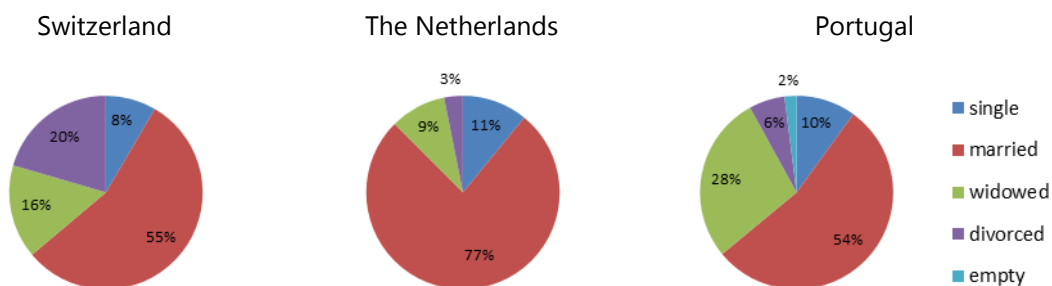
Sample size, gender and age

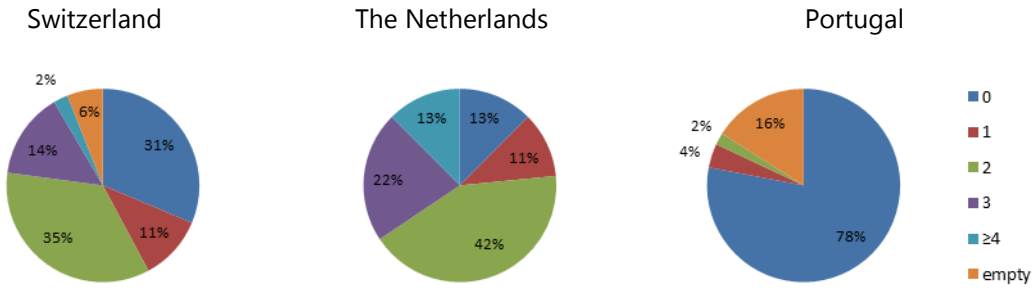|	Total N = 197	Switzerland N = 83	The Netherlands N = 64	Portugal N = 50
Gender (female/male)	99/98	34/49	32/32	33/17
Average Age (years range)	73 (65-97)	75 (65-97)	70 (65-82)	74 (65-93)

Table 1: Sample size, gender and age.

The above mentioned sample sizes apply for all the following analysis and figures. If there was an invalid value or a missing answer, it was counted as "empty" and also shown in the figures as separate category. Concerning gender distribution, the total sample is well balanced with 99 female and 98 male participants. The average age of all participants is 73 years with a range of 65 to 97.
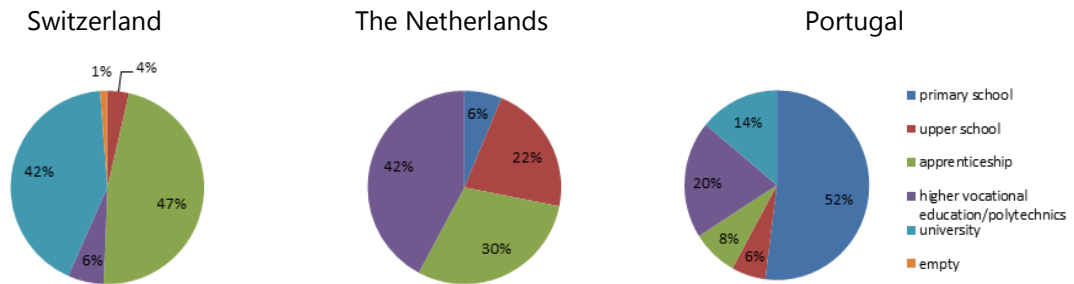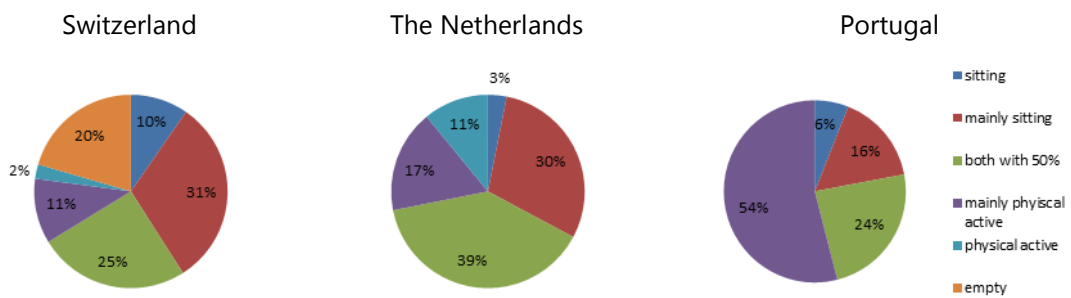
Civil status

Children

Switzerland	The Netherlands	Portugal

Switzerland: 2%, 6%, 31%, 11%, 35%, 14%

The Netherlands: 13%, 13%, 11%, 42%, 22%

Portugal: 2%, 4%, 16%, 78%

Legend:
- 0
- 1
- 2
- 3
- ≥4
- empty

Education

Switzerland	The Netherlands	Portugal

Switzerland: 1%, 4%, 42%, 47%, 6%

The Netherlands: 6%, 22%, 30%, 42%

Portugal: 14%, 20%, 8%, 6%, 52%

Legend:
- primary school
- upper school
- apprenticeship
- higher vocational education/polytechnics
- university
- empty

Previous professional activity

Switzerland	The Netherlands	Portugal

Switzerland: 10%, 31%, 25%, 11%, 2%, 20%

The Netherlands: 3%, 11%, 30%, 39%, 17%

Portugal: 6%, 16%, 24%, 54%

Legend:
- sitting
- mainly sitting
- both with 50%
- mainly phyiscal active
- physical active
- empty

Physical activity (times per week)

Switzerland	The Netherlands	Portugal

never
1x
2x
3x
>3x
empty
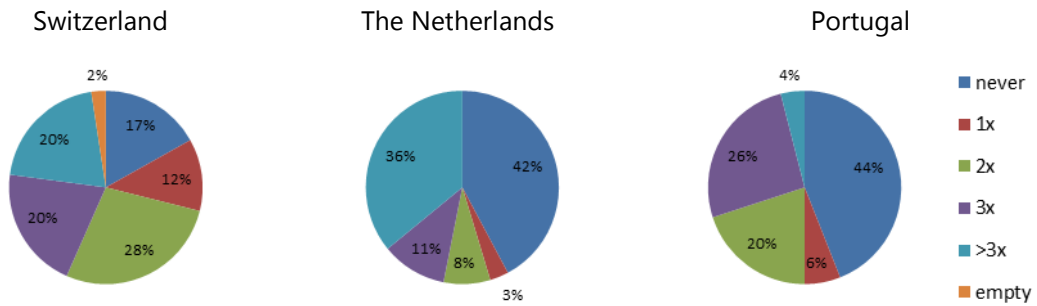
Physical activity (hours per week)

Switzerland	The Netherlands	Portugal

<1h/w
1-3h/w
>3h/w
empty
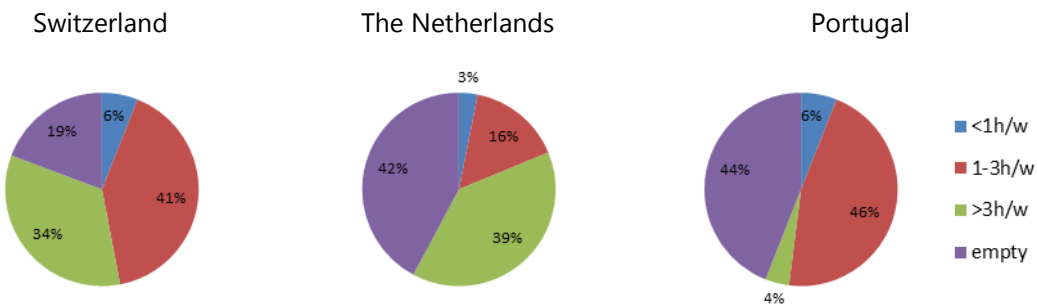
To summarize the main aspects in writing, most participants of the sample are married. In Portugal, there is a high rate of participants without children (78%) which is due to a translation error in the translation process of the questionnaire from English to Portuguese. In the other two countries, most of the participants have children (most of them have two). Education seems to be higher in Switzerland and the Netherlands than in Portugal. In previous professional activity and also in weekly physical activity, there is a wide range regarding physical requirements of the work. Especially in the Netherlands and in Portugal, there is a high rate of participants without any required physical activity during work (>40%). However, one third of Dutch participants are categorised as really active (>3x per week, >3h per week).

2.3 Results

The questionnaire is divided into several parts. The following results section is structured following the subsections of the questionnaire. Implications for the Active@Home project are written in bold and in the end of each subsection there is a short summary of main results.

2.3.1 Self-evaluation concerning age/health

All participants were asked 12 questions about self-evaluation concerning age and health. In the following, the answers are presented in 12 figures including the data of all three countries in one figure for a good visual comparison.

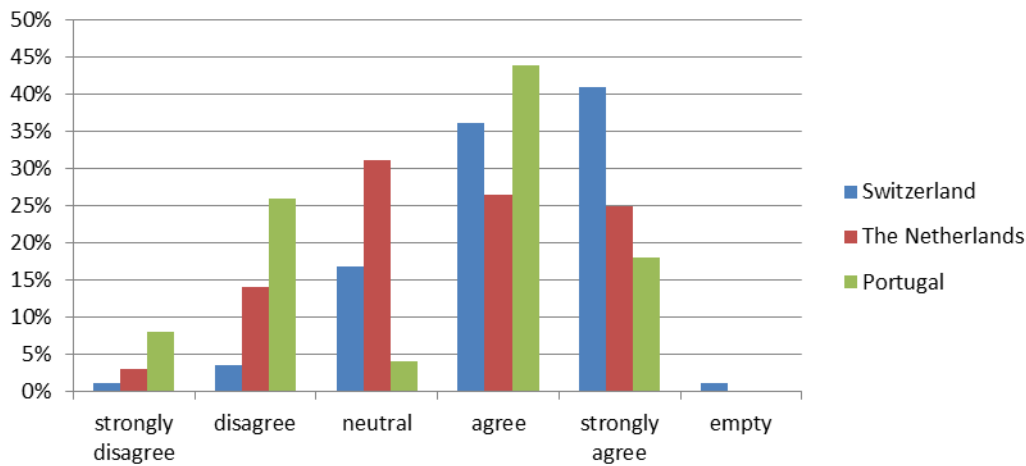**Figure 1. I feel physically fit and healthy**

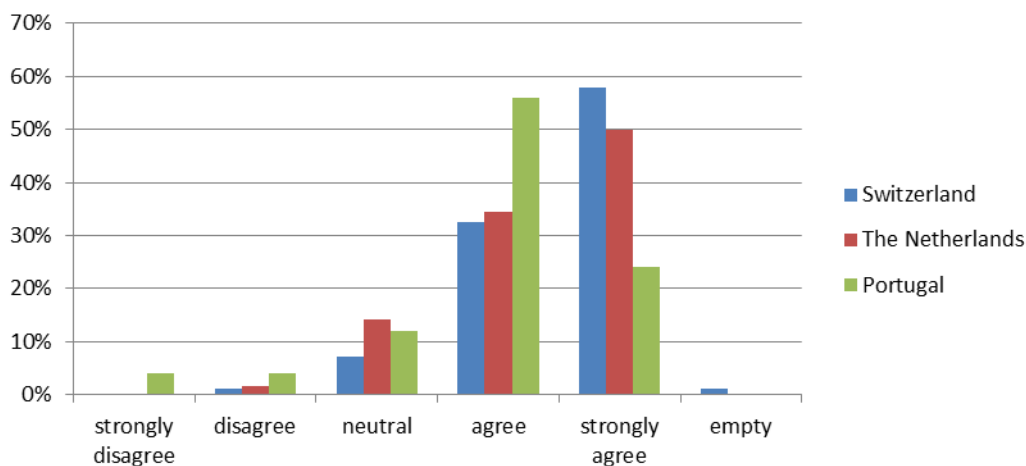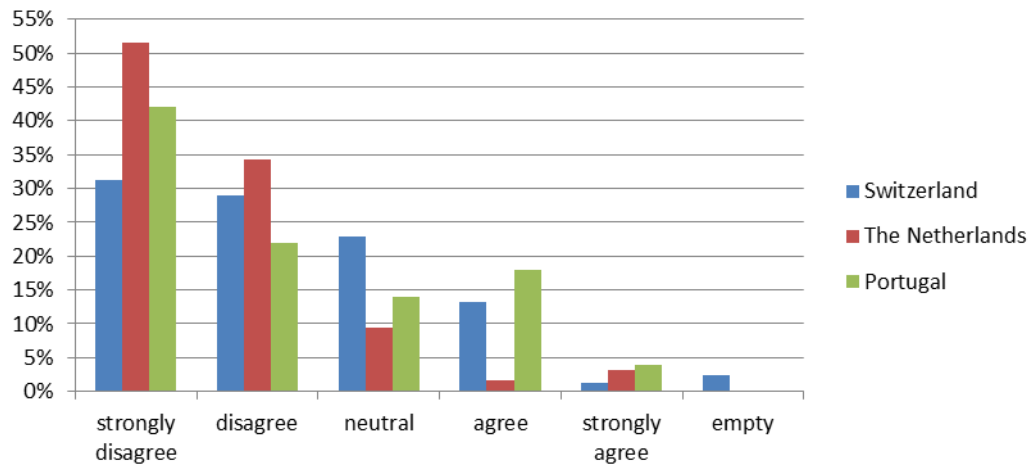**Figure 2. I feel cognitive fit and healthy.**

Figure 3. I feel old

Considering figure 1 to 3, most of the participants in all three countries feel physically as well as cognitive fit and healthy and not old. In Portugal, there a quarter of participants is not feeling physically fit/healthy and almost a quarter feels old.

➔For the Active@Home project this could mean that especially for marketing the main focus has not to be on changing fitness and health state. Maybe the developed exergame should more be marketed as providing a lot of fun next to having an impact on health.
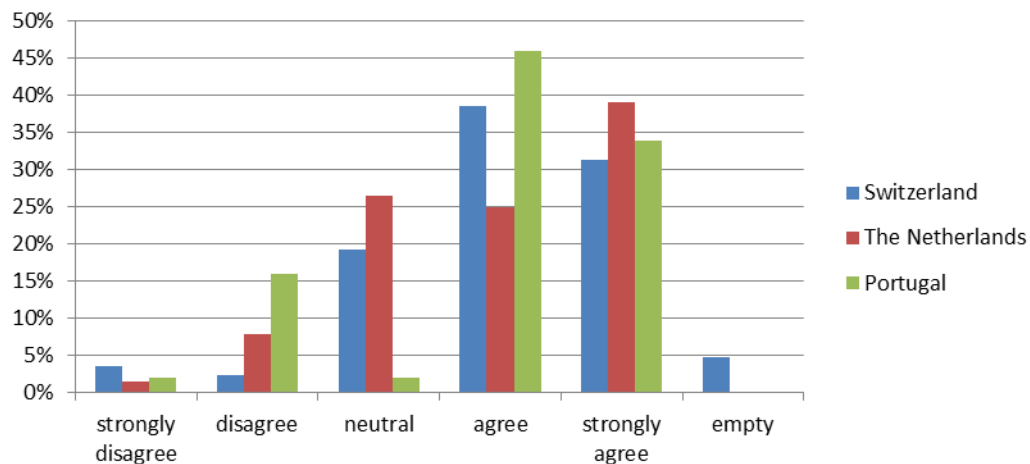
Figure 4. I'm an active person and move a lot.

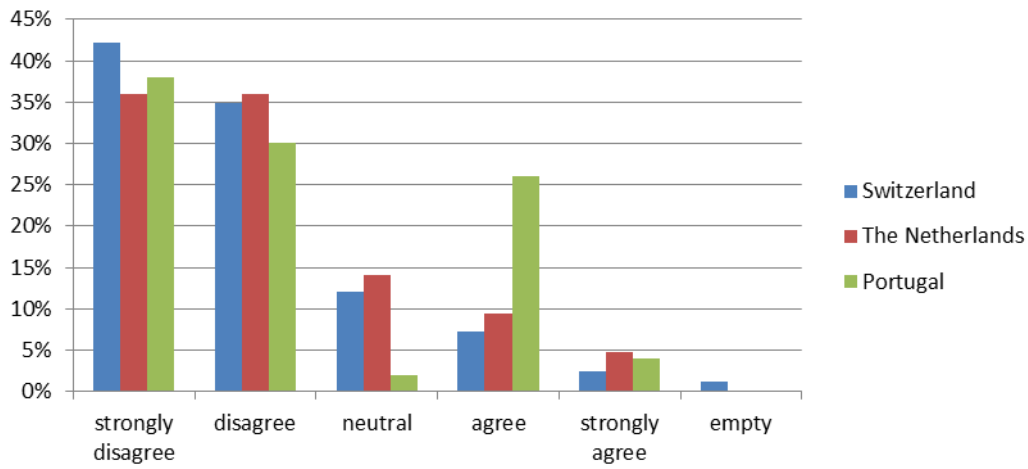**Figure 5. I do not move a lot in my daily life.**
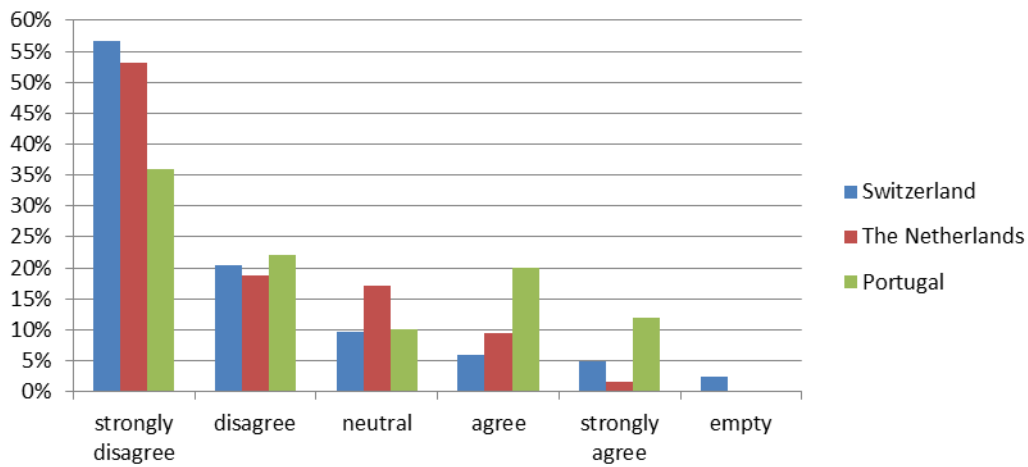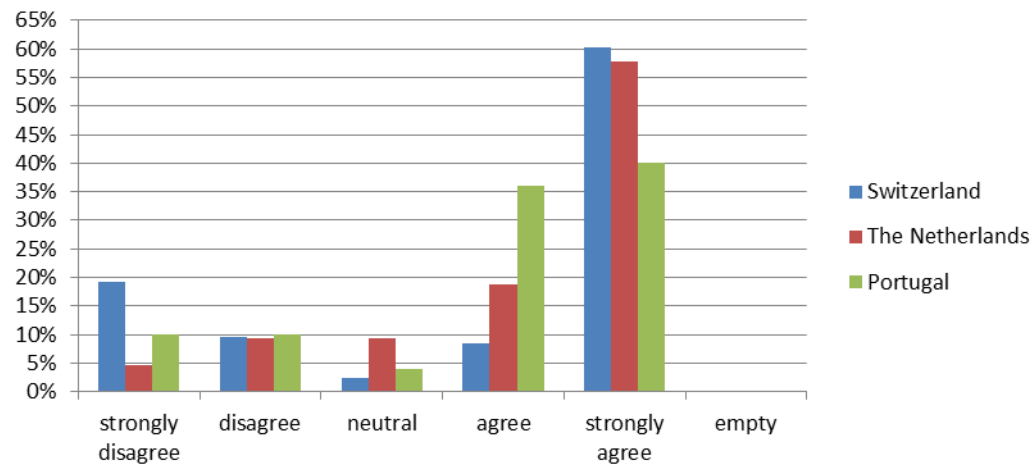

Figure 6. I feel unsure afoot.

Figure 7. I can easily put on my socks and my shoes.

Considering figure 4 to 7, most of the participants in all three countries indicate that they are physically quite active in daily life. In Portugal, a quarter of participants states not to move a lot. Most participants do not feel unsure afoot, but one third of Portuguese participants do feel unsure afoot. Most of the participants can easily put on their socks and shoes. But in Switzerland, 19% - almost a fifth – have problems with putting on socks/shoes.

➔ **Most of the people in the target population could already be motivated for movement (as they already are quite active in daily life according to the answers to these questions) what has to be supported. There should be an indication that the user of the training program should be able to gain a more safe feeling afoot after training with Active@home. Furthermore, it seems necessary to include a "check" whether people are suitable for the program. Using sensors which have to be put on arms and legs requires a certain degree of flexibility and should be possible with most of the people.**

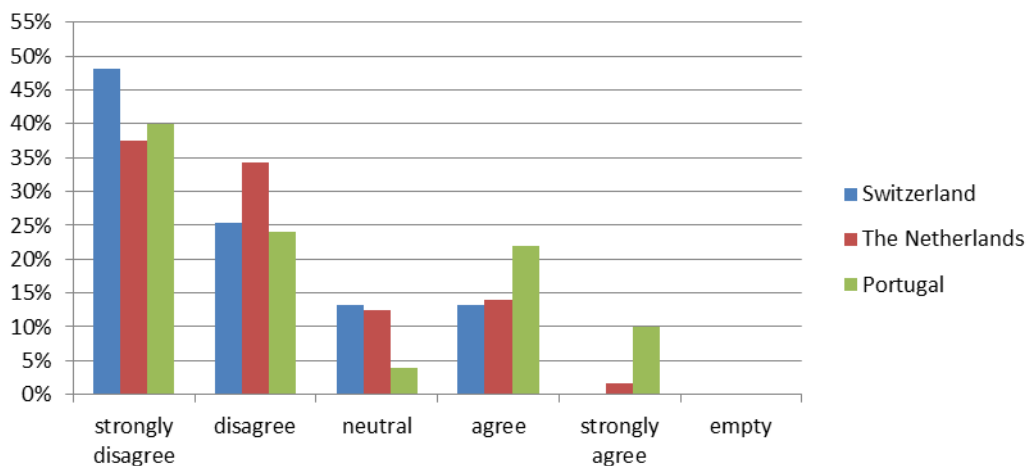**Figure 8. I suffer from age-related visual constraints.**

Figure 9. I suffer from age-related auditory constraints.
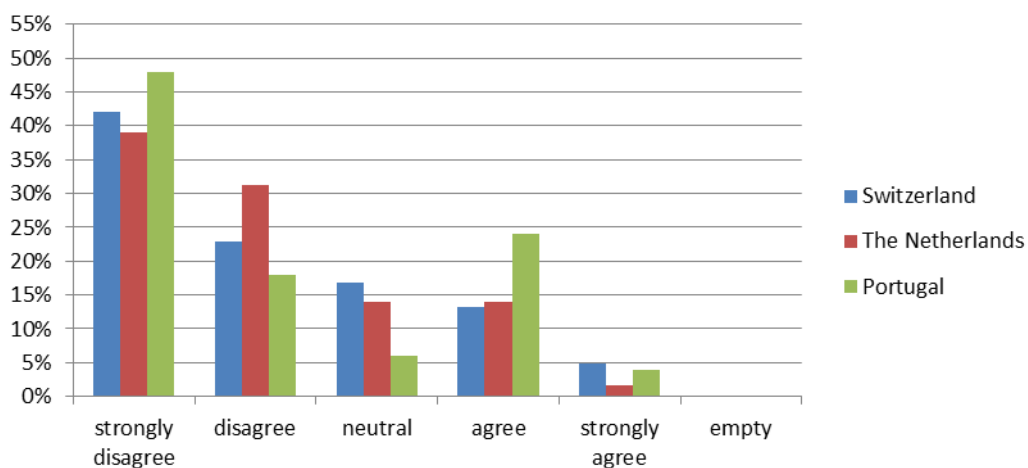
Considering figure 8 and 9, most of the participants in all three countries do not suffer from age-related visual or auditory constraints by self-report. However, one fifth of Portuguese participants indicate having such constraints.

➔ **For the Active@Home project, age-related sensory changes have to be considered but they seem not to be very constraining for elderly people. Nevertheless, age-related sensory constraints have to be taken into account during the development of the system for the elderly population especially during the user interface design process (e.g. adequate size of the text and buttons, adequate contrast on the screen, adequate flow of screens, adequate interaction with the system, audio interface and feedback, etc.). The system development will require a strong collaboration with end-users during the whole project for an iterative human-centred design process.**

Figure 10. I like to meet new people.

Figure 11. I enjoy participating in social events/activities.

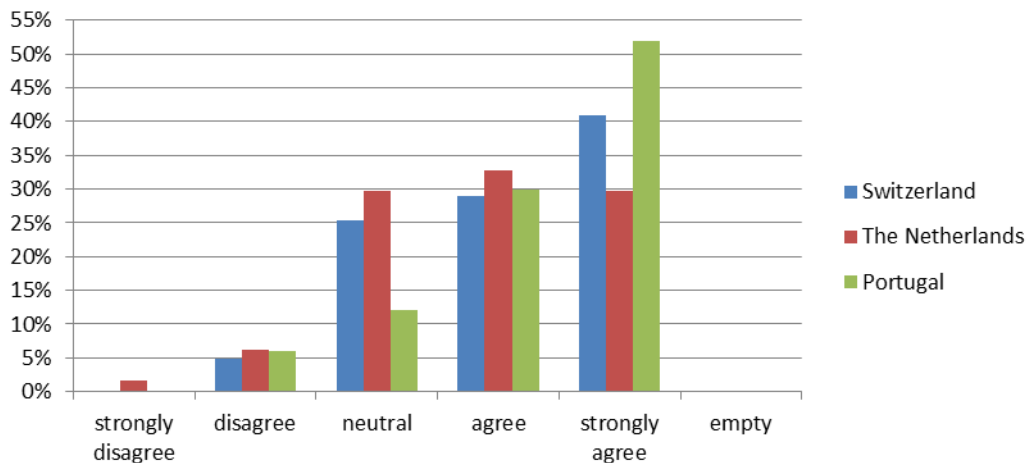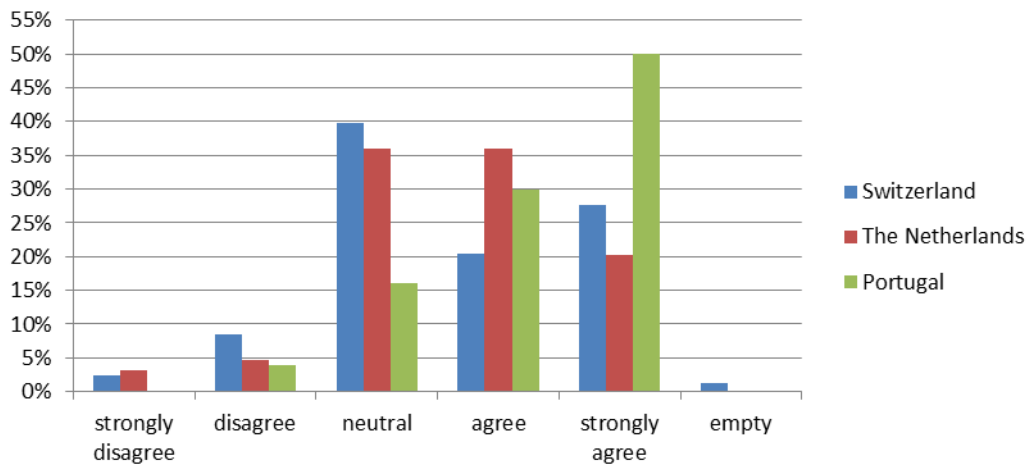**Figure 12. I use social networks like Facebook.**
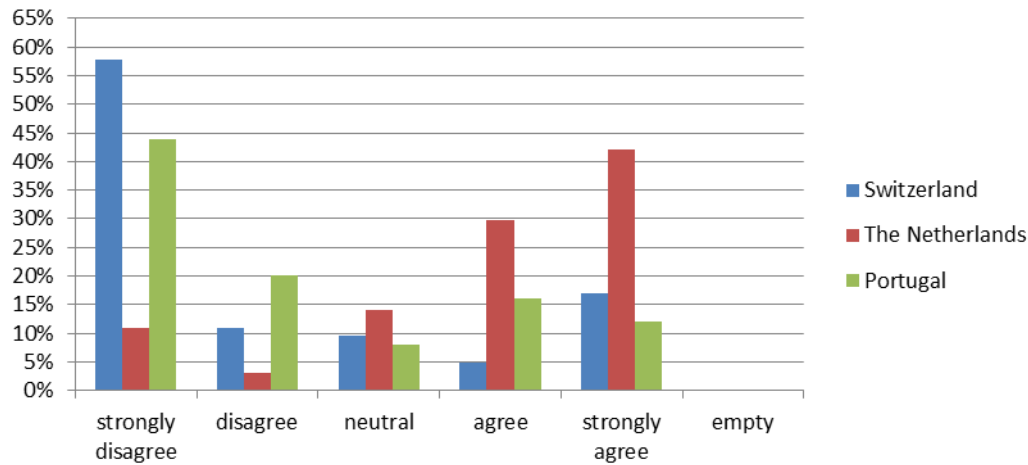
Considering figure 10 and 11, most of the people in all three countries like to meet new people and to participate in social events/activities or at least they do not dislike. Especially Portuguese participants enjoy participating in social events/activities (50%). Considering figure 12 and the use of social networks like Facebook, there is a discrepancy between the countries: Swiss and Portuguese people do not use social networks, Dutch people seem to do.

➔ **For Active@Home it could be an option to develop game solutions that allow to train together with others as most of the elderly people like social interaction, meeting new people and participating in social activities. This has to be considered as further motivational factor and, therefore, the system has to be developed also with anticipating and construing a possibility to promote social interaction. The use of social networks differs a lot between countries which has to be considered if social networks are included in the program.**

SUMMARY

Most of the participants in all three countries feel physically and cognitively fit and healthy and indicate to move quite a lot in daily life. Most of them do not suffer from age-related sensory impairments causing a disability of certain functions and like social interactions. There is a differing attitude between the countries concerning the use of social networks.

2.3.2 Available devices at home

All participants were asked if they have six different devices (television, computer, laptop, tablet, smartphone, game console) available at home or not. Furthermore they were asked if they have access to internet at home. Answers are presented in three figures, one per each country.

Figure 13. Switzerland - Available devices at home.
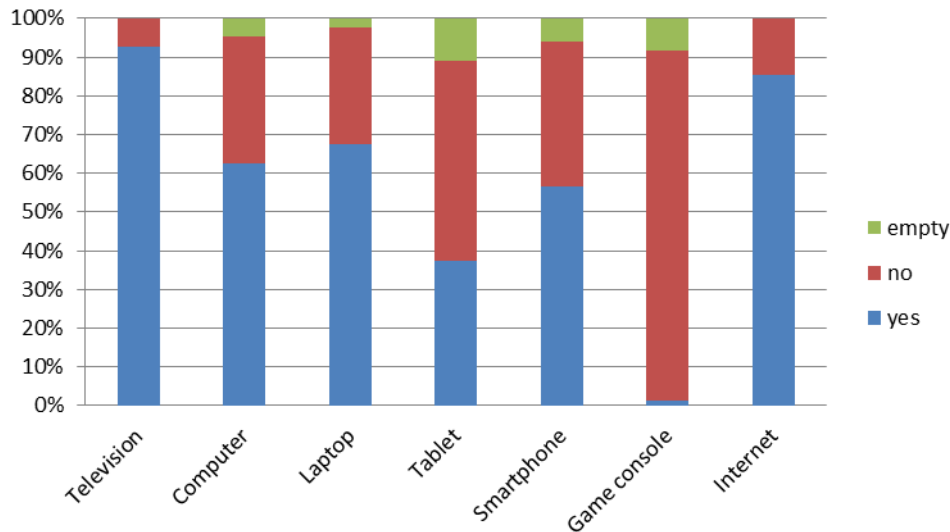
93% of Swiss participants have a TV at home. One third has <u>no</u> computer, laptop or smartphone. Only 37% have a tablet at home. 86% have access to internet at home.

Figure 14. The Netherlands - Available devices at home.
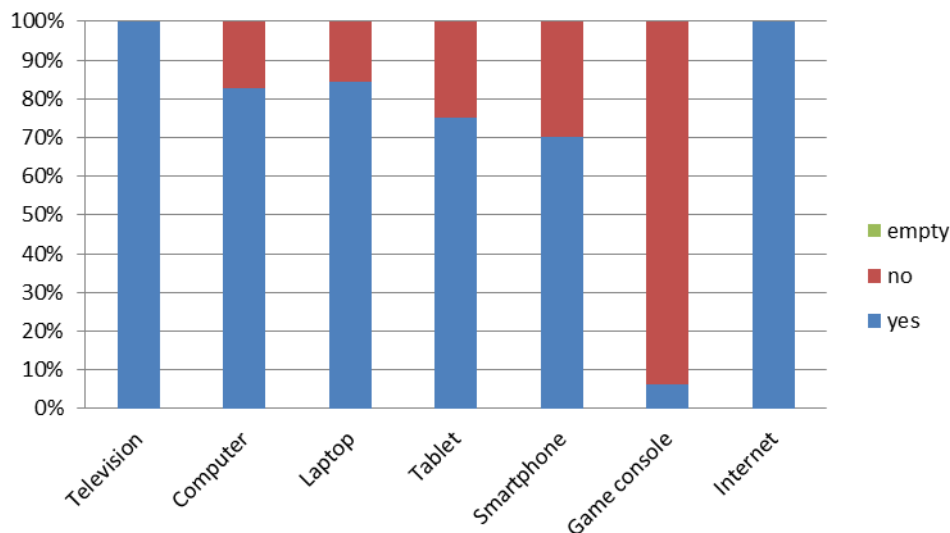
All Dutch participants have a TV at home. 70-80% also owns a computer, laptop, tablet or smartphone. All Dutch participants have an internet connection at home.

Figure 15. Portugal - Available devices at home.
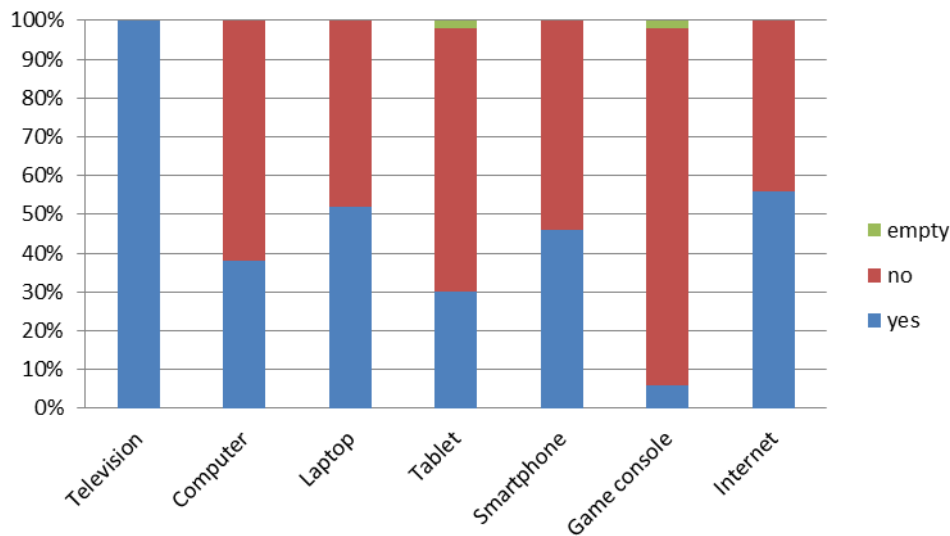
All Portuguese participants have a TV at home. 30-50% owns also a computer, laptop, tablet or smartphone. 44% have <u>no</u> internet access at home.

SUMMARY

Most participants in all three countries have a TV at home. Concerning the other devices (computer, laptop, tablet, smartphone) in the Netherlands there is the highest rate of possessing such devices (up to 80%), in Switzerland and Portugal the rate is much lower (30-50%). In Switzerland and the Netherlands, most of the people have access to internet at home, in Portugal almost half of participants have not (maybe there is a correlation with the use of social networks like Facebook).

➔ **For Active@Home solution it might be a good idea to use TV screens (instead of computers or tablets) as most of the people have a TV at home. In one country (Portugal) there isn't access to internet in every household, this has to be taken into account.**

2.3.3 Technology attitudes and expertise

All participants were asked seven questions concerning their attitudes towards and their experiences with new technologies. In the following, the answers are presented in seven figures including the data of all three countries in one figure for a good visual comparison.

Figure 16. I'm really interested in new technology.
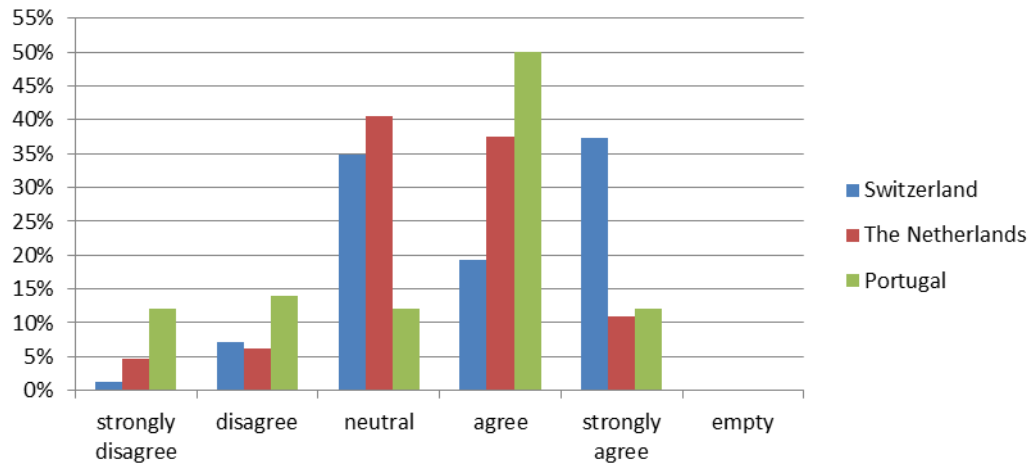
Figure 17. The technological progress is fascinating to me.
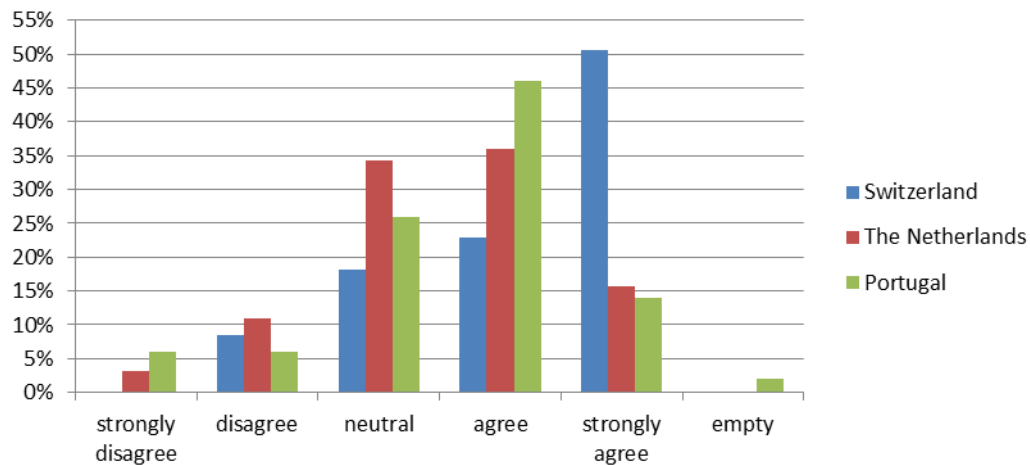
Figure 18. I oppose the technical progress.
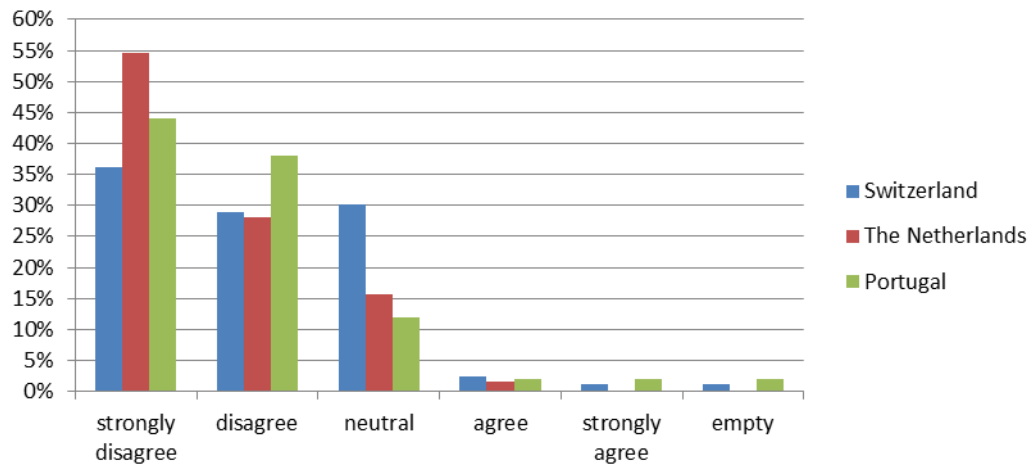
Figure 19. I'd like to test new technological devices.
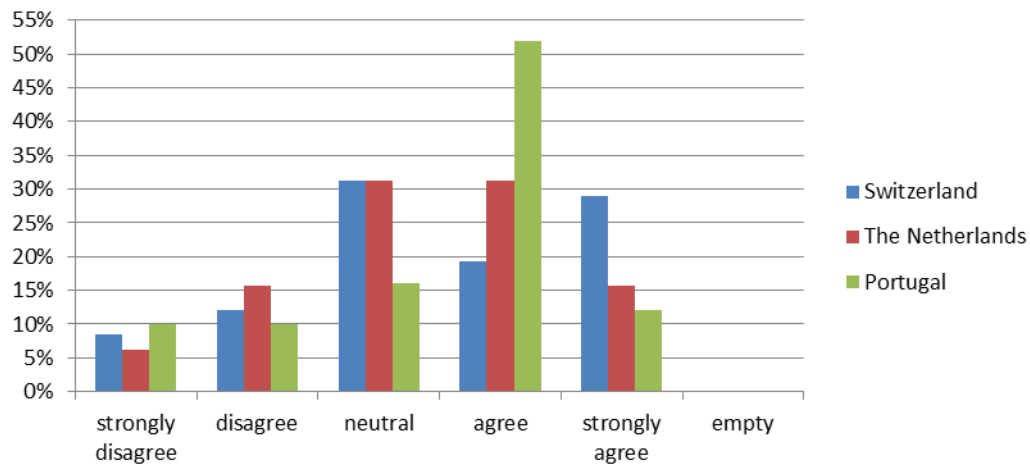
Considering figures 16 to 19, most of the participants in all three countries have a neutral or positive attitude towards new technologies and technical progress. Especially Portuguese participants stated that they would like to test new technological devices (more than 50%), but also in the other two countries there seems to be this interest.

Figure 20. I have a lot of experience with technological devices.
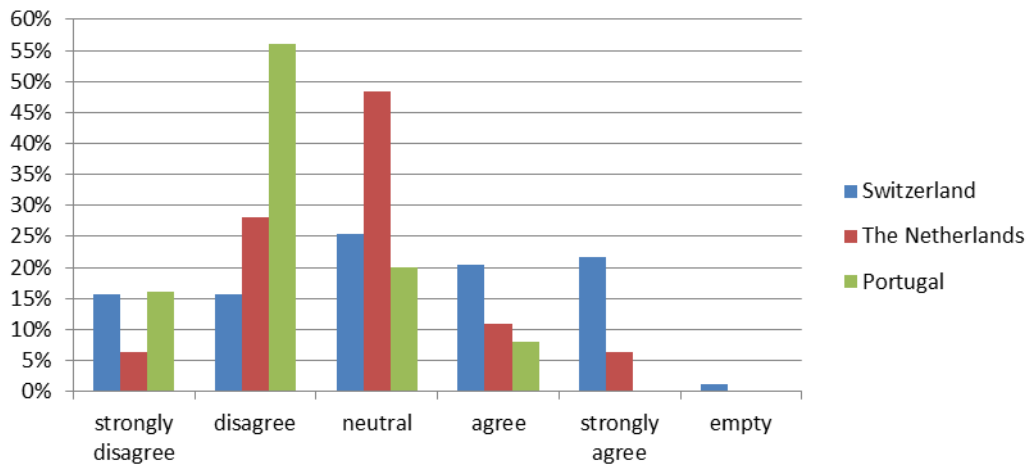
Figure 21. The handling of modern technological devices is easy for me.
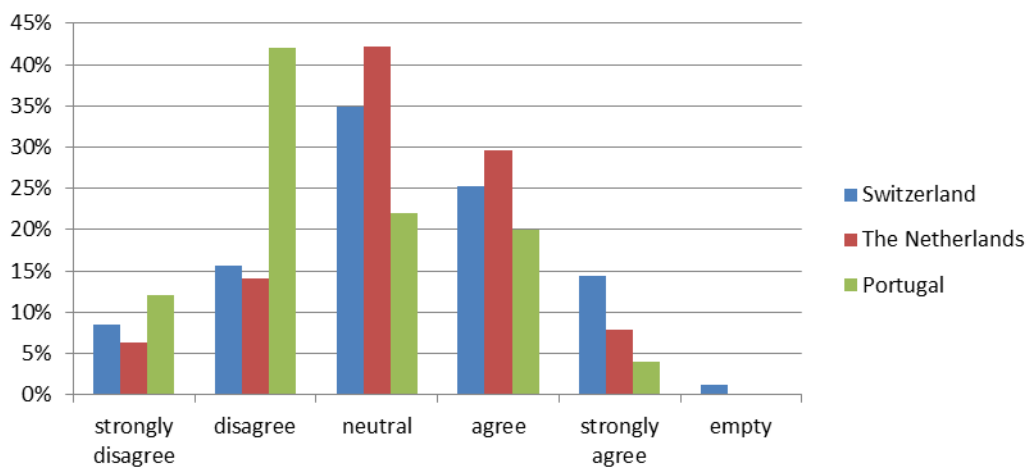
Figure 22. I have experiences with video games.
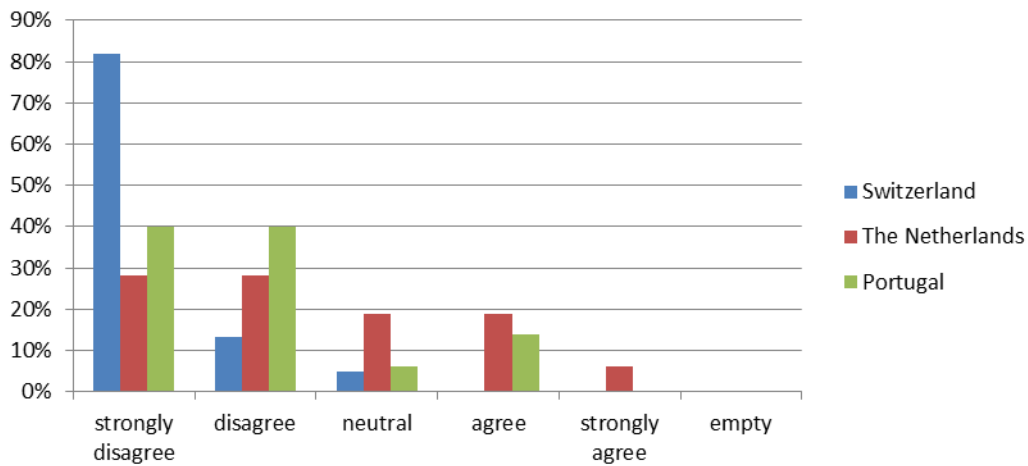
Considering figure 20, there seems to be a wide range of experiences with technological devices among participants of all three countries. But half of Portuguese participants state to have no experiences. In figure 21, it is shown that also concerning the handling of modern technological devices there is a wide range of assumptions, experience and attitudes. Especially Portuguese participants think it's not easy to handle such devices (maybe because most of them don't have access to technological devices). Considering figure 22, especially Swiss participants (more than 80%) state to have no experiences with video games, in the two other countries there is a wider range of experience. Although most of the Swiss participants have smartphones, computers, laptops, they seem not to use these resources to play video games.

SUMMARY

Most of the participants in all three countries have a neutral or positive attitude towards new technologies. Concerning the experiences with and handling of technological devices, there is a wide range. Especially in the Swiss sample, there are no individual experiences with video games. This should be taken into account when developing the Active@home solution (e.g. not considering any pre-defined gaming concept or paradigms).

➔ **For the Active@Home project, it's good that people seem to have a rather open attitude towards new technologies. Considering the wide range of experiences and handling abilities, the developed solution should fit also lower levels of experiences and handling abilities.**

2.3.4 Aspects of the training program

All participants were asked about their weighting of different aspects of a training program (totally 10 aspects). In the following, answers are presented in one figure per each country.

Figure 23. Switzerland – Weighting of aspects of the training program.
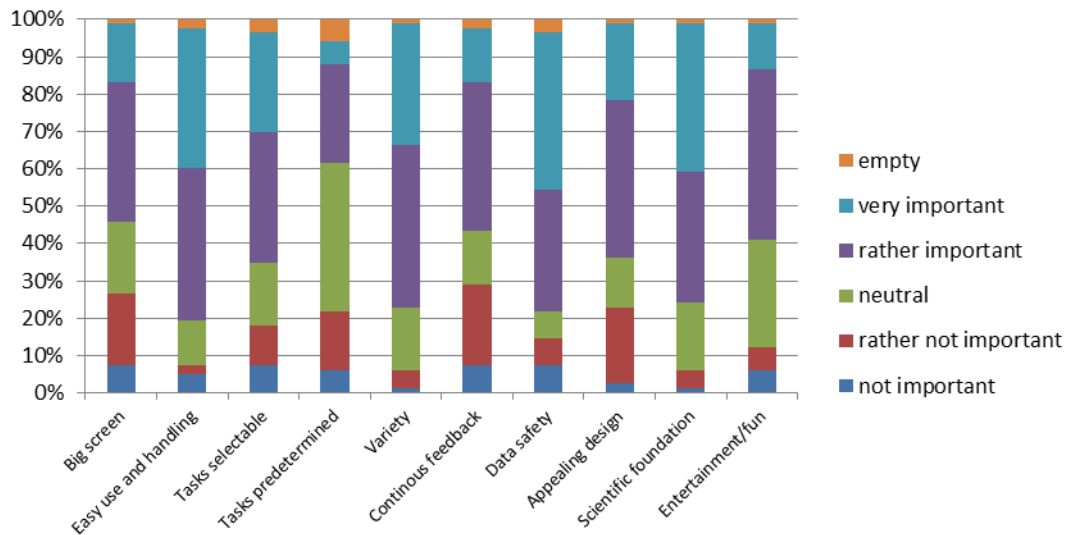
For Swiss participants, most of the mentioned aspects are rather important (e.g. big screen, easy use and handling, tasks autonomously selectable, variety, continuous feedback about training progress, appealing design). "Scientific foundation" and "data safety" are most frequently rated as very important aspects. For almost half of Swiss participants (46%) "entertainment and fun" is deemed rather important.

Figure 24. The Netherlands – Weighting of aspects of the training program.
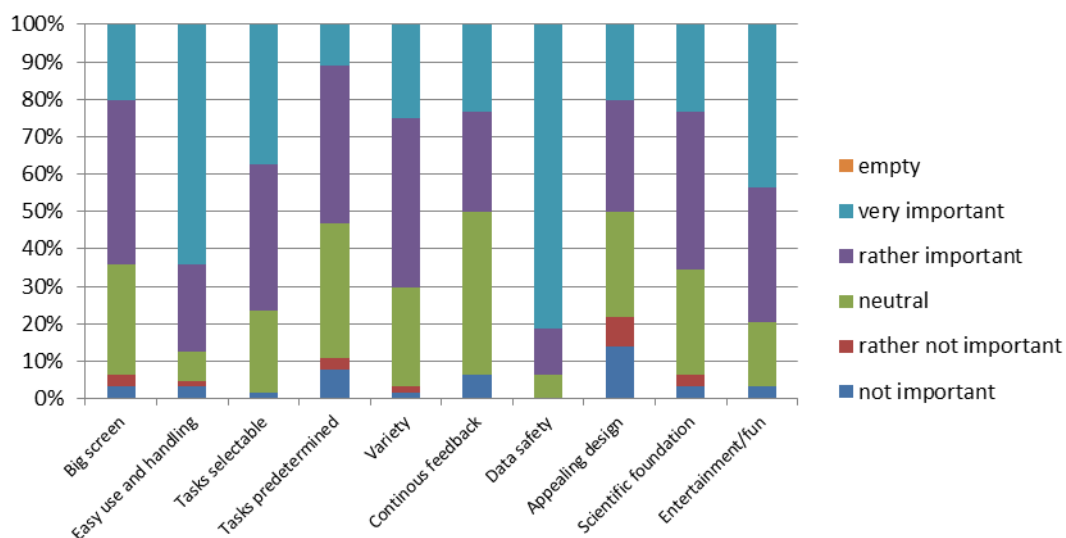
For Dutch participants, most of the mentioned aspects are rather important (e.g. big screen, tasks autonomously selectable, tasks predetermined, variety, appealing design, scientific

foundation). More than 80% say that "data safety" is a very important aspect. 64% state that "easy use and handling" is a very important aspect. Also "entertainment and fun" is stated as a very important aspect in almost half of the Dutch participants (44%).

Figure 25. Portugal – Weighting of aspects of the training program.
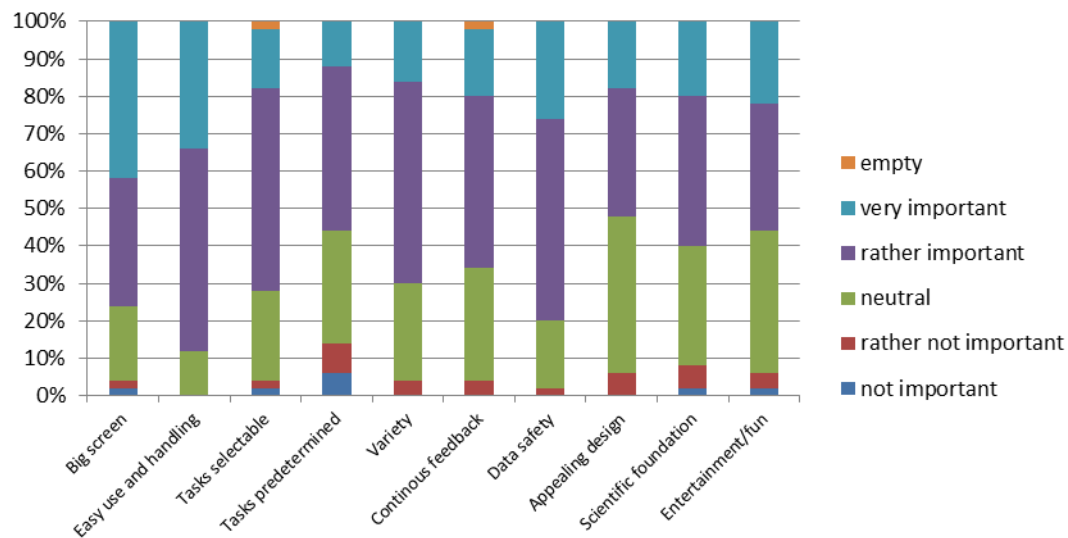
For Portuguese participants, most of the mentioned aspects are rather important (e.g. easy use and handling, tasks autonomously selectable, tasks predetermined, variety, continuous feedback about training progress, data safety, scientific foundation). "Big screen" is most frequent stated as a very important aspect. More than one third of Portuguese participants rates "entertainment and fun" as neutral, as well as the aspect of "appealing design".

SUMMARY

In all three countries, most of the mentioned aspects are rather important. In Switzerland and the Netherlands, "data safety" is rated as a very important aspect and "entertainment and fun" are also very important. Dutch participants state "easy use and handling" as a very important aspect whereas Swiss participants state "scientific foundation" as a very important aspect. For Portuguese participants, "big screen" is most frequently stated as a very important aspect.

➔ **For the Active@Home solution, all the mentioned aspects should be paid attention to, but there should be a special focus on "data safety" and "scientifc foundation", "easy use and handling" and "big screen" and not at least on "entertainment and fun".**

2.3.5 Desires/fears concerning the training program

All participants were given 11 statements including desires and fears concerning the training program which has to be rated in regard to agreement. In the following, answers are presented in 11 figures including the data of all three countries in each figure for a good visual comparison.

Figure 26. A lot of cables distract me from using a device.
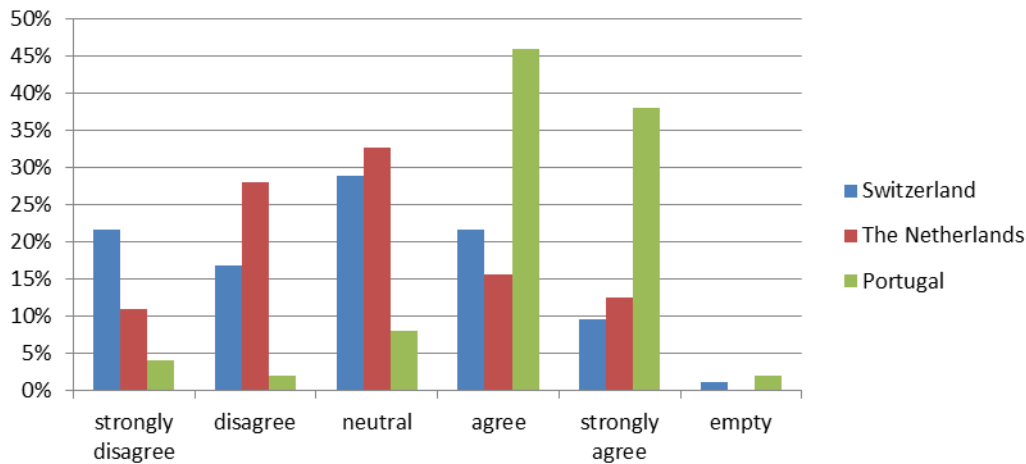
Especially Portuguese participants state that they would be distracted by a lot of cables from using a device.

Figure 27. I'm afraid of technical problems.
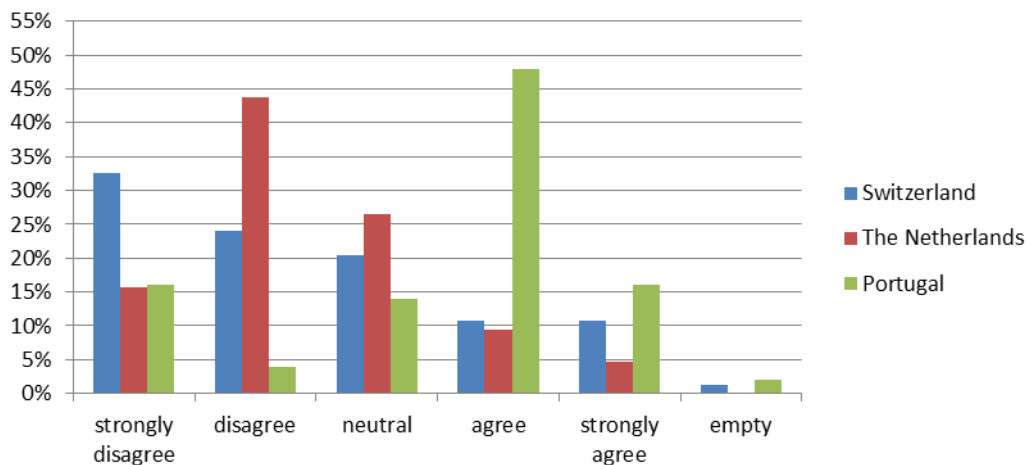
Especially Portuguese participants state to be afraid of technical problems.

Figure 28. I think it's appropriate to use bracelets at arms and legs to measure movements.
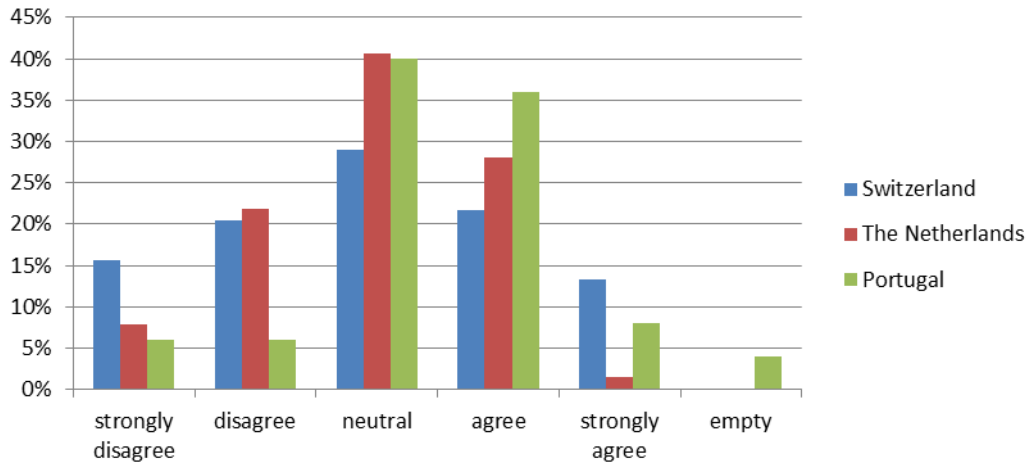
Most of the participants in all countries have a neutral attitude towards using bracelets at arms and legs to measure movements. But it has to be considered that nearly one third of Swiss and Dutch participants do not think it's an appropriate solution.

Figure 29. I'd like to have a „coach" guiding through the training program.
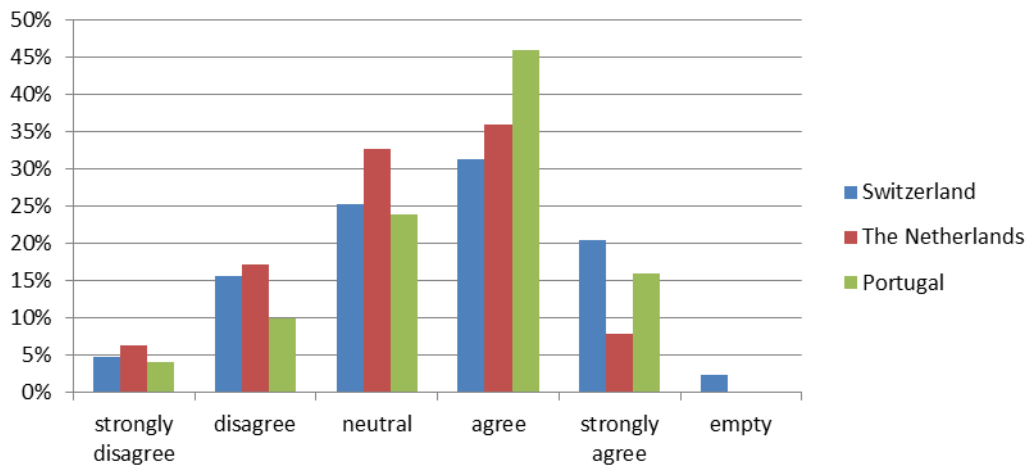
Figure 30. I would like to choose the sex of this coach by my own.
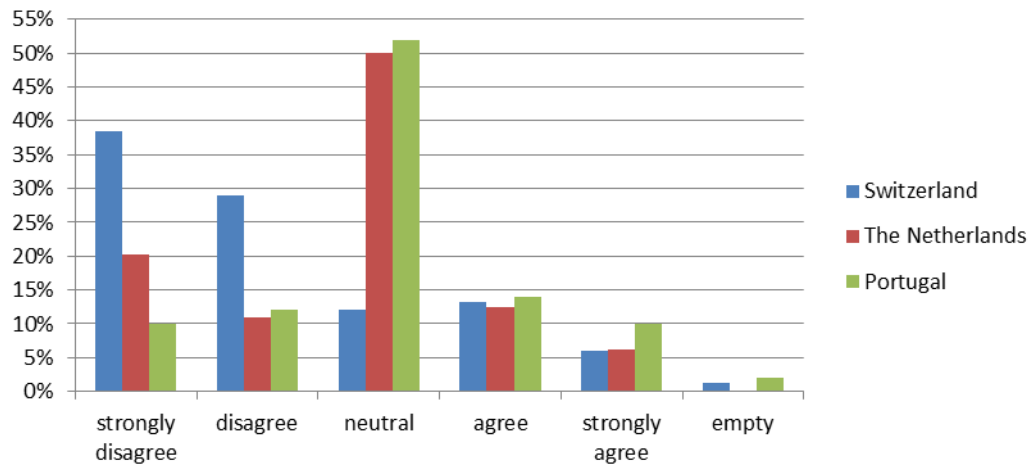
Considering figures 29 and 30, most of the participants like to have a "coach" guiding through the training program. For all participants, it seems not to be very important to have the opportunity to choose the sex of this coach.

Figure 31. I think it's important that there is music included in the training.
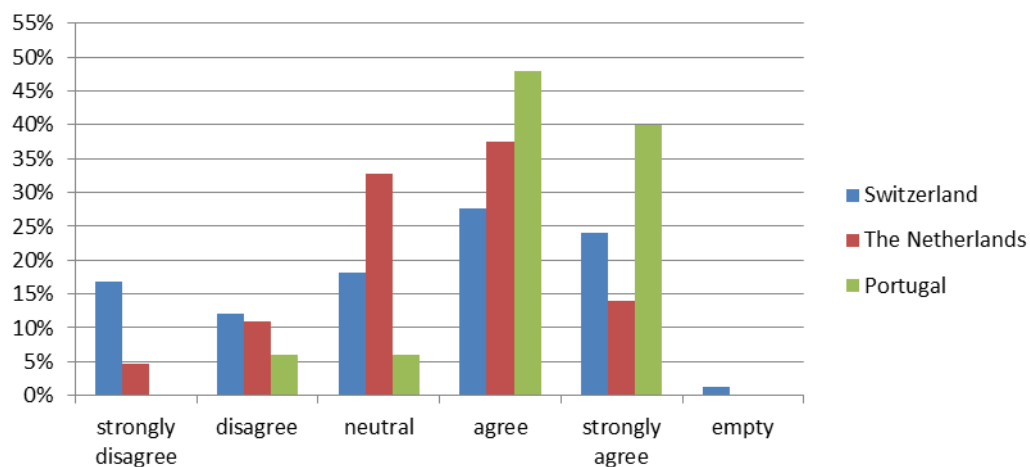
For most participants, it's important that there is music included in the training especially for Portuguese people.

Figure 32. I guess it would be fun to use such a training program.
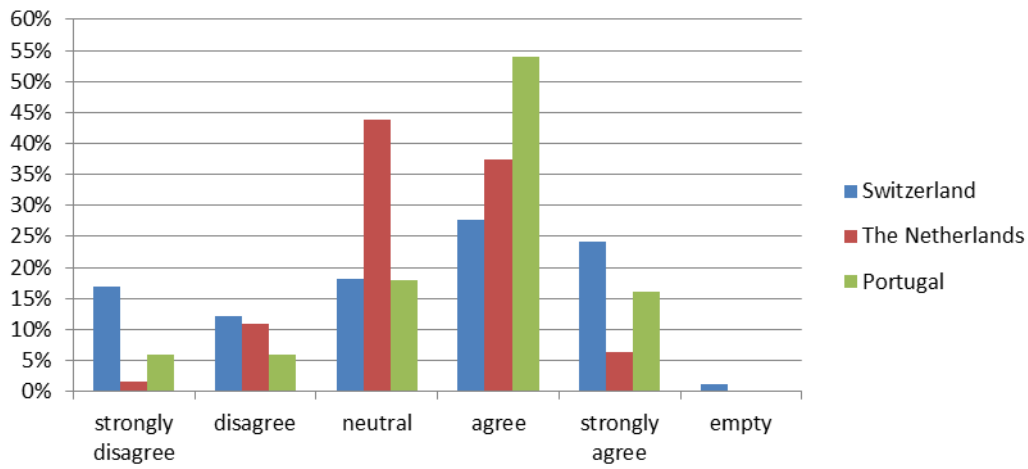
Most of the participants think that it would be fun to use such a training program.

Figure 33. I can imagine that video games which require movements have a good training effect.
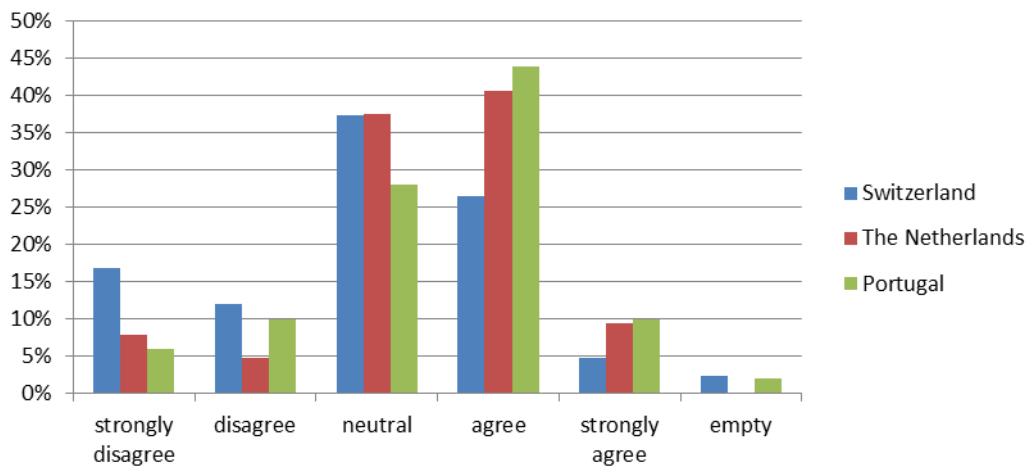
Figure 34. I think such training programs are useful for health.
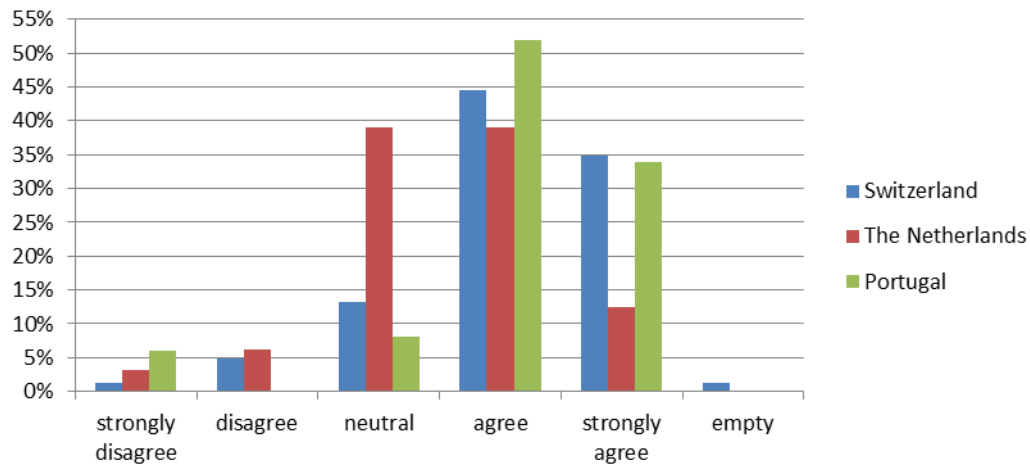
Considering figures 33 and 34, most of the participants think that such a training program could be useful for health and show training effects (improvement in motor functions).

Figure 35. I would be afraid of falls and injuries while using the program.
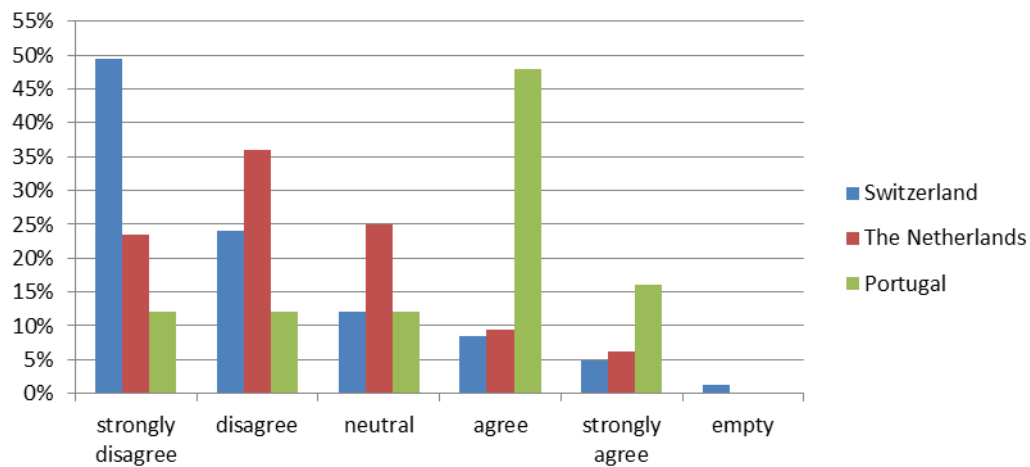
Most Swiss and Dutch participants would not be afraid of falling and injuries while using the program, but most Portuguese people would.

Figure 36. It would be great to play together with others.
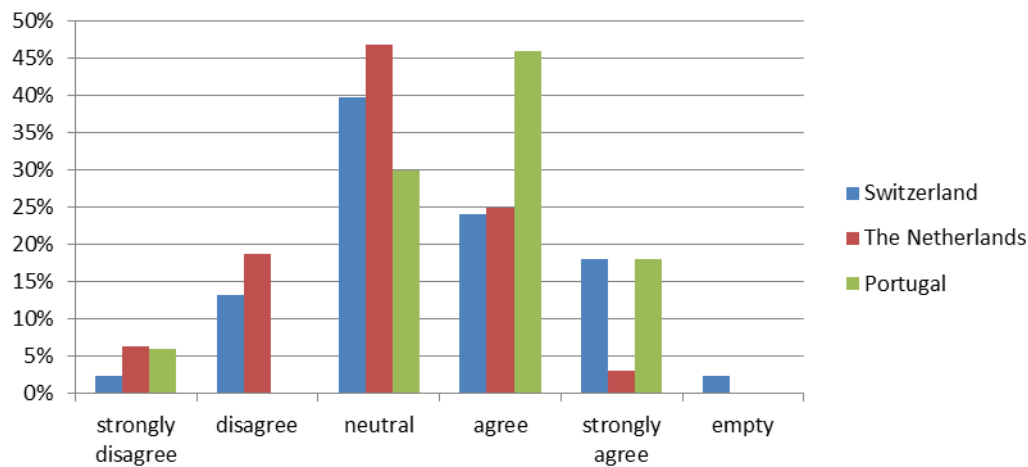
Most Swiss and Dutch participants have a neutral attitude towards playing the training game with others. Most of the Portuguese participants would like to play together with others.

SUMMARY

Most of the participants think that it would be fun and also useful to practice with such a training program. Most of them think that it's important to include music especially Portuguese people. Most of the participants like to have a "coach" guiding through the training program whereby it seems not necessary to choose the sex of this coach. Especially Portuguese participants state that they would be distracted by a lot of cables from using a device, to be afraid of technical problems but also of falling or getting injuries while playing. Most of the participants in all countries have a neutral attitude towards using bracelets at arms and legs to measure movements. But it has to be considered that nearly one third of Swiss and Dutch participants do not think it's an appropriate solution. Most Swiss and Dutch participants have a neutral attitude towards playing the training game with others. Most of the Portuguese participants would like to play together with others.

➔ **Implications for the project:**

- **Avoid the use of cables which may have a negative impact.**

- **System has to be easy to use, probably explain people how to use the system before they start, they should not be afraid of causing damages to the system.**

- **Develop really easy to use and comfortable bracelets.**

- **Offer the possibility to use less sensors than the ideal (four) in case people don't want/like to use them all but make them aware that the use of four sensors will provide**

more accurate results and better outcomes and a more detailed progress over time could be obtained.

- Music and a virtual coach should be included.

- The game and training program has to be designed with the concept of progression in mind to accomodate also people afraid of falls.

- Game solutions allowing playing with others needs to be considered.

2.3.6 Willingness for training

All participants were asked to rate two statements about willingness for using the training program. Furthermore, they had to state weekly frequency and duration of one training session. In the following, results are presented in figures.

Figure 37. I'd like to play video games to train my physical and cognitive functions.
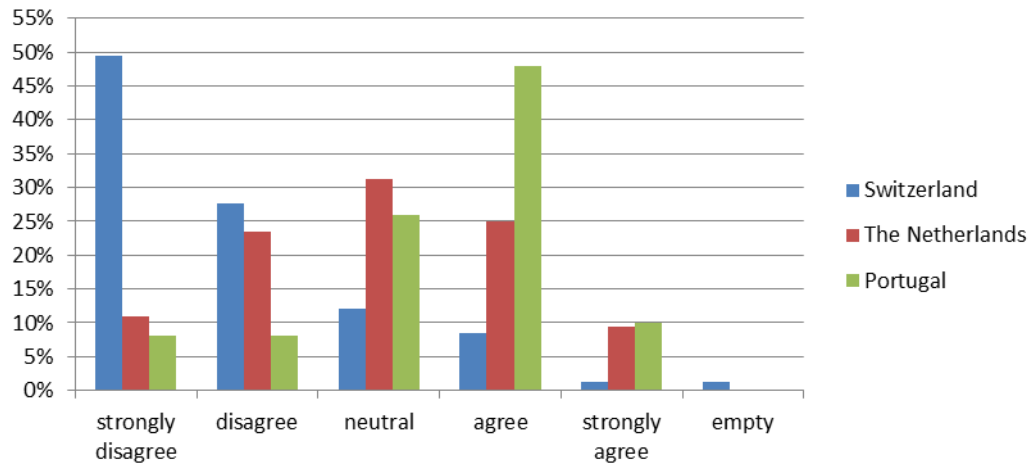
Especially Swiss participants (almost the half of them) state not to like to play video games to train physical and cognitive functions. This is consistent with the absent experience with video games of Swiss participants. It's important to understand the reason of this "aversion" (maybe also analysing carefully the currently available existing systems).

Figure 38. I would like to conduct this training at my place independently.
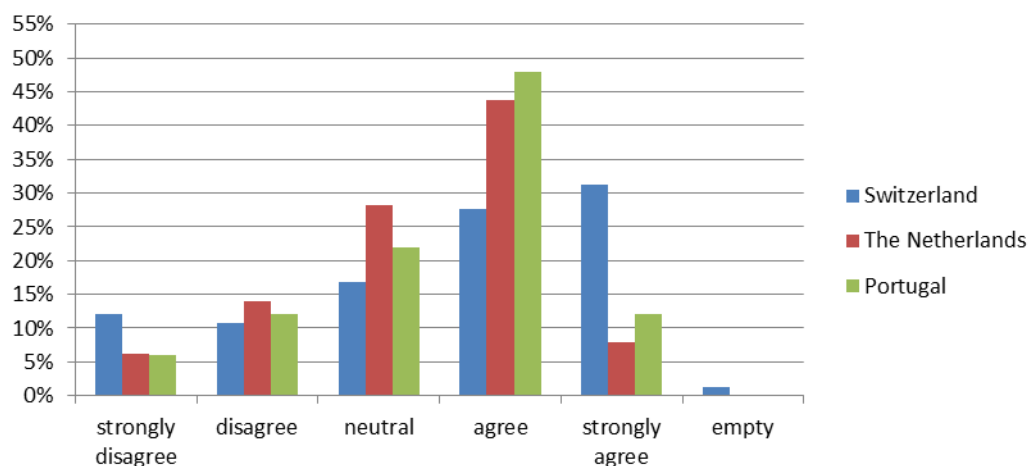
Most of the participants in all three countries would like to conduct the proposed training (also Swiss participants – considering the results shown in figure 37, they may think that "video games" is something different from the Active@Home training program).

Figure 39. How often per week would you use such a training program?
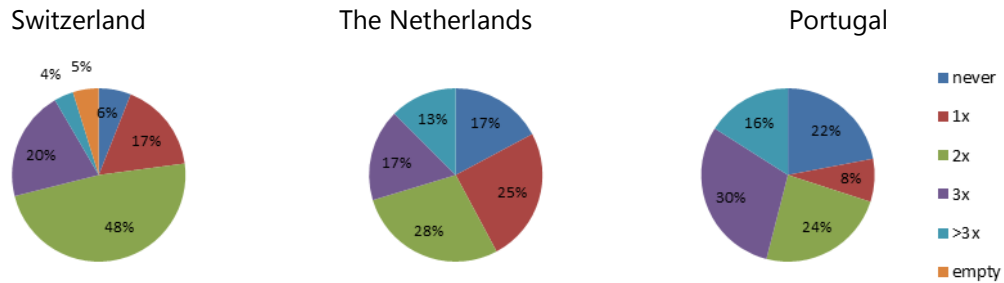
The most frequently chosen option in Switzerland and the Netherlands is "2x per week", in Portugal it's "3x per week". In the Netherlands and in Portugal, roughly one fifth of participants would never use such a training program (contrasting the statements above).

Figure 40. How much time would you invest in one training session?
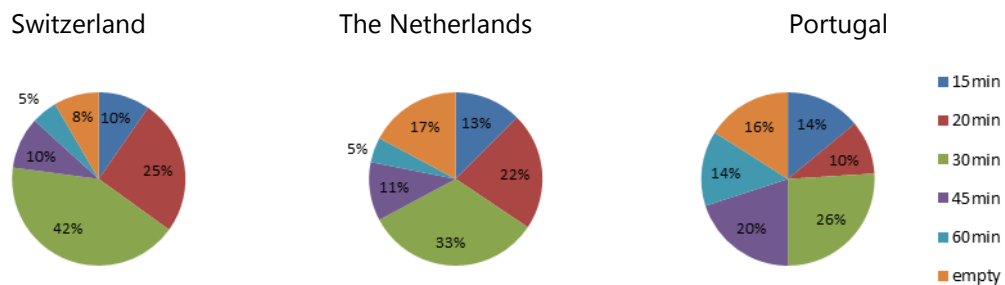
The most frequently chosen option in all three countries is "30 min per training session". In Switzerland and the Netherlands almost one fourth of participants also chose "20min". In Portugal, "45min" was more often chosen than "20min" as second most frequent option (even "60min" was more often chosen than "20min").

SUMMARY

Most of the participants would like to train two to three times per week with duration of 30min per training session. Different from Switzerland and the Netherlands, Portuguese people would also like to train longer (45-60min).

➔ **Active@Home solution should be designed taking into account these results in order to maximize the impact and benefits. Educational elements explaining the value of reaching minimal amounts of training might be added to the solution.**

2.3.7 Tai Chi and dance

All participants were asked four questions about Tai Chi and dancing. The answers are presented in the following figures, the data of each country separately in one figure.

Figure 41. Do you know Tai Chi?

Switzerland   The Netherlands   Portugal
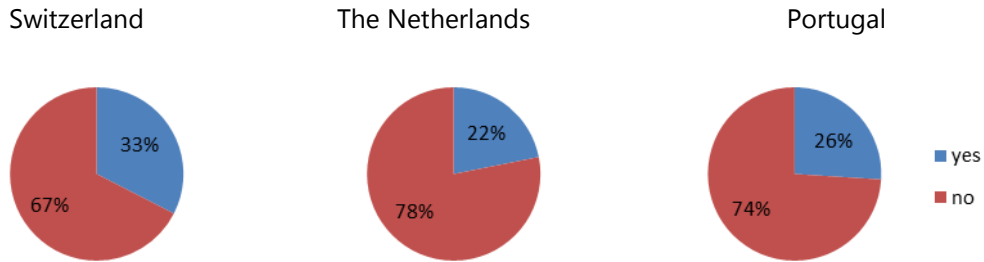
Most participants in all three countries do not know Tai Chi. The number of people knowing Tai Chi varies from 22% in the Netherlands to 26% in Portugal to 33% in Switzerland.

Figure 42. Do you like Tai Chi?

Switzerland   The Netherlands   Portugal
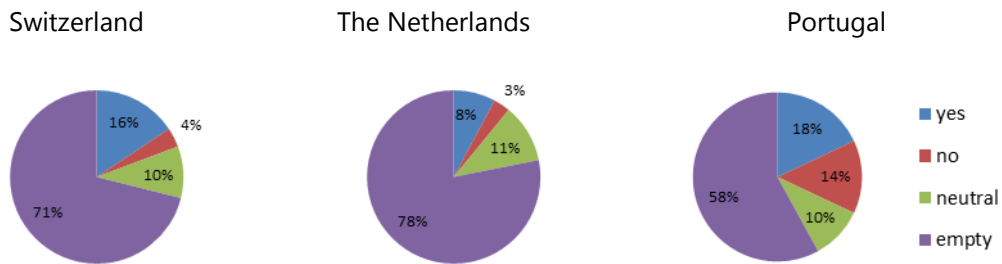
There are a lot of "empty" values because most of the people who do not know Tai Chi left this question unanswered.

Figure 43. Do you like dancing?

Switzerland   The Netherlands   Portugal
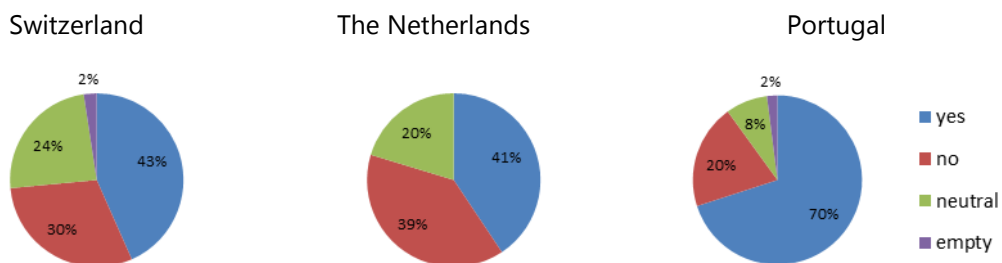
In Portugal, most participants like to dance (70%. In Switzerland and in the Netherlands around 40% like to dance and 30-40% do not like dancing.

Figure 44. What kind of dances do you like?

| Switzerland | The Netherlands | Portugal |
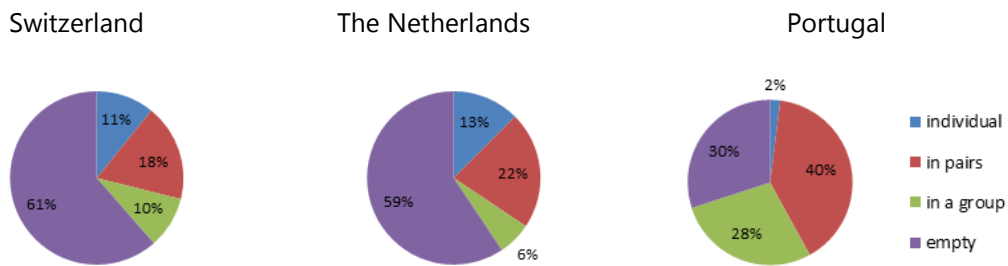
There are again a lot of "empty" values because most of the people who do not like dancing left this question unanswered. The most frequently chosen option in all countries is to dance "in pairs".

SUMMARY

Most participants do not know Tai Chi.

Most participants like to dance (in Portugal much higher rate than in Switzerland and the Netherlands). Most participants prefer to dance in pairs.

➔ **Implications for the project:**

- **It has to be considered that most participants don't know Tai Chi. Therefore, Tai Chi exercises should be carefully presented to the people; they may be excited to try something new, but they can also be afraid of doing things they don't know so far.**

- **It should be considered that people like to dance in pairs. This offers opportunities of designing games with an "Avatar-(dance)-partner.**

- **There were also some people stating that they don't like to dance. This has to be considered as well during game development (more training program instead of dancing?).**

3. Focus groups with stakeholders

3.1 Introduction/Background

As mentioned in the first part of this document, the Technology Acceptance Model builds a solid basis for considering important aspects which could influence the acceptance and active use of a newly developed technological system by end-users with perceived usefulness and perceived ease of use as main predictors. On one hand it's important to ask the end-users directly about their attitudes, experiences, needs and requirements in order to design a new system in accordance with these main demands. This should lead to high perceived usefulness and ease of use by the end-users and, thereby, improve system acceptance and use. On the other hand, gerontological experts with experiences concerning abilities and requirements of elderly people should be consulted and their recommendations should be also taken into account while developing a new system design. Therefore, in the Active@Home project, focus groups with gerontological experts were conducted in every country involved during the conceptualizing and investigation phase.

The main goal of the second part of this document is to complement the profile of an archetypical end-user and to summarize important implications for the following development phase not only directly from end-users (primary stakeholders) but also from secondary stakeholders.

In the next sections, after a general part about methodology of focus groups and materials, the description of participants and reporting of results will be divided into the three involved countries. There will be an aggregation of all the results in the last part about general discussion and implications for the project.

3.2 Methodology

3.2.1 Materials and procedure

A focus group is defined as a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards a topic. Questions are asked in an interactive group setting where participants are free to talk with other group members. Considering the comparability of the results from the different focus groups in the involved countries, ETHZ prepared – in line with the questionnaire from the survey with end users - some guiding questions for the focus groups which were structured in several topics (see guiding questions for focus groups in the appendix): Characteristics of end-users, attitude and experience, technology, design and usability, compliance and motivation, social aspects, dance and Tai Chi, general opinion, remarks and suggestions, business aspects.

In every country, at least one focus group had to be conducted. The sampling procedures and selection of the participants were carried out on the basis of each partner's resources. According

to the D2.1 Ethical roadmap, a written informed consent was needed for the focus groups and had to be signed by every participant. Therefore, a document was created with all the important information about the purpose of the project, the research procedures and data protection and privacy (see full informed consent in the appendix). Especially it was mentioned that the discussion in the focus groups will be recorded in order to improve the quality of the report, that the recordings will be destroyed after the reporting and that no names will be mentioned in the report. Furthermore, the researchers had to make the participants aware that their participation is completely voluntary.

To provide the participants of the focus group in advance with some basic information about the project discussed about, an information document was created with a short project description (see information document in the appendix). This was sent to the participants some days before the focus group took place.

To summarize, the following documents were created for the focus group (main part from ETHZ with review and revision of the content of all the partners involved) and translated in the three languages Dutch, Portuguese and Swiss:

- Guiding questions for the discussion

- Informed consent

- Information document with short project description

The procedure for the focus group was as follows:

1. Welcome and short introduction (partner, focus group moderator)

2. Introduction of the participants

3. Further information about the project "Active@Home" (presentation - optional)

4. Discussion based on guiding questions (this part was recorded)

5. Closing (next steps, more information e.g. homepage of the project)

3.2.2 Participants and dates

Switzerland:

In Switzerland, two focus groups were conducted. The first group took place at the 23th of August 2016 with four stakeholders; participants were physiotherapist and ergotherapist from a well-known rehabilitation clinic in Switzerland. The second focus group took place at the 24th of August with two stakeholders; participants were senior researchers in the area of game designing and healthy aging. In a PowerPoint presentation a short introduction and description of the project was provided. The sessions were recorded in order to make a comprehensive report.

The stakeholder groups consisted of the following participants:

F.B.	Ergotherapist (Rehaclinic Rheinfelden)
D.F.	Ergotherapist and Leader of the Daycenter (Rehaclinic Rheinfelden)
K.E.	Physiotherapist (Rehaclinic Rheinfelden)
T.W.	Medical training therapist (Rehaclinic Rheinfelden)
A.M.	Senior Researcher in Game Design (Department of Design, Zurich University of the Arts)
A.S.	Senior Researcher in Dynamic Healthy Aging (Centre for Gerontology, University of Zurich)

Manuela Omlin	Project employee Active@Home of ETH Zurich
Michael McCaskey	Project employee Active@Home of ETH Zurich

The Netherlands:

In the Netherlands a focus group was conducted on the 8th of September 2016. Professionals engaged in fall prevention of national organizations were invited. In the end we spoke with five experts on this issue. Three participated in the focus group and two were interviewed separately. In a PowerPoint presentation the themes and leading questions were projected on a screen. The session was recorded in order to make a comprehensive report.

The stakeholder group consisted of the following participants:

J.Z.	Kenniscentrum Sport (National Knowledge Center Sport)
L. C.	VeiligheidNL (National Safety Organisation)
J.A.	Projectleider Veiligheid Unie KBO (Projectleader Safety Advisors)

Ciska van Harten	Projectmedewerker Active@Home of Unie KBO (facilitator and report)

The interviews were held with:

F.K.	Tai Chi instructor for elderly
J.W.	Physiotherapist and instructor/developer of the Dutch fall prevention training "In Balance"

Portugal:

In Portugal, one focus group session was conducted. The session took place at the 27th of September of 2016 with three stakeholders, who are professionals working in caregiving associations and day centers in the Porto area. A PowerPoint presentation was first presented to provide a general overview of the project and its main objectives. The sessions were audio and video recorded in order to make a comprehensive report.

The stakeholder group consisted of the following participants:

M.N.   Associação Senhor do Bonfim
S.V.   Associação Social e Cultural S. Nicolau
F.L.   Centro Social de Soutelo

Rui Leite   Active@Home collaborator from Comfort Keepers
António Santos   Active@Home collaborator from Fraunhofer Portugal
Sílvia Rego   Fraunhofer Portugal assistant

3.3 Results

3.3.1 Switzerland

Topic	Summary of discussion
Characteristics of end-users	Participants mentioned that there is a huge variance in health state and general functionality and motor/cognitive abilities in elderly people, even if they are independently living.
	In general, a reduction in (high-speed) strength and reaction time can often be noticed; all the movements and a lot of things to do in daily life (e.g. get dressed) take more time and also the loss of strength can be observed in daily life (e.g. problems with carrying "heavy" shopping bags). Furthermore, there might be an age-associated decrease in fine motor skills and complex coordination (e.g. buttoning of the jacket). Nevertheless, putting on bracelets/sensors on arms and legs seems doable (not impossible/critical).
	Concerning the cognitive abilities, a decrease in learning abilities and reduced general absorption capacity is mentioned. Also here, there are big differences between people.
	What most of the elderly people notice (and also often mention) is a decline in sensory functions as visual and auditory functions. A lot of them wear glasses. It has to be considered that they often take off glasses when they do sports. The main problem is mostly to view close things (less the things which are far away). The distance from the player to the screen has therefore to be considered. Furthermore, appropriate visual design/graphics seem to be important (e.g. enough contrast large letters in writing etc.). Concerning the reduced auditory functions, there are fewer aids (e.g. hearing aids) used.

	Implications for the project: There is no typical "65+", a huge variance in motor and cognitive abilities has to be considered. In general, there is a decline in strength and reaction time and reduced visual functions (a lot of people wear glasses) Especially the visual design/graphics of Active@Home has to be adjusted. Putting on bracelets/sensors seems not critical.
Attitude and experience	Also concerning attitudes towards and experiences with new technologies, there is a huge variance and heterogeneity in elderly people e.g. also in use of smartphones, tablets and computers. There are those using iPhone and skyping with their grandchildren. Others do not have a computer and don't want one. But with a growing number of "digital natives", especially in the near future there will be a higher expectable use of these technologies in elderly, these days we are in a transition period. Therapists mentioned that ARMin (hand robot) and Nintendo Wii have already been used in therapy settings, as well as some "tablet games". Some patients are highly motivated to use these techniques, others are not at all. Often, there is a negative attitude towards new technology in the beginning and people say "No, that's nothing for me!". But you can notice and feel a kind of curiosity. If they test the new technology anyway, often they change their opinion and like it. Maybe it's more about "the fear of the unknown". Therefore, it seems important that the elderly people can test the exergame under some form of guidance (exhibitions, introduction courses etc.). It was mentioned that also positive attitude towards new technology does not automatically lead to the aimed behaviour (using the technology). There can be also a discrepancy. Gender aspect: Males are in general a bit more interested in new technologies and media. Often husbands are responsible for the "technical stuff" at home. For the Active@Home solution, it's recommended to use TV (TV screens) instead of computers or tablets because most people are already used to it and it's a part of most living rooms. Therefore, the "inhibition threshold" is smaller.

	Implications for the project: It's recommended to use TV instead of computers/tablets because most of the people are used to it and own one. Considering an "inhibition threshold" with new technologies, it seems important to give the targeted population the opportunity to test the developed solution. As females could be a little less interested than men, it's important to catch also their attention.
Technology, design and usability	As already mentioned, putting on bracelets/sensors on arms and legs is not considered as impossible or critical (especially if there is an easy system e.g. elastic or "automatic closing magnetic" bracelets). Glue or putting things directly on the skin should be avoided. It should be very clear where the sensors have to be put. There was the question why there is no fifth sensor in the center of the body to get even more information. But otherwise it was mentioned, that there is maybe too much "stuff to wear" already with four sensors (also because of calibration). An idea was to use the sensors also as tactile feedback. An alternative suggestion was to use Kinect (newer version of Kinect can also measure activated muscles, heart rate, blood pressure, emotions etc.). A big advantage is that people do not have to wear anything and one Kinect could be used for multi players. It was mentioned that the visual design/graphics seems to be very important and has to be adjusted to elderly people's (visual) abilities. Especially visual contrast has to be very high considering the age-related visual constraints. The game design should look trustable/"scientific" but not boring. It's recommended to use not too much stimuli on the screen (reduction to the essentials). Furthermore, it has to be considered that there is a variance also in screen size, not everybody has a huge screen. There was a clear statement that an easy handling is very important. A "plug and play" solution would be preferred (e.g. program automatically starting after plugging in). Also further interaction with the game and operating should be as easy as possible. Instructions have to be very simple and easy understandable for everybody. There was the idea of introduction courses (personal or in groups). What about further (technical) support then? In general, there was a very positive attitude towards a virtual coach. Of course, the coach has to be nice and pleasant. There should be a

female and a male version which can be chosen. In some existing games, it's even possible to create your own avatar. User groups should definitively be included in the development process of the virtual coach to get feedback. Different perspectives have to be considered: frontal or back view of the coach. There could also be the option of "mirrored movements" what would be interesting considering cognitive demands. Especially therapists mentioned that movement tasks are better shown than verbally instructed. Especially for elderly people, visual input is very important and even if there are cognitive deficits they can copy movements. A question was if the coach only gives instructions (shows task/movements) or if the coach also gives feedback. There was the idea that also the participant is pictured in the screen, you could compare your own movements with the coach's.

There are no big safety concerns. But there should be something like a "check" in the beginning if people are suitable for the training program (some exercises or just a short text which describes the physical demands). It has to be ensured that there is enough space to train and also a non-slipping floor. People should perhaps be instructed to wear shoes (no slippers etc.). The option of "emergency button" was shortly mentioned.

It was mentioned that a lot of elderly people have concern about data security and protection especially with the internet. An offline-version was suggested. Furthermore, maybe not everybody has an internet connection at home.

Implications for the project:

Putting on bracelets/sensors seems not critical especially if there is an easy system (e.g. elastic or magnetic bracelets).

The visual design/graphics has to be adjusted to elderly people's abilities. Especially high visual contrast is important as well as a reduction to the essentials (not too much stimuli).

Using a virtual coach seems a promising option. Different perspectives have to be considered.

There are no big safety concerns. It has to be ensured that participants are suitable for the training, that there is enough space and a non-slipping floor.

An offline-version of the game has to be considered.

Compliance and motivation	In the beginning, a personal introduction to the program could be very helpful to start and increase motivation. An important question is how to maintain/increase compliance after the first "hype". The goal should be that the exergame is a part of people's daily life routine and that they like to play (intrinsic motivation).
	One factor which might influence motivation and compliance positively is that people can train at their homes. They do not need energy to leave the house.
	<u>Feedback</u> is supposed to be very important and to increase motivation and compliance. Feedback helps to learn the right movements. And to notice an improvement (via feedback) might increase motivation very much (improvement in game itself but also improvement in daily life functions e.g. people can do thinks which were no more possible before).
	<u>Automatic progression and difficulty adaptation</u> is really important. A lot of people underestimate their skills and if they have to adjust by themselves they may chose a level which is too low for optimal learning and training effect (optimal load). Of course there are also some people overestimating themselves. So it's a good idea if the program choses optimal load and leads automatically to higher difficulty levels. But otherwise, autonomy and self-determination are also really important. People often want to decide by themselves what they do and what they don't do. This has to be considered (maybe including some opportunities for taking own decisions).
	One participant also mentioned that there is often a difference between attitude and actual behaviour. People may say they like something or want to do something. But it does not mean that they actually do it (Fishbein and Ajzen: Theory of Reasoned Action and Theory of Planned Behaviour). This is also related to the Technology Acceptance Model (TAM) of Davis. In this model "perceived usefulness" and "perceived ease of use" have a huge influence on the attitude (and hopefully also on the behaviour) of people.
	Active@Home should therefore focus on both aspects: It seems quite obvious that the developed solution should be as easy to use as possible (easy handling). What about "usefulness"? On one hand, training effects and improvements in motor functions as well as reduced fall rates are expected. On the other hand, the training game could provide a lot of fun. Especially the last aspect is considered to be very important and it's related also to the concept of intrinsic motivation, flow and game experience. For game experience,

haptic/tactile feedback is a central aspect; it makes a game much more realistic and increases flow and immersion. Also a good "game story" might increase fun. Especially considering the fun aspect, there might be different "personas" or type of players with different preferences. It's not realistic that one game fits all. There is not "the one game" for the target population, but members of the target population will find their own game. Therefore, it would be nice if there are several games and people could somehow also choose (thereby also increased autonomy). One helpful tool is to work with "mood boards" during development phase to find the "game style".

Social aspects could help to increase motivation and compliance. (see below)

Implications for the project:

A personal introduction to the program could be very helpful.

An important question is how to maintain/increase compliance after the first "hype".

Feedback is supposed to be very important; it helps to learn the right movements and improvement might increase motivation strongly.

Automatic progression and difficulty adaptation seems to be really important.

People might under- or overestimate their skills, therefore, the program should automatically choose the optimal load. Anyway, the need for autonomy and self-determination has to be considered.

Furthermore, it has to be considered that there might be a discrepancy between attitude and actual behaviour. According to the Technology Acceptance Model (TAM), "perceived ease of use" and "perceived usefulness" influence the attitude of people towards technology. Concerning "ease of use", the solution should be as easy to handle as possible. Concerning "usefulness", there are training effects and improvements on one hand. On the other hand, the training game could provide a lot of fun. This latter aspect is related to intrinsic motivation, flow, game experience and enjoyment. For game experience in general, haptic/tactile feedback is important (sensors could be used) but also a good "game story". It's not realistic that there is one game for all the target population. Development of several games is recommended.

One factor which might influence motivation and compliance positively is that people can train at their homes.

Social aspects	Therapists mentioned that a lot of people can be motivated by training in groups. There are several explanations for this: The group might put "more pressure" ("others wait for me to train with them", "others look at me while training, I have to do a good job" etc.) so it's a kind of obligation. In a group, you can also compete with each other. Competition might be a motivation factor especially for competitive people who like this. Besides possible competition, there is also the idea of a "common mission" ("we do something together", "we support each other"). Again, it depends on personality and character of the people if they like to train in groups because of one of the mentioned explanations.
	It has to be considered that couples might play together in their living room at home. The question was if it would be possible to share one screen.
	One participant mentioned the option of multiplayer game connecting players via internet instead of having all players together in one room. The others could be pictured in the screen as avatars. The critical voice here was that there is no real social interaction anymore.
	Elderly people are not supposed to use social networks as Facebook often.
	Implications for the project:
	Social aspects could help to increase motivation and compliance.
	People might be motivated by training in groups e.g. because the group puts "more pressure" and obligation, there is the opportunity to compete but also the idea of a "common mission".
	If people are motivated by group training depends also on personality and character.
	It has to be considered that couples might play together in their living room (share one screen).
	Another idea is to create multiplayer games connecting players via internet.
	Elderly people are not supposed to use social networks as Facebook often.
Dance and Tai Chi	A lot of elderly people respond really well to music. Of course it depends also on biography, personal lifestyle and preferences but most of the older people like to dance (especially the standard

	dances). Dancing is a demanding motor-cognitive task and a good balance and coordination training. Remembering dance steps/step sequences seems to be a good cognitive training.
	Tai Chi could be much less known by elderly people. But it seems to combine balance with strength training.
	Altogether, the combination of dancing and Tai Chi seems to be a holistic approach integrating different motor functions (balance, strength, coordination) but also cognition. This should meet the target of fall prevention and promotion of movement in elderly of the Active@Home project. Therapists mentioned that speed and reaction time should be specially paid attention to if not already included in dancing and Tai Chi.
	Participants think that the label of "Tai Chi" should be avoided in the title/description of the program (or it should be mentioned as "inspired by").
	Another idea is to focus more on cognitive concepts/tasks and include movements and motor functions there. If this is not possible and not aimed by the project, cognitive functions have to be included in the training program anyway because a lot of elderly people complain about a decline in cognitive functions and they are important also in daily motor tasks like routine walking.
	Implications for the project:
	Elderly people are supposed to respond well to music even if this depends also on biography and personal preferences.
	Dancing is considered to be a demanding motor-cognitive task and a good balance and coordination training.
	Tai chi might be less known by elderly and seems to combine balance and strength training.
	The combination of dancing and Tai Chi is supposed to be a holistic training approach for fall prevention including different motor functions and cognition.
	Focusing on the cognitive aspects of the training program might be a good "selling" argument for the proposed program.
General opinion, remarks and suggestions	In general, participants really liked the presented approach and would like to test the exergame by themselves but also with elderly people. It seems a good idea to combine "workout" with fun in a training game and a promising and exciting option also from a scientific

perspective. But maybe it should not be promised too much concerning the effects.

Especially for "digital natives" it seems to be a really interesting training option because they are already used to games and new technologies. It's supposed that especially younger seniors will like this program.

One participant mentioned that compliance has to be considered beyond the first "hype" in order to provide a long-term solution.

One participant considered that movement should be encouraged and supported in general, this program will not fit anybody's needs and wishes but there should be no pressure and force, if people like more to go for a walk outside, they should.

One participant was critical about the "cognitive part" of the training program: it seems to be too secondary. One idea is using mirror functions (e.g. do the opposite of the coach). There should be more focus on the combination of motor and cognitive tasks. A training approach is more promising if it's holistic and close to daily life situations (multi task situation).

A critical voice asked: "What is new here? What is the difference to other training programs?" If there is anything, this should be focused… For example, the automatic adaptation and progression (on physical activity level but also on an "emotional level"/dual-flow).

There were some ideas concerning the field trials: One participant suggested measuring a "movement profile" with simple movement sensors. People could wear the sensor during one week pre and post intervention. You could then maybe observe effects like people move more after intervention e.g. because they feel safer etc. Or you could use the pre-measurement to describe participants/sample. Perhaps the training effects are dependent on activity levels of participants. It's recommended to include also a measurement of game experience, enjoyment and motivation (intrinsic, extrinsic) and of course general well-being. A good question might be: How painful would it be for you to lose the training game again?

Implications for the project:

In general, participants really liked the presented approach and would like to test the exergame by themselves but also with elderly people.

It seems a good idea to combine "workout" with fun in a training game.

Business aspects	It was mentioned that older people might not have a lot of money.
	Participants stated that the costs of training program should not exceed 300-500 CHF. Justification of the costs could include the calculation for other training courses (10x dancing course costs also 500 CHF).
	Participants also mentioned that the solution should not be too cheap so that it seems not to be "useless".
	What about the option to "rent" the program and not to buy it?
	Another idea was that you pay the program yearly or monthly or that you could buy new games as soon as there are more. There could be a discount in price for people with a high training rate etc. (more extrinsic reps. financial motivation). Maybe there is a cheaper price for the second set (partner), like "quantity discount".
	There should be a clear distinction to other solutions on the market (youtube Tai Chi videos, Nintendo Wii etc.). Active@Home solution should find its market niche. One idea is to emphasize automatic difficulty adaptation and progression beside of the holistic aspect of the approach and the high fun factor.
	The training program should be sold for example at exhibitions for health or also by physiotherapists.
	Implications for the project: The costs of training program should not exceed 300-500 CHF. Options like renting, buying the program monthly/yearly, discount for "high training rates" or "quantity discount" for the second set have to be considered. There should be a clear distinction to other solutions on the market. One idea is to emphasize automatic difficulty adaptation and progression beside of the holistic aspect of the approach and the high fun factor. The training program should be sold for example at exhibitions for health or also by physiotherapists.

3.3.2 The Netherlands

Topic	Summary of discussion
Characteristics of end-users	This is very different. Experiencing limitations is subjective. Some people have limitations but don't feel this as a disability. While others, with relatively small restrictions can make a big issue of it. You often notice <u>decline of fitness</u> when elderly for example, put away their vegetable garden or get trouble with heavy household tasks. Elderly become more anxious with cycling.
	The existence of a pyramid is mentioned. In this pyramid different groups of elderly people are described. It makes a difference between fit elderly, elderly people with a chronic condition who don't suffer and don't want to be addressed on it. The third group is the one with multiple chronic conditions and finally it contains the group who already lives in healthcare institutions. There are figures of the size of these groups in the Netherlands. In a very short time elderly can slide down from the group with one chronic condition into the stage of multiple disorders.
	The group of vulnerable elderly, who have to stay longer in their own homes, is increasing. For example, also the group of slightly demented elderly. It is important to encourage this group to move. But the question is whether this group can be achieved with a game. But for the group not vulnerable yet, the game might be interesting. If you look at the pyramid of vulnerable older people; this is the group between having 1 chronic condition and multiple disorders. The group that just or may just not receive care. It would be interesting to talk to a social-care community team about this. In general the game might be seen as intended for the fitter elderly.
	It is very good to think about the precise target audience. These are strategic choices that definitely need to be made in the project group.
	Within the project a choice should be made where the game exactly focuses on:
	• Offer universal prevention (focus on the general population regardless of risk status) • Offer selective prevention (focus on people with certain risk factors) • Offer indicated prevention (focus at people with (beginning) complaints, vulnerability, symptoms) • Offer care-based prevention (as part of care/treatment, if there is a problem already)

	Implications for the project: Experiencing limitations when getting older is subjective. Within the project the target group should be further described.
Attitude and experience	There is a dichotomy between the younger and older elderly (65 plus and 80 plus). You can convince elderly using technology with pleasurable activities that are easy to use. Such as skyping with children and grandchildren, doing a game. Filling in official digital forms is something completely different and much more difficult. A game can be more accessible for certain elderly because they can do it at their own pace. Some seniors think they're not capable of doing certain exercises. They're afraid of reducing the tempo of the group. "Maybe I can't do this, everyone has to wait for me". It can also be used to keep people moving. For example, starting with a fall prevention program that can be followed by a more general moving program. The combination with a group meeting is also good. For example, an hour a week a group meeting and 15 minutes each day exercising at home with the program. The social part is important to keep seniors active. Single seniors like to do something in a group. But for people still having a partner, this is not necessary. Following the program together at home can be fun.
	Implications for the project: The 'fun factor' is very important. Possibility of doing it in your own tempo and level is very important. What if they have finished the program? Can elderly be redirected to regular activities? Combination with a group meeting should be possible. But doing the program just on your own or with more people at home should be possible too.
Technology, design and usability	A friendly voice is important and the game should be in Dutch. The approach should especially not be childish and didactic. There should be humor in it but it must be general humor. It is very important to examine the images people like during the development of the game. Images people (elderly) like can be specific. 'The Netherlands Moves' is a Dutch television program. Every morning elderly at home can join the movements. This program uses all sorts of different trainers; male, female, white, tinted. Elderly often see glitzy instructors as (too) young people. To enthusiast the elderly

is very important, stimulation by making compliments.

You have to screen people otherwise you could even get problems. In this context, reference by the family doctor or physical therapist is important. Some exercise programs online use a text in advance: "This is meant for fit people, make sure you have sufficient space to move." Building up the exercises is also important: Start from your chair, then get up, stand on one leg etc. A self test by means of a constructive exercise that increases in difficulty. Every day can be different in terms of fitness of someone. It is mentioned to do a small self test each time the game gets started. "How fit are you today?" If the user is out of breath after 10 squats, choose level 1. Also combined with a balance exercise. Three small exercises (Borg score) linked to a certain level. Competition is always very important; there must be a sort of progress. If someone achieves a certain level, the user must get a compliment.

Implications for the project:

Dutch.

Friendly voice.

No childish or didactic approach.

Use humour.

User research during development is important (kind of images).

Enthusiasm is important.

Give compliments when achieving a certain level.

Screen the fitness of the user by using a self test.

Link the outcome of the test to a certain level.

Use competition elements.

Compliance and motivation	Within the 'In balance' method questions are asked to check if a person fits in the program. Has the user a fall history? Difficulties in moving and walking? Reference by the family doctor often does not take place. Cooperation with home care organizations seems more logical.
	Possibility of gaming with two people at the same time can be motivating.
	It is advised to use the method of Social Marketing in communication about the product. Look with the eyes of the target group. Choose the positive approach in communication. Don't say: With this product

	you'll reduce fall risks with 40% but say: With this product you'll enjoy a longer independent life.
	Use a third party to motivate people for the product. Give people the feeling they choose for it themselves. The feeling of being in control themselves is very important for elderly.
	It's important for people to have the feeling to be part of something, a sort of club. This could be further considered in the project.
	Implications for the project:
	Check if a person fits in the program.
	Possibility of playing the game with two persons at the same time.
	Use the social marketing method when communicating about the product.
	Use third parties to recommend the product.
	Give the users the feeling they are in control themselves.
	Consider if the product can be part of something 'bigger', the feeling of a club.
Social aspects	There is already a wide ranch of fall prevention group activities in the Netherlands intended for different elderly target groups. In the focus group these programs and activities are discussed. There is a need for individual training programs.
	Implications for the project:
	There is a need for individual training programs.
Dance and Tai Chi	One participant wonders if dance really promotes fall prevention. She asks if there's scientific evidence for that. Probably there's no scientific evidence but it is believed that most MBVO teachers (more exercise for elderly program) in the Netherlands will confirm that dancing is a good way of moving for elderly. In this program dance movements are used. They often stand on 1 leg, they run, they have to balance, and they have to orientate themselves. Dance is better known among elderly than Tai Chi. Line Dance is getting pretty popular. Music and dance make people happy.
	Active@Home can be valuable when based on the principles of the training method 'In balance'. This is an existing fall prevention method that is widely used in Netherlands. In this method Tai Chi exercises are integrated. The tip is given that a teacher of the training 'In Balance' can be contacted. Also the name of a person who knows a

	lot about dance is mentioned. These trainers/experts are elderly themselves. The name of Isma Kogie is mentioned. She is a German woman who has developed a method in which you train without moving very much. This is mainly done by tightening muscles.
	Implications for the project: Tai Chi is not well known among elderly. Dance contains good movements for fall prevention. Research can be done at existing exercise programs for fall Prevention, especially the program 'In Balance'.
General opinion, remarks and suggestions	It is advised to get the game under the 'authorized interventions'. This is a list of interventions in the Netherlands that are proven effective. Four fall prevention programs in the Netherlands are already on this list. The intervention will be more visible to everyone and sport associations can ask for grant applications. Also insurance companies will be more interested.
	Implications for the project: It is advised to get the game under the 'authorized interventions' in the Netherlands.
Business aspects	Organizations of patients, specialists, family doctors are important. Use multiple channels. The app Evy is referred as used by a lot of people. If you want as many people as possible using it, you should make the software available. With regard to the price, 25 Euro is mentioned. It could be offered by a homecare organisation in a common platform to which members have access. As a participant you only have to buy the wristband. Compensation by health insurers would be nice. Health insurance companies are becoming more open for this. For example, Menzis insurance supports movement activities for elderly in certain municipalities. If the results are positive, health insurers will be more interested. How do you reach people who don't receive homecare? They visit maybe twice a year the doctor and that's it. This is a general group for fall prevention. Will they buy this product in a shop as a consumer product? The example is given of an elderly of 69 who is still active

	and will never visit a home care shop. Perhaps these people are still to fit. Like mentioned before, the target audience with beginning symptoms is most likely easier to reach.
	Also, children and grandchildren often point (grand)parents on certain possibilities. The magazine of the Union KBO is also widely read and can play a role. First you have to convince people to try it. You should give potential buyers the opportunity to test it.
	The participants do not immediately link the name of the project to elderly. If the game would come on the market in the Netherlands, it should have a different name. Now, the participants think more about gardening and doing jobs in the house.
	Imlications for the project: Use multiple channels. 25 Euro is seen as a good price. Home care organizations and insurance companies are interesting partners. Focus on the target audience of elderly with beginning symptoms. Children and grandchildren play an important role in recommendation of the product. Give potential buyers an opportunity to test it. Before putting it on the market, the name should be changed.

Interview with J.W. (Physiotherapist and instructor/developer of the Dutch fall prevention training "In Balance") – Implications for the project:

- The Tai Chi movements must be converted into awareness, that's the trick. Elderly have to feel their body, especially their feet, legs and pelvis (the centre of the body). The Tai Chi principle is: create awareness of the body.

- Besides the 'In Balance' training, elderly have to move moderately intense for a minimum of 30 minutes a day.

- The people coming are often people who feel already a bit unsure and have been fallen already. In fact, the target group is the group that exercises insufficiently.

- The idea is mentioned to put the awareness activities/education regarding fall prevention in the Active@Home game.

- Start with a warming up and see on the base of the score what the capabilities are that particular day.

- To discuss the fear for falling is also important.

- The idea is mentioned to train monthly in a group and the rest of the time at home.

- You have to offer it in such a way; the users can determine the limit for themselves. Don't decide for the user.

- With every user, do an entrance test. Test the progress in between.

Interview F.K. (Tai Chi instructor for elderly) – Implications for the project:

- There are five styles within the Tai Chi. With all these different styles; Tai Chi is not a very clear movement style.

- The lessons for arthritis patients (part 1 and 2) (Wu style) of Paul Lam and the 24 basic movements (Yang style) are according to F.K. best suited for elderly. The lessons for arthritis patients are the most simple.

- The social interaction is really necessary. The combination with a meeting or a couple of meetings could be an idea. For example once a month a meeting and fall prevention education and the rest practice at home with the game.

- Series are recorded from the front, from the side and from behind. This is something to taken into account within the Active@Home game also.

- We also need to consider whether exercises from a chair should be added.

- Each lesson has to start with a warming-up and close with a cooling down.

3.3.3 Portugal

Topic	Summary of discussion
Characteristics of end-users	In general, at age 65 the elderly are autonomous, in possession of his faculties physical and cognitive. Have some hearing impairment and some are visually impaired (most of them in are controlled). Many elderly wear glasses, others because of their limited education do not realize the visual difficulties they may have.
	Sensors should not be an obstacle, should be of easy placement on the cuffs.
	Place sensors on the ankles may be more problematic. The system should be able to function only on the sensor handles.
Attitude and experience	The elderly have a favorable opinion on technology and have contact with it (computers, social networks, smartphones, tablets). The same does not apply in the next age group. Receptive.

Technology, design and usability	The sensors should be practical to put on and without causing any discomfort for the senior.
	Preference for a younger coach and with good physical appearance.
	Individual factor can be demoralizing. Preference for group classes. The social part is important. May work in users of home care service.
	Must presuppose a "mandatory", the need to report to someone progress and get feedback.
Compliance and motivation	Having a Client Care to motivate and monitor the use; Join the fun and healthy aspect as motivation.
Social aspects	The group games and social events are more appealing.
Dance and Tai Chi	Tai Chi is an activity much appreciated by Seniors.
	The idea of dancing is great but without the need to perform the technical part with great perfection.
General opinion, remarks and suggestions	It should be something cheaper than a game console on the market today.
	It should be sold in public places and for any age, to prevent labeling games for seniors.
	Should have the connotation of play equipment and prevention.
	Must present an initial cost of installation and then a reduced monthly fee, for example practiced by tele assistance.
	The fee should not pass 10 €.
Business aspects	Necessary to consider the need of technical aspect have to be simple.
	Sensor clamps only on the handles. Periodic analysis of data and development record.
	Having Client Care service, supervision and proximity.

4. Appendix

Questionnaire for survey with end-users

Informed consent for focus group

Information document for focus group

Guiding questions for focus group