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ICT-Based Exercise Concepts for Seniors to Support Fall Prevention

What Do Seniors Really Want?

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Abstract

BACKGROUND: Seniors, in this case 67 plus years, are the fastest growing demographic group in Norway. The people in this group have a high risk for falling, where one out of three has at least one fall incident each year. The fall incidents often leads to injuries and reduced quality of life, and even reduced lifetime expectancy. The falls are not just making the seniors suffer, a publication by the The Norwegian Directorate of Health about fall prevention, stated that around 80% of all accidents and injuries among seniors are directly linked to fall, costing the society about three billions Norwegian kroners annually. A preliminary study to this thesis, conducted fall 2014, showed that exercise, more particularly strength and balance exercise, can be a great intervention to prevent falls. Another important finding was that none of the papers, found by doing a literature review, did document neither the use of any user acceptance tests, or any inclusion of the users in the development process. OBJECTIVE: The objective for this Master's Thesis is to develop concepts that would encourage physical activity, with the use of Information and communications technology (ICT), in order to reduce the risk for falling among seniors. RESEARCH METHOD: The report starts out by elaborating the problem at hand, and presents several commercialized exercise concepts. This is followed by a systematic literature review, aiming to illuminate the State-of-the-art (SoTA) within seniors, ICT and training. A workshop with active seniors, consisting of a focus group used to investigate their motivations, challenges and general thoughts about ICT and physical activity, and a co-design session where participants came up with ideas to a concept were conducted. Ideas from participants and results from literature review were used to develop concepts by making mockups. Our developed concepts were then evaluated by two experts through semi-structured interviews. RESULTS: The conducted literature review, about ICT, exercise and seniors, shows that seniors

are not included in development processes, which also supports one of the findings from the preliminary study. We also found that few of the papers did discuss fall as an important part of the interventions. Our workshop with the seniors gave us valuable insight in the seniors everyday life. Our participants were three active seniors, who reported that their main motivation for doing physical activity was simply to get a better life. As we also saw among the commercialized exercise applications and literature review, the seniors from the workshop were focusing on endurance exercise. We learned that they did conduct some strength exercise as well, but none were especially focusing on balance training. The concepts that we developed can be seen as a result itself, but it also proved to be an excellent platform for discussing seniors with experts. We found several similarities, but also some differences when we compared experts' and seniors' opinions, especially when it comes to how they focus on fall and what kind of activities the seniors should do to prevent fall.

Keywords: seniors, welfare technology, ICT, fall, prevention, workshop, User-Centered Design (UCD), elderly people, physical activity, training, exercise

Sammendrag

BAKGRUNN: Seniorer, i dette tilfellet de over 67 år, er den demografiske gruppen som vokser raskest i Norge. Personer i denne gruppen har høy risiko for å falle, en av tre opplever å falle minst en gang i året. Disse fallulykkene leder ofte til skader og en redusert livskvalitet. Man kan også se at den forventede levealderen synker etter slike ulykker. Disse ulykkene rammer ikke bare de eldre, en studie utført av Helsedirektoratet om fallforebygging, uttaler at 80% av alle skader og ulykker blant eldre skyldes fall, og koster det norske samfunnet rundt tre milliarder norske kroner årlig. Forstudiet til denne masteroppgaven, utført høsten 2014, viste at trening, nærmere bestemt styrke- og balansetrening, kan være en meget god metode for å forebygge fall. Et annet viktig funn var at ingen av forskningsartiklene, som ble funnet ved å utføre et systematisk litteratur studie, dokumenterte verken bruk av brukertester, eller inkludering av seniorer i utviklingsprosessen. MÅL: Målet med denne masteroppgaven er å utvikle konsepter som skal engasjere til fysisk aktivitet, ved bruk av IKT, for å redusere risikoen for fall blant eldre. METODE: Rapporten starter med å utbrodere problemet, nemlig fall hos eldre, samt presenterer flere kommersialiserte treningskonsepter. Dette etterfølges av et systematisk litteraturstudie, med formål om å belyse State of The Art blant faglitteraturen innenfor seniorer, IKT og trening. Det ble deretter avholdt en workshop med aktive seniorer, bestående av en fokusgruppe, som ble brukt til å studere deltakernes motivasjoner, utfordringer og generelle tanker rundt IKT og fysisk aktivitet. Det ble også under denne workshopen utført en co-design økt, hvor deltakerne kunne uttrykke sine idéer rundt et nytt konsept. Idéen og resultatene fra litteraturstudiet ble brukt til å utvikle konsepter. Våre utviklede konsepter ble vurdert av to eksperter gjennom semistrukturerte intervjuer. RESULTATER:

Litteraturstudiet som ble utført, om IKT, trening og seniorer, viser at seniorer er lite inkludert i utviklingsprosesser, som igjen støtter funnene fra forstudiet. Det viste seg også at veldig få av studiene som ble undersøkt så på fall som en viktig del av tiltakene. Workshopen som vi avholdt ga oss verdifull innsikt i seniorers hverdag. Deltakerne våre, tre aktive seniorer, kunne fortelle at hovedmotivasjonen deres for å drive fysisk aktivetet enkelt og greit var for å få et bedre liv. Som vi også fant i de kommersialiserte treningsapplikasjonene og litteraturstudiet, fokuserte deltakerne fra workshopen først og fremst på utholdenhetstrening. Noen drev også med styrketrening, men ingen fokuserte spesielt på balansetrening. Konseptene vi utviklet kan sees på som et resultat i seg selv, men konseptene skulle også vise seg å være en god plattform for å diskutere forskjellige aspekter knyttet til seniorene med ekspertene. Vi fant flere likheter, men også noen forskjeller når vi sammenlignet ekspertenes og seniorenes meninger, spesielt når det kom til deres fokus på fall og hvilke aktiviteter seniorene burde gjøre for å forebygge fall.

Nøkkelord: senior, velferdsteknologi, IKT, fall, forebygging, workshop, brukersentrert design, eldre, fysisk aktivitet, trening

Preface

This submission is Odd Fredrik Mørch Rogstad, Nitharshaan Thevarajah and Truls Bjørnar Steinseth Hamborg's Master dissertation in Computer Science at Norwegian University of Science and Technology (Department of Computer Science and Information Science). Our master specialization is software.

The assignment was given by our supervisor Babak A. Farshchian, and is due June 2015.

We would especially like to thank our supervisor Babak A. Farshchian for important and valuable guidance throughout this project. His guidance have been exceptional. We have brought up countless questions and problems at his office, but never walked out unanswered.

Additionally we are grateful for meetings and advice from Yngve Dahl, Thomas Vilarinho and Marius Mikalsen at SINTEF ICT. Jorunn Helbostad and Ebba Bredland have also been truly helpful in evaluating our developed concepts. At last but not least, we also want to thank the three participants that attended our workshop.

Trondheim, June 8, 2015

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List of Acronyms

BMJ British Medical Journal.

GIF Graphics Interchange Format.

ICT Information and communications technology.

NTNU Norwegian University of Science and Technology.

SoTA State-of-the-art.

UCD User-Centered Design.

Chapter 1
Introduction

1.1 Motivation and purpose

Seniors, in this case 67 plus years, are the fastest growing demographic group in Norway, and will steadily increase in several decades to come. It is a known fact that seniors have a higher risk of falling, and when they do, it is at a higher risk than other groups. About one in three people over 65 years has at least one fall incident each year. In about 5% of all fall incidents results in a bone fracture [28], most commonly a fracture in the wrist, hip or back. A fracture may lead to bedsore and even trauma, which again may lead to a reduced quality of life and even reduced lifetime expectancy.

According to a paper [24] published by several universities in Norway, 40% to 60% of the falls among the elderly results in injuries that require medical attention. The cost of the medical attention varies a lot. The cost depends on the age and the severity of the damage. The cost is overall very high, both for the patient, when it comes to the physical and mental cost, and the society in terms of healthcare utilization and resources [24]. Another publication by the Norwegian Directorate of Health about fall prevention [26], stated that around 80% of all accidents and injuries, among seniors, are directly linked to fall. As the elderly are becoming older, their responsiveness and coordination skills are becoming less effective. The

senior's reduction in responsiveness and coordination skills causes a higher risk for hip fracture, as the seniors are losing the ability to cushion the fall with their hands (the reason for wrist fracture). The majority of the seniors with hip fracture does not recover to the same functional level as before the fall, which leads to increased assistance from the home care service, or a transfer to a nursing home [26]. All of this costs the Norwegian society about three billions Norwegian kroners annually [26], or over 350 million Euros, which can be said to be a lot considering the relative small population. The same publication lists a lot of tested preventive measures, or so called interventions; training of personnel in home care service, nursing home hazard management, information dissemination via doctors, nurses and brochures, senior parties, exercise facilitation, home visits by nurses, telephone service and more. Many of them have proven to have good effects. The problem with most of the preventive measures are that they require not only the elderly's attention, but also other personnel such as doctors, nurses, trainers and so on. The former minister of Local Government and Regional Development, Liv Signe Navarsete (Sp, Centre Party), said in an interview in 2012 that it was "important to focus on preventions and self management rather than prioritizing medical care and building more and more nursing homes for the elderly" [31], in conjunction with the aging population.

Of the listed interventions in the previous paragraph, we find little trace of interventions that include ICT. All over the world we see researchers trying to eliminate fall among elderly, and many of the proposed interventions are without ICT. Our goal is to use ICT to reduce the risk of seniors falling.

A systematic review and meta-analysis of randomised clinical trials by Chang et al. [12], published by British Medical Journal (BMJ), states that one of the most effective component in reducing the risk of falls is exercise. Another systematic review and meta-analysis [50], with 9 603 participants, published by The American Geriatrics Society, showed that the pooled estimate of the effect of different forms of exercise was a reduction in the rate of falling by 17%.

Studies [47] show that most fall risk assessment and fall prevention technologies

are developed without the involvement of the users, i.e. the seniors. This, combined with the difficulties of using ICT for impaired elderly, and a general lack of interest and stigma are reasons that make using ICT for fall risk assessment and prevention a challenge. We will therefore employ user-centered methods for development, and develop a series of concepts for ICT to be used in future fall prevention and fall risk assessment services.

1.2 Research questions

As we see in the former section we have a problem, i.e. the health issue of seniors falling and hurting themselves, and we have a well documented intervention, namely exercise. Our thought is therefore to use ICT to get more seniors to exercise. As mentioned, we will use user-centered methods for development, where we will let the seniors participate in a co-design process.

Our main research aim is "how to encourage physical activity with the use of ICT, in order to reduce the risk for falling among seniors". The main goal is to present one or several concepts that should increase the motivation to exercise among seniors. In order to achieve our goal we must answer a few research questions which are presented in table 1.1. To answer these questions we will see to scholarly literature, conduct workshops with seniors and cooperate with experts.

Research Questions	
RQ-1	What do we know about physical activity, exercise and seniors?
RQ-2	What motivates active seniors to exercise or perform physical activity?
RQ-3	What are the characteristics of ICT tools designed for seniors in relation to physical activity reported in the literature?
RQ-4	What kind of ICT tools do active seniors use in conjunction with physical activity?
RQ-5	What kind of functionalities do the seniors want in an exercise concept?

Table 1.1: Research Questions

1.3 Research context

This project is an extension to a pre-study, with the title "ICT in fall prevention and assessment, a literature study", conducted by Odd Fredrik M. Rogstad, in the fall of 2014. This project builds upon the results documented in the pre-study. One of the main findings are that seniors are not included in research and development projects, regarding fall prevention and fall assessment tools, especially in the crucial and early development phase. Another important finding from the pre-study is that one of the most effective interventions for fall prevention is exercise.

A newly started project, called ADAPT, where the work package leader happens to be our supervisor, Babak A. Farshchian, aims to develop and evaluate technology for assessing fall risks among seniors. We will of course have a close cooperation with our supervisor, but also have the opportunity to ask for help from the experts within the ADAPT project. We also hope that this thesis can be further used in the

ADAPT project.

1.4 Result

The conducted literature review, about ICT, exercise and seniors, shows that seniors are not included in development processes, which also supports one of the findings from the preliminary study. We also found that few of the papers did discuss fall as an important part of the interventions. Our workshop with the seniors gave us valuable insight in the seniors everyday life. Our participants were three active seniors, who reported that their main motivation for doing physical activity was simply to get a better life. As we also saw among the commercialised exercise applications and literature review, the seniors from the workshop were focusing on endurance exercise. We learned that they did conduct some strength exercise as well, but none were especially focusing on balance training. The concepts that we developed can be seen as a result itself, but it also proved to be an excellent platform for discussing seniors with experts. We found several similarities, but also some differences when we compared experts' and seniors' opinions, especially when it comes to how they focus on fall and what kind of activities the seniors should do to prevent fall.

1.5 Report Outline

The rest of this report will be organized in the following chapters:

Chapter 2: Problem Elaboration and Analysis
This chapter presents the problem at hand and the target group.

Chapter 3: Method
Describes research methods used in this thesis.

Chapter 4: Combining exercise and ICT
Highlights the evolution of ICT and exercise and presents some commercialized exercise applications.

Chapter 5: Literature Review

Presents a SoTA in exercise ICT and seniors.

Chapter 6: Workshop with seniors

Describes a workshop held with active seniors.

Chapter 7: Concept design

Presents four developed exercise concepts to support fall prevention.

Chapter 8: Evaluation of concepts

Evaluation by two experts on the developed exercise concepts are presented in this chapter.

Chapter 9: Discussion & Conclusion

Summarizes, discuss and conclude the thesis and suggest further work.

Chapter 2
Problem Elaboration and Analysis

2.1 Introduction

This chapter aims to clarify the problem at hand. We will take a look at the situation today, when it comes to seniors and their challenges. We will then take a further look at fall prevention and assessment tools for seniors, that was studied thoroughly in the preliminary study, conducted prior to this thesis. But first, it is important to get to know the population you are studying, therefore the next section tries to elaborate who the seniors are, and what they think of the products and services that are developed especially for them.

2.2 Seniors

Who are the seniors? The word "senior" is just a polite expression for an old person [46]. Other words we will use in this report is elderly, older adults and aging population. A study, done by the Pew Research Center, an American think tank in Washington, D.C., asked people at different ages about when they considered a person as old. The group with an age between 18 and 29 believed, in average, that a person becomes old at age 60. The group with people with an age above 65 answered, in average, that a person does not become old until turning 74 [11], and as a well known Irish writer once wrote, *"The tragedy of old age is not that one is old, but*

that one is young." (Wilde, 1890, The Picture of Dorian Gray, Chapter 19). It is simply problematic to label a person as old. A study, at the Centre for Social Action at De Montfort University in Leicester, with 700 participants over 65 years, did several interesting findings. The study found that the majority of the participants did not feel as old as they were, and did not use services specifically made for older people, [15]. For those who actually used the services, one in ten reported that the services were not what they wanted. The study reported that "many services were doing things for older people rather than working alongside them and asking them what they want" [15].

All kind of demographic groups have their problems and challenges. The teenagers are "struggling" with acnes and other complications the puberty brings with it. Women in the fifties are fighting with their unpredictable hormone levels in their menopause, while many men in the same age are experiencing the so called "midlife crisis", doing outrageous and impractical things like buying a motorcycle or impulsively quitting their job. But what about the seniors?

2.2.1 Challenges

What are the seniors daily challenges? Little do we know, and most of the challenges are individual. Some of what we do know are described in this section, and are fairly generalized.

When aging, there is something happening to your body and mind. Purely biological, we can see that the building blocks of the body, which are complex biological molecules, becomes more and more dysfunctional and they start having trouble repairing themselves [36]. This leads to weaker muscles, skeleton, joints, reduced vision, poorer balance, poorer ability to react etc.. All of this again leads to higher risk of falling, and other ailments and limitations. When combining this, and the fact that seniors not are seeing themselves as old as they are, puts them in a risk of overperforming, not knowing their own capabilities [19]. Another effect is that the learning process is becoming more unstable, and may become slower [48] and it is

difficult for the seniors to keep up, considering the rapid development of technology as well.

A qualitative exploratory study from the Faculty of Sports Sciences, University of Extremadura, Cáceres, Spain, asked 34 persons over 65 years about "difficulties of old people in the use of the Internet" where 55% answered that the problem was that they "did not know how to use it" [22]. There can be several reasons for the difficulty of using the Internet, one of them could be lack of educational programs or general lack of interest [22]. Another problem could be the stigmatization around seniors and technology, for instance that seniors are stigmatized of lacking the basic skills to even use new technology.

Aminzadeh et al. [2] did research on seniors' views on the use of assistive devices in fall prevention. They could document, through focus groups with 30 community-living older adults from Italy and British-Canada, that aging, disability and cane use are stigmatized in todays society. One could perhaps say that assistive technology in general is stigmatizing. The use of such technology tells the user, and the society, that one needs help, which clearly is a problem for many people. Every person has a basic desire to fend for themselves, but by using these assistive technologies, one shows the society that the person is not able to do so.

To change a persons behavior is a challenging task, especially to change behavior of an elderly person, who most likely likes to follow and have daily fixed routines. An example is that elderly people are encouraged to participate in 30 minutes of moderate physical activity, preferably every day. Brawley et al. [8] mentions commonly identified barriers to physical activity for older adults. Lack of time, lack of energy, motivation, illness, fear of injury, and lack of skill were identified as major barriers. The fear of getting injuries during physical activity, or the fear of not being able to perform physical activity due to lack of skills creates less motivation for doing physical activity. The motivation is probably the biggest incentive to continuously perform physical activity over a longer period of time. When the motivation becomes the largest barrier to break, the task of changing attitude or behavior towards physical

activity, becomes a difficult one.

Another challenge, as the introduction chapter clearly states, is falls. 40% to 60% of the falls among the elderly results in injuries that require medical attention, and one in three people over 65 years has at least one fall incident each year. With that in mind, one can clearly see that something has to be done. How can one prevent falls?

2.3 Preliminary study

The aim of the preliminary study [47] was to elaborate well known prevention and assessment methods within falls among the senior population, as well as the State of The Art in the research field.

The preliminary study started out wide, by mining for terminologies in 50 relevant scholarly papers considering seniors, fall prevention, fall management and fall assessment. A terminology extraction program called TerMine [5] were used, and the result were used to make a table, summing up the found interventions and assessment methods. Theses methods were further documented, and are closer described in the next subsection.

The SoTA in the same study aimed to answer two questions; “What is the SoTA within the field of ICT and fall prevention and assessment among the aging population” and “Are researchers and developers involving seniors when developing new products? If so, what are the effects of such involvement, and what are the key factors when designing a successful product?”. The SoTA were conducted doing a systematic literature review, that helped in gathering existing knowledge in an unbiased and replicable way. It gave a broad review of the field of ICT and fall prevention and assessment among the aging population. Some of the major findings from the preliminary study are listed below.

Major findings:

- Sensors and motion capture are technologies that are most commonly used for assessment and prevention tools.
- The found assessment tools are fairly good at assessing whether people are at risk of falling or not, compared to manual assessment.
- Found prevention tool have the ability to warn the user about gait abnormality with a 99,8% accuracy.
- None of the found interventions did document neither the use of any user acceptance tests, or any inclusion of the users in the development process.

The last item in the list above became one of the reasons we wanted to continue working with seniors and technology in a more user-centered way, which will be documented in chapter 6. The next section will further elaborate what Rogstad found during his work on fall prevention and fall risk assessment.

2.3.1 Fall prevention and fall risk assessment

There exists many solutions today that address fall prevention and fall risk assessment, but many of these solutions are without ICT and depends on health care professionals. According to National Center for Injury Prevention and Control, in the U.S, one could encourage the seniors to *get some exercise*, *be mindful of medications*, *keep their vision sharp* and *eliminate potential fall hazards at home* as preventive measures to fall[20]. These are by all means good preventive measures, but none of them includes the use of ICT. The tip for getting more exercise could involve ICT as a tool for keeping track of exercise progression, empower knowledge about exercise and its effects, motivational purposes and many more. An introduction to already commercialised and popular applications will be presented in chapter 4.

One known fall prevention method is to engage seniors in physical activity, which is mentioned in the preliminary study [47]. Especially balance training has been pointed out as the most rewarding fall prevention method. As mentioned earlier, many seniors struggle to change their behaviors towards performing physical activity and

therefore have many barriers to overcome. Another barrier seniors have to overcome is the rapid growth of technology. There have been developed many applications related to physical activity, but are they designed by and for the elders?

2.4 Exercise

In this section we will try to define the term exercise, and take a look at some best practises regarding exercise and fall prevention among seniors.

According to Oxford Dictionaries [16] exercise is described as an "activity requiring physical effort, carried out to sustain or improve health and fitness". There are many forms and types of exercise, everything from doing calf raises on the bathroom to playing hockey in the NHL (the professional National Hockey League for men in Canada and USA). It is simply entirely individual what you like and are able to do, and what kind of goals you have when doing a certain physical effort. The root of our thesis is to help seniors in preventing falls, and we are therefore focusing on exercise, which has proven to be an important fall preventive method. A meta-analysis [49], published by New South Wales Public Health Bulletin, reviews 54 randomised controlled trials and supports that exercise, as a single interventions, can prevent falls. The review includes some best practises, based on the 54 trials, in terms of how to use exercise for fall prevention. The recommendations are presented in table 2.1, and we should consider them all when designing concepts for exercise applications.

In some of the literature we can see a clear distinction between exercise and physical activity, where exercise for instance would be a planned workout at the gym, whereas physical activity could be shoveling snow. The planned workout would typically have a clear purpose of improving one or more health aspects, while the main purpose for shoveling would be to remove the snow. We decided to include physical activity in the exercise term, due to the indirectly effect physical activity have on the health, and we will use both terms interchangeably. We will also use the word training in the same way.

Recommendations	Description
Exercise must provide a moderate or high challenge to balance	It is important to include balance training to effectively prevent falls. According to the review, one should challenge the balance in three ways; reduce the base of support, movement of the centre of gravity and reduce the need for upper limb support
Exercise must be of a sufficient dose to have an effect	It is suggested that one should exercise at least two hours per week
Ongoing exercise is necessary	It is important exercise regularly, since the benefits are temporary
Falls prevention exercise should be targeted at the general community as well as those at high risk for falls	It is important to develop exercise programs for both the general community and for those at high risk for falling, as different groups of people need different types of exercise
Falls prevention exercise may be undertaken in a group or home-based setting	Several of the most effective trails mixed home-based and group-based exercise strategies.
Walking training may be included in addition to balance training but high risk individuals should not be prescribed brisk walking programs	Surprisingly, programs that included walking was less effective than programs without walking. Sherrington et al. are therefore suggesting that the inclusion of walking training not should be a crucial feature of an exercise program, but could be a part if it is not endangering the user, it is after all many health benefits of such activity
Strength training may be included in addition to balance training	In the same manner as the inclusion of walking training, inclusion of strength training does not seem to be crucial, but there may be longer-term benefits considering falls prevention
Exercise providers should make referrals for other risk factors to be addressed	One of the most effective interventions for fall prevention is multifactorial preventions programs, therefore one should also include other interventions to the exercise programs. Examples of other interventions are; reviews of drug use, home hazard management and even cataract surgery.

Table 2.1: Best practice recommendations by Sherrington et al. [49], based on 54 randomised controlled trials

2.5 Conclusion

In this chapter we have become better acquainted with available literature about the challenges seniors have, especially with the aging process in mind. As we saw in the previous section, there are several existing fall prevention and assessment tools, but there are obviously room for improvements. We think that exercise and physical activity are interesting areas, especially due to the many beneficial aspects affecting the user.

We also think that ICT can be an important tool for both getting seniors to exercise and to get them to continue exercising. Unfortunately ICT is not an easy and well integrated part of all seniors' everyday life. It is therefore important to listen to the users, i.e. the seniors, and ask them what they really want and need. More importantly, what type of interventions would they enjoy using?

Chapter 3
Method

The previous chapter highlighted some challenges seniors have when using ICT. A common feature of the technology developed for seniors was that the seniors themselves did not like the technology that was intended for them. Many interventions did not include seniors in the early development phases, which is also pointed out in the preliminary study [47] done prior to this master thesis. This chapter highlights methods used to answer our research question shown in table 1.1 in chapter 1.

3.1 Research process

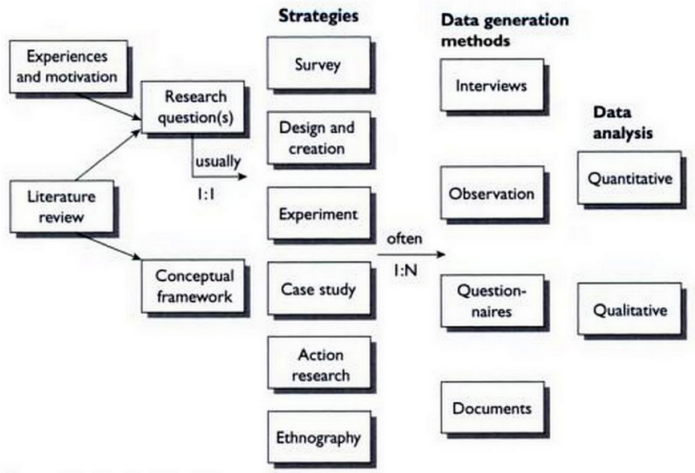

Figure 3.1: Model of the research process [42]

The model presented in figure 3.1 gives an overview of the research process and its components. This model has been used as our main driving force throughout our thesis and is presented by Briony J. Oates [42]. As in any rigorous research, the research process should be carried out in a systematically way. To achieve this, we used the model presented in figure 3.1. For each research question, a research strategy was selected, and one or more methods were selected to generate data. The data generation was then followed by a data analysis method, either qualitative or quantitative. Each of our methods, which are described in the next sections, uses strategies and data generation methods from this model and is either a quantitative or qualitative data analysis.

3.2 User-centered design

The seniors does not seem very pleased with the services designed for them [15], a possible reason for this is a general lack of inclusion of real users when designing

the products or services. A very useful method when designing something for a user group that you are not familiar with is user-centered design (UCD). Inclusion and user acceptance are keywords when doing UCD. According to Abras et al. [1] UCD is a design process where end-users influence how the design takes shape. The important concept is that users are involved during the process of making the product in one way or another. There are several ways to involve a user during the development process, depending on the stage of the design cycle. It is possible to do interviews and questionnaires to gather data regarding needs and expectations from the user at the beginning of the project. At the early stage of the project it is possible to do interviews and questionnaires, focus groups or on-site observations to see if requirements for the product are met. Usability testing or interviews and questionnaires might be used during the final stage of the project to measure user satisfaction and to test the usability of the concept. There are many commonly used UCD methods according to Karel Vredenburg et al. [61]. We used focus group in a workshop which we held, that involved inviting a group of intended/actual users to share their thoughts, feelings, attitudes and ideas on a product [54]. When we invited active seniors to a workshop, they were considered as the users of the product, and thus stakeholders as well. This is also known as another UCD method, named participatory design [32]. We also used another known UCD method named informal expert review, when experts evaluated concepts we made.

Previous work, by Uzor et al. [55], shows that involving seniors in designing a products leads to more engaging products and more positive effect on adherence to exercise than tools produced without UCD. Stephen Uzor et al. concluded that involving seniors in the early stages of the design process could highlight some of the obstacles and challenges seniors had to go through, which the designers might not be familiar with. This highlights the importance of involving seniors during the development process of a tool intended to be used by the seniors themselves.

The next sections describes our approach to answer our research questions shown in table 1.1, in chapter 1. We started with a SoTA literature review on seniors, ICT

and exercise. We used knowledge gathered from the SoTA to arrange a workshop with some active seniors where we got many important findings and comments from the seniors, which we used to develop some concepts involving ICT and exercise. We then had some experts who evaluated these concepts and gave us many important thoughts and feedback on the concepts and even suggested changes for future work. Each phase follows the research model in figure 3.1, which we will describe shortly, and can also be seen as phases in an iterative development process.

3.3 Iterative development process

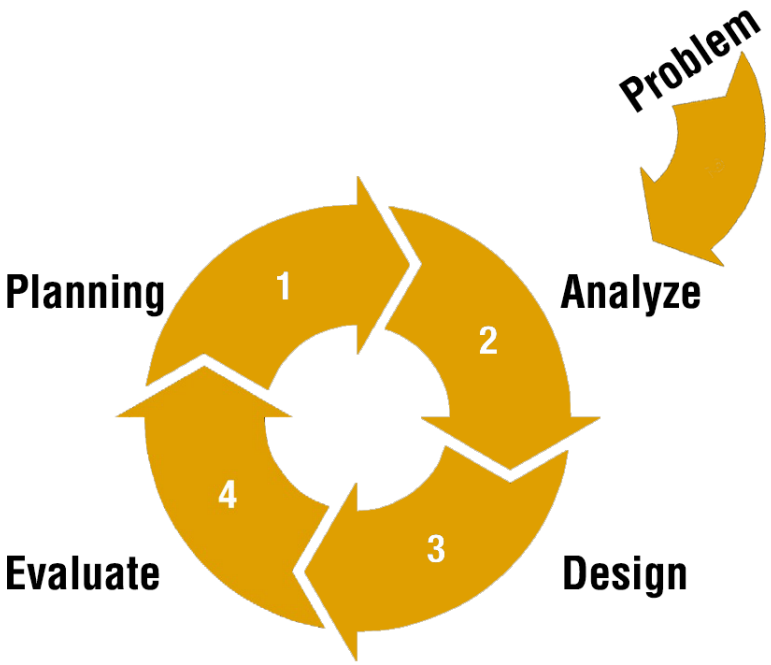

Figure 3.2: Iterative development process

The idea behind an iterative process is to develop a product through repeated cycles (iterations) [63]. The product which is developed is refined and improved for each cycle through each phase in the development process. The preliminary study,

conducted prior to this master thesis, is the problem phase shown in figure 3.2. The SoTA and the workshop is the analyze phase, where the problem at hand is analyzed and our design phase consisted of generation of several concepts which were evaluated by experts. The whole cycle is completed when future improvements and work are suggested. Figure 3.3 sums up how each phase in the iterative development process is adapted to our research.

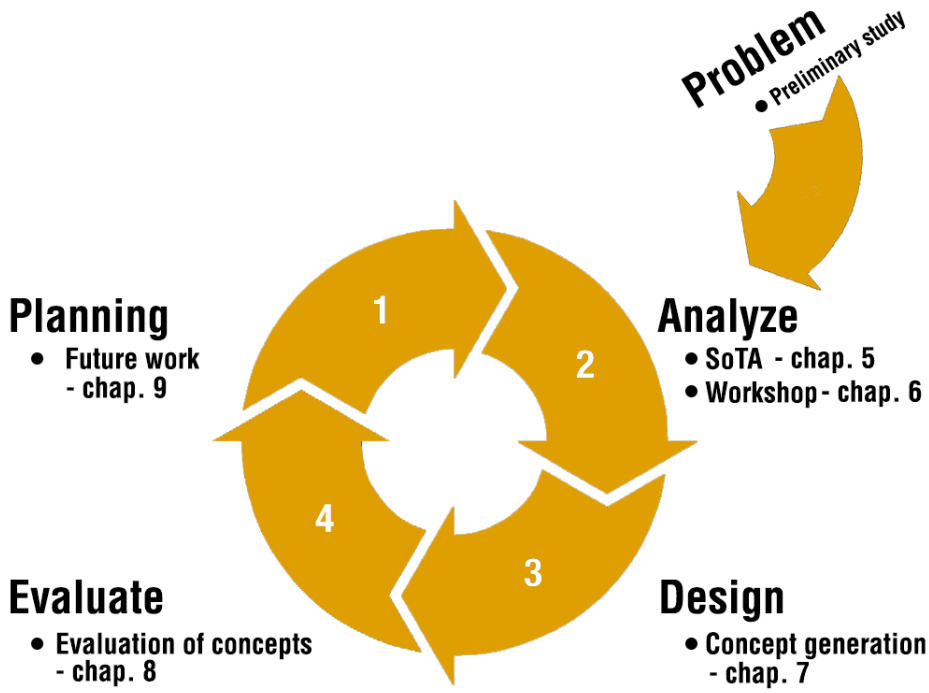

Figure 3.3: Iterative development process adapted to our research

It is worth to mention that each phase consists of one or several stages. The analyse phase consists for instance of SoTA and a workshop. Similarly for the design phase, which consists of the stage concept generation. Each of these stages is either one or several iterations of the research model presented by Oates shown in figure 3.1.

3.4 State of The Art Literature Review

SoTA is a known research method [37] where you can learn about what have been done in the field you are researching about. A SoTA is often done by conducting a literature search of relevant documents. In our case, we did a literature review on ICT, elderly people and physical activity, which consisted of a survey of several documents. This is also in line with the research model shown in figure 3.1 where survey is the research strategy chosen and documents are the prefered data generation method. We were trying to answer RQ-3 : "What are the characteristics of ICT tools designed for seniors in relation to physical activity reported in the literature?" by conducting this SoTA. This also corresponds to one iteration of the research model in figure 3.1. We chose to perform a SoTA on seniors, ICT and exercise, since we found out that physical activity was a good initiative to prevent falls and we wanted to know what the research field consisted of. The SoTA is described in detail in chapter 5.

3.5 Workshop with seniors

A workshop is a great way to gain hands-on experience or opinions from several people at once. We chose to conduct a workshop since it gave us the opportunity to hold a focus group and a co-design session with the participants during the same event. The conducted workshop is described in chapter 6

A focus group can be considered as a survey involving interviews and questionnaires to gather qualitative data [40]. Our focus group was organized as a survey involving questionnaires and was conducted to answer RQ-1 : "What do we know about physical activity, exercise and seniors?", RQ-2 : "What motivates active seniors to exercise or perform physical activity?" and RQ-4 : "What kind of ICT tools do active seniors use in conjunction with physical activity?".

Co-design is about letting the users themselves take a part in the development process. We chose to conduct a co-design session since both the preliminary study

and SoTA found that seniors were less involved in the development process. Co-design was the preferred method for answering both RQ-5 : "What kind of functionalities do the seniors want in an exercise concept?" and to solve the problem with seniors being less involved in the development process. We planned to perform product box which is a co-design exercise where the users are asked to create a product box to represent their vision of the product [33].

3.6 Design of concepts

Workshop, along with the SoTA, was considered as the analyze phase in figure 3.2, while the design phase consisted of concepts that were created as a result of findings gathered from the workshop. This is a design and creation strategy from Oates' model in figure 3.1. One reason for creating concepts was to evaluate them afterwards to see if RQ-5 : "What kind of functionalities do the seniors want in an exercise concept?" was satisfied. Each concept was created as mockups, first as raw drawings, and then a program called Balsamiq was used to refine those raw drawings. We made the concepts as sketches since it would create an illusion of not being complete. This is a technique that allows the evaluator of the concept to lower their threshold for speaking their mind. The created concepts can be found in chapter 7.

3.7 Evaluation of concepts

We chose to get the concepts generated in previous phase evaluated by two experts, who had great experience of working with seniors. This part equals to the evaluation phase in the iterative development process and with this part done, it completes 3 of 4 phases in the iterative development lifecycle. Evaluation is a form for qualitative data analysis and this data analysis was done on the concepts generated which is, as already mentioned, a design and creation strategy in Oates' model. Our reason for having experts evaluate the concepts was to see how their opinions differed from the seniors' opinions. Another reason for having experts to evaluate our concepts was that it was easier to get in touch with them and since they were working more or

less with the same theme, they were interested in our research and more willing to participate. Chapter 8 summarizes their feedback on each concept.

3.8 Summary

This chapter describes methods we used to conduct our research and the rationale behind each method. Figure 3.3 shows in which chapter each method is applied. The coming chapters describes each method in detail and highlights important findings from each method.

Chapter 4

Combining exercise and ICT

4.1 Introduction

This chapter will bring exercise and ICT together. Exercise is not what it used to be, the influx of information and communication technology (ICT) have done something with the perception of how some people look at exercise. In the beginning of this century, exercise and ICT did not seem like the most natural pairing. All you needed and had was some comfortable clothes and perhaps some sporting equipment, the scene today is quite different. It is not rare to see joggers with a smartphone attached to the overarm, collecting a huge amount of data, everything from physical location to the pulse of a person, even watches and bracelets can do much of the same tasks. After the workout, people can share and compete with friends on social medias.

Figure 4.1: Evolution of running

"Go out and play", "climb in trees" and "build a snow cave" were phrases our moms used a lot during our childhood, and of course, that were things we actually did, we did simply not have many other options. The scene today is quite different, we will not say that children does not do these kind of activities, but they have a whole range of other options. Not many years back, the other options meant sitting in the sofa playing video games, but in the recent years, other options which are more suited for physical activity have appeared. Children all over the world are able to play digital tennis, bowling and even boxing, in their family living room today.

Figure 4.2: Evolution of playing

Even at the traditional golf club at St Andrews, that just allowed women members,

you can see golfers analysing their swing with sensors and tablets, or calculating the distance from tee at the famous par-4 17th hole, “The Road Hole”, with specialized golf devices which uses the Global Positioning Systems (GPS).

Figure 4.3: Evolution of golf

We have now presented a brief part of the evolution in exercise, physical activity and ICT, and it shows that the variety and possibilities are endless. We will take a look at some of the most popular and commercialized exercise and fitness applications, both on smartphones and various other platforms. This will help us, and the reader, to get a grip of what is already out there, and further be an important source for our knowledge about popular concepts that we can build on when designing our own concepts, which is described in chapter 7. We will also present what we found when we searched for commercialized applications designed especially for seniors.

4.2 Popular commercialized exercise applications

The technology within ICT has evolved rapidly during the past few decades. The time where mobile phones were used to only call other people are gone, and nowadays people are able to perform several tasks that earlier required additional devices. People are able to access the Internet, send emails, video chat, pay with the phone

and many other things, the phone has evolved into a smartphone. It is not only the phone that has evolved, watches, bracelets and clothing are also becoming smarter, with the help of various types of sensors, smaller and smaller circuits, Internet, advanced middleware and operating systems, new innovative I/O and user interfaces and many other things. They all fall under the relatively new concept of wearables. One could say that we are moving towards the vision of Mark Weiser, from 1988, where computing is available everywhere and anywhere, and the concept of ubiquitous computing is becoming real.

How can this evolution in technology help and motivate seniors to exercise? The Norwegian Directorate of Health [27] advises, in an article about how to be more physically active, to use mobile applications that motivates and help you to plan and log activities. So, what kind of applications are they writing about?

A quick look up at Google Play (the Android application store), under the category health and fitness, reveals all the best selling and most popular exercise applications. The reason for looking at Google Play is that we are able to extract the number of downloads of an application. We will now shortly describe some of the most best selling and popular applications from Google Play and some other interesting applications found.

4.2.1 Endomondo Sports Tracker

Figure 4.4: Endomondo Sport Tracker screenshot

Endomondo is one of the most popular exercise applications around the world for both Android and iOS. A screenshot of the application is presented in figure 4.5, which is a typical "in-activity" screen, where you have an overview over the current activity. Endomondo aims to *"motivate people to get and stay active, by making it more engaging, more social and more fun to exercise."* [18] The application has the ability to track all forms for activity, everything from cricket to diving, although the main type of activities are endurance exercises, that utilizes the possibility of collecting data about location, speed, distance and pulse. Endomondo further use this data to present a summary to the user after each workout, as we see in figure 4.4, and the user is able to see the progression over time.

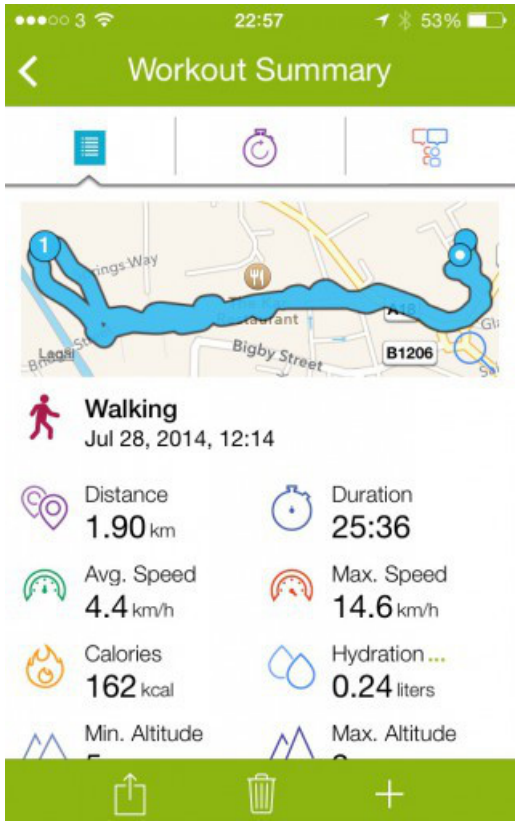

Figure 4.5: Endomondo Sport Tracker workout summary

Endomondo also have motivating features such as "Audio Coach Feedback", which is feedback on your performance each kilometer, and "Workout goals", where the user can set a distance goal for each workout, and get motivating feedback during the workout. The application is simply trying to replace the personal trainer, by offering and imitating many of the human characteristics of a trainer. The application also let the user be social by sharing their results, by sending and receiving sound clips from friends and by creating races with friends to beat their records.

Other similar and popular mobile applications are listed in table 4.1.

App	**Number of downloads**	**Rating**
RunKeeper	10 000 000 - 50 000 000	4,4 from 258 719 people
Runtastic Running	10 000 000 - 50 000 000	4,5 from 352 071 people
Runtastic Running PRO (paid version)	500 000 - 1 000 000	4,6 from 98 035 people
Garmin Fit™	50 000 - 100 000	3,5 from 1 305 people
Nike+ Running	10 000 000 - 50 000 000	4,4 from 293 720 people

Table 4.1: A collection of fitness mobile applications, their number of downloads and rating. Found at the best selling list at Google Play 11th February 2015

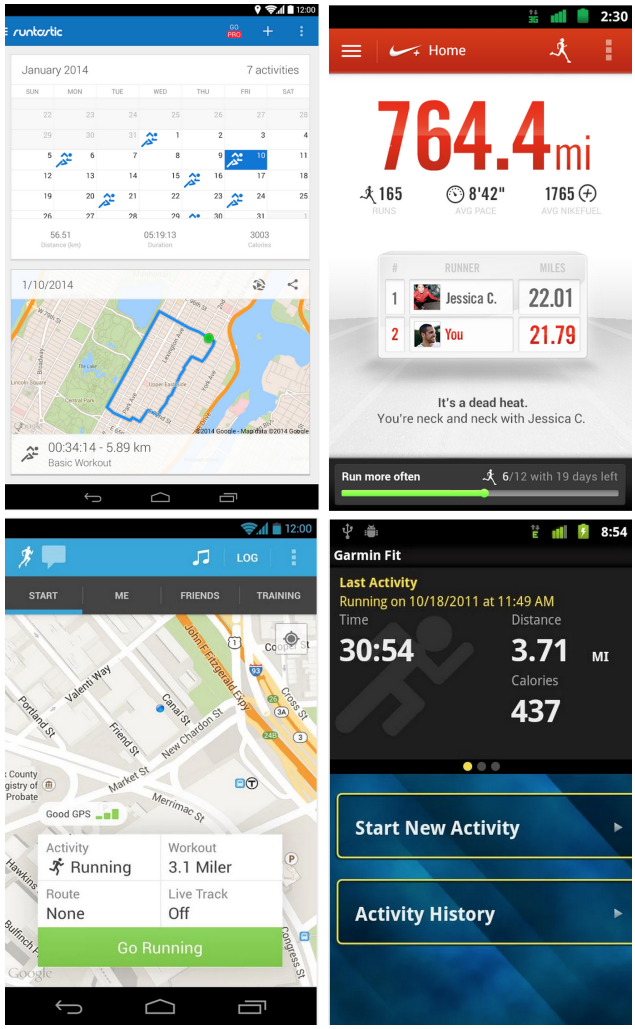

Figure 4.6: A collection of fitness mobile application screenshots, Runtastic Running, Nike+ Running, RunKeeper and Garmin Fit™

4.2.2 Dytt

Figure 4.7: Race to the north Pole - one of Dytts competitions

Dytt (eng.:Push) is the biggest organizer of physical activity campaigns in Norway [17]. Dytt offers a wide range of different concepts that aims to get people physically active and motivated, by facilitating social support from others. One of the concepts is as of now a competition where the goal is to reach the number of steps equivalent to the distance to the north Pole, as we can see in figure 4.7. The application, that the user can access via web or a mobile application, provides an overview over your activity, "team members" activity, articles, your personal profile and more.

Dytt differs from the other applications that are presented by focusing more on the social and motivational aspect, rather than the more technical aspect, like numbers of kilometers covered, average heartbeat, activity analyses and so on. Dytt also offers a simple pedometer along with the membership, while the others typically depends on either external smart watches or smartphone hardware, especially accelerometer, gyroscope and magnetometer.

4.2.3 Applications for seniors

We tried to search for exercise applications especially made for seniors, by searching for "seniors exercise" and "seniors fitness" at Google Play (search conducted 11th February 2015). The search yielded a lot of different applications, among them "Brain

Exerciser", "Senior Golf 101" and "Words for Seniors". Some exercise applications listed in table 4.2. Screenshots from the exercise applications are displayed in figure 4.9. As we see, the number of downloads of an application are many times lower than the best selling applications presented earlier, and we wondered why? We therefore quickly tested the applications. The "Senior Fitness Workouts" application, which at first glance seemed to be the most relevant application for seniors who wanted to improve their physical health, felt cumbersome to use, i.e. not completely self-explanatory, even for us self-proclaimed smartphone expert users. When you manage to sift out the important parts of the application, and start a workout, the workout itself is rather big. The first workout, week 1, day 1, consist of 21 exercises, which can be said to be a lot. The exercises are carefully explained, some even with film clips and GIFs (Graphics Interchange Format), but there is no explanation of why you actually need to do the given exercises. It is also no options for customization, which is an important feature for this diverse group. The application is also based on the senior to have a fully equipped gym, for instance a leg press machine and a rowing machine, as illustrated in figure 4.8. Other reprehensible areas is that the application's content was advertising for other fitness applications from the same developer and advertising for products that you could buy, for instance "Triple Strength Omega-3 Fish Oil 1360g".

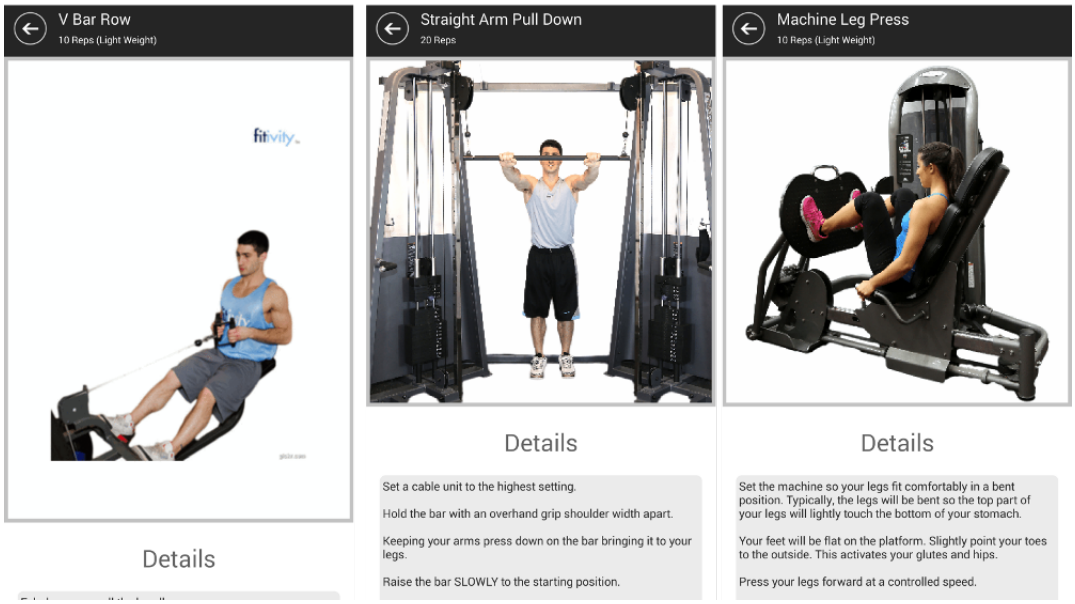

Figure 4.8: Some screenshots from the "Senior Fitness Workouts" application, illustrating some of the exercises

App	Number of downloads	Rating
Senior Health	1 000 - 5 000	2,0 from 1 person
Senior Fitness Workouts	500 - 1 000	3,8 from 5 people
Never Too Old To Exercise	50 - 100	N/A
Exercise Tips for the Elderly	100 - 500	5,0 from 1 person

Table 4.2: A collection of fitness mobile applications for seniors, their number of downloads and rating

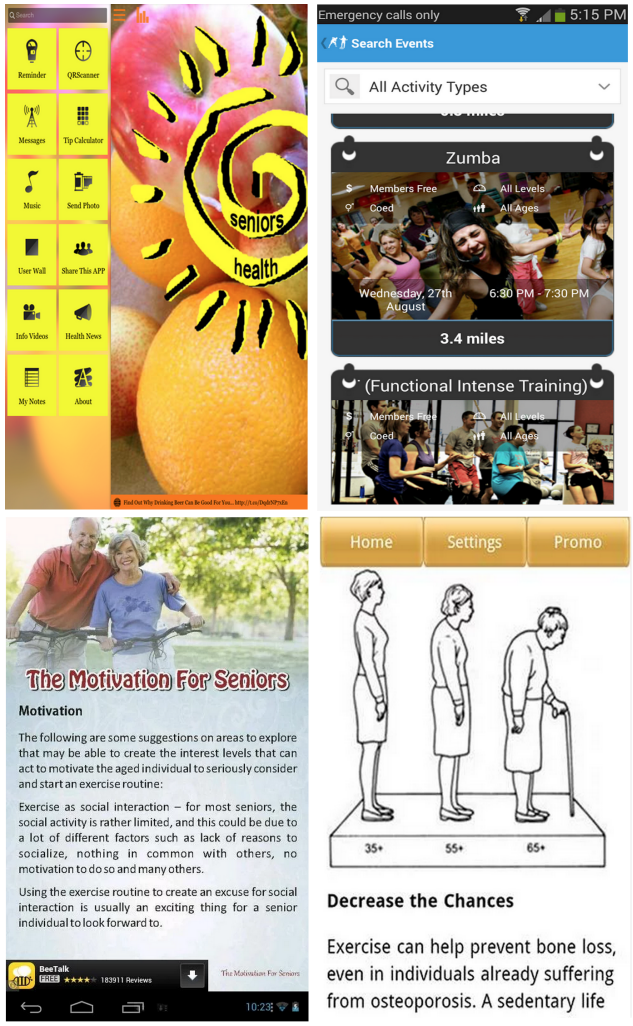

Figure 4.9: A collection of fitness mobile application screenshots for seniors, Senior Health, Senior Fitness Workouts, Never Too Old To Exercise and Exercise Tips for the Elderly

4.2.4 Exergames

A popular term that have been frequently used is exergames. The term exergames often refers to video games that require physical activity in order to play. A more thorough definition of exergames, presented by Yoonsin Oh et al. [45] is “an experi-

ential activity in which playing exergames or any video games that requires physical exertion or movements that are more than sedentary activities and also include strength, balance, and flexibility activities". The Microsoft Xbox Kinect and the Wii Remote Plus are some well known examples of exergames devices. If we look at exergames, from a fall prevention perspective, the point with exergames is to improve the users physical and mental condition, which is considered as a preventive measure [47]. Mike van Diest et al. [57] did a review on the effects of exergame training programs on postural control of elderly and concluded with that exergames had the opportunities for improving balance ability in older adults.

A concrete example of an exergame is "Wii Fit Plus". Wii Fit Plus is a "combination of fitness and fun, designed for everyone, young and old" [41]. With the use of Wii Balance Board, one can play different balance games, which has a goal of improving the balance. The game "Table Tilt", shown in figure 4.10, is a such game where you use the Wii Balance Board to lean your body to left, right, forward and backward to tilt the balls into the holes.

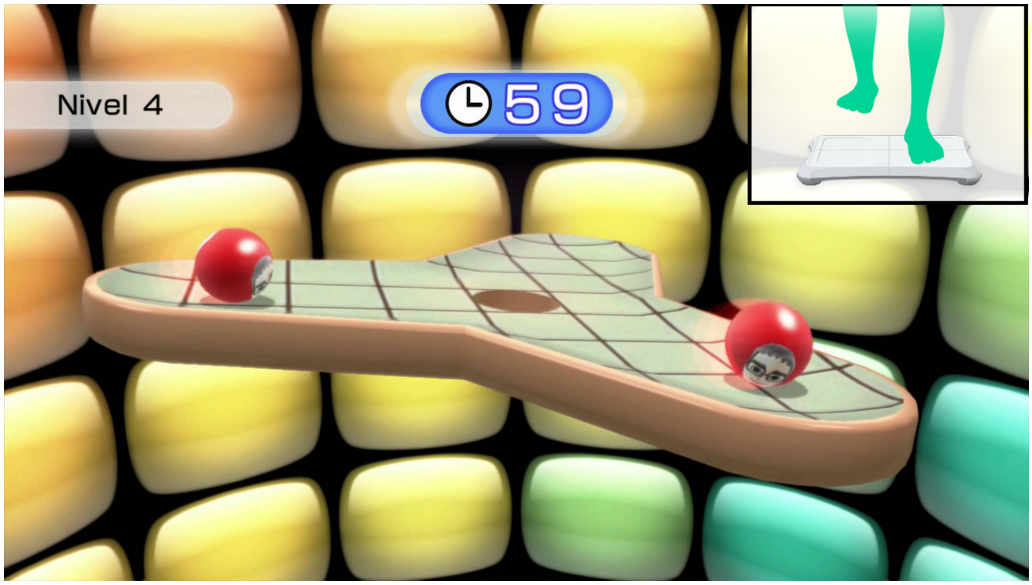

Figure 4.10: An exergame called Table Tilt, which uses Wii Balance Board to tilt each ball on the table

4.3 Conclusion and discussion

There are many popular commercialized exercise applications both at Google Play and App Store, but there are few and low variety of applications designed for seniors. When looking at the top five most popular commercialized exercise applications we can see a clear resemblance. All of the applications are mainly focusing on endurance exercises, i.e. activities that makes your heart pump faster, and where the main goal is to improve the users endurance. This corresponds poorly with the recommendations presented in table 2.1, where Sherrington et al. [49] points to balance and strength training as an important part when designing exercise programs to prevent falls among seniors.

The popular mobile applications we have mentioned offers sharing and competing with friends on social media. Dytt takes this concept further, by offering features that

integrates a social aspect, instead of using external social medias such as Facebook and Twitter. The social features are enforcing the users to collaborate to achieve a common goal. This can perhaps even further motivate the users to actually conduct a certain amount of exercise, although Dytt is also focusing on walking and endurance training.

Exergames is an interesting concept. What could be better than combining exercise, games and social platform? Exergames has also proven to have opportunities for improving balance ability among seniors [49]. On the other hand, which senior is actually buying a game console?

The applications designed for seniors are downloaded much fewer times than the popular training applications, and can be said to be of very low quality. Perhaps the seniors are using the more popular and high tech applications, or as mentioned in chapter 2, seniors may not be that interested in new technology. Maybe the popular applications are too advanced for seniors or maybe they don't use smartphones at all. We will look more into what seniors are using in chapter 6, where we describe a workshop we conducted with the seniors.

Since there are a low number of downloads per application designed for seniors, and seniors may not even use these applications, we will in the next chapter turn our attention to existing research comprising seniors, ICT and physical activity. This will help us answer research question RQ-3 and give us more insight in physical activity among seniors.

Chapter 5
Literature review

5.1 Introduction

As we have seen in chapter 4, a lot of ICT solutions supporting exercise already exists. Many of these are not especially designed and developed for seniors. Seniors may of course use these applications, but they are not especially designed with seniors in mind, considering their challenges, described in chapter 2. Therefore we did a literature review. We wanted to get an overview of what kind of ICT services and tools regarding seniors and physical activity researchers were looking at or developing, and thereby address research question RQ-3 : "What are the characteristics of ICT tools designed for seniors in relation to physical activity reported in the literature?"

5.2 Subquestions

From RQ-3 we derived subquestions described in table 5.1 which this chapter tries to answer. As mentioned in chapter 2, one of the main findings in the pre-study was that existing interventions in fall prevention and fall risk assessment did not document any inclusion of seniors in the development process and neither any use of user acceptance tests [47]. We are curious about how this inclusion is in the ICT interventions for physical activity among seniors (SQ-3-1) as well as the technology and form factor of these interventions (SQ-3-2). The training applications mentioned

in the previous chapter are mostly mobile applications. These mobile applications incorporates social aspects through sharing your results with your friends and to social medias (e.g. Facebook). We wonder if the interventions for physical activity among seniors also incorporates social aspects (SQ-3-3) and how these interventions are tailored for seniors (SQ-3-4), hence what differs from the training applications mentioned in the previous chapter. Most of these training applications focus on endurance training rather than strength training or balance training. We wonder if this also is the trend in the interventions for physical activity among seniors (SQ-3-5) as well as if the papers are mentioning anything about fall risk and fall risk assessment (SQ-3-6), e.g. exercises to reduce the risk of falling. In the following sections we will describe how we performed the search for literature and discuss the findings and results from the literature.

Subquestions	
SQ-3-1	How well are seniors included in the development and testing phase?
SQ-3-2	What kind of technology and form factor is described in the literature?
SQ-3-3	What type of social aspect incorporated in the proposed solutions?
SQ-3-4	How are the proposed solutions designed for seniors?
SQ-3-5	What type of physical activity is described in the literature?
SQ-3-6	In which context is fall and fall prevention mentioned in the literature?

Table 5.1: Subquestions derived from RQ-3

5.3 The Literature Search and Criteria for Relevance

The literature review to find the SoTA of ICT, seniors and physical activity started with defining the search string. PICO [25] was used as a tool for defining the search string. PICO, which is an acronym for Population/problem, Intervention, Comparison and Outcome, is a tool that helps the researcher to clarify certain parts of the question asked. PICO will help to clarify who and what the researcher is interested in (P), what kind of interventions the researcher is looking for (I), if there are any main alternative one can consider (C), and what kind of outcome the researcher is looking for (O). In this literature review we defined the problem, population and intervention in table 5.2. Comparison was irrelevant because we were not comparing any alternative against our outcome. None existing intervention we already knew was compared to the resulting papers. The outcome part was set to be papers including an intervention or a prototype or papers describing the development process of an intervention or a prototype. Since this literature review is the main basis for answering RQ-3 and we are specially interested in what researchers are looking at these days, see subquestions in table 5.1, we decided that the papers did not need to contain any scientific results, a prototype was sufficient enough as a result. If we had omitted papers with no scientific results, we would not have seen the whole scope of the research. The scope itself is an important part in searching for literature since results and findings depends on the scope. By not omitting these papers we may find more vital, perhaps better and more interesting, results and findings.

Problem	**Population**	**Intervention**
Exercise, Training, Physical activities	Elderly, Older adults, Senior, Aging population, Aged population	ICT, IT, Computer Science, Information technology, Information and communications technology, Smartphone, Smart phone, Mobilephone, Mobile phone, Mobile application, Cellphone, Cell phone, Wearable, Website, Web site, Webportal, Web portal

Table 5.2: Search table

5.3.1 Conducting Search

We decided to use the Scopus database, because it is the largest abstract and citation database of peer-reviewed literature and it delivers a comprehensive overview of the world's research output in the fields of science, technology, medicine, social sciences, and arts and humanities [9]. Scopus also has the advantage to define a search string in a simple and straightforward way. The search string used in our search was the following:

(exercise OR training OR "physical activities") AND (ict OR it OR "computer science" OR "information technology" OR "information and communications technology" OR smartphone OR "smart phone" OR mobilephone OR "mobile phone " OR "mobile application" OR cellphone OR "cell phone" OR wearable OR website OR "web site" OR webportal OR "web portal") AND (elderly OR "older adults" OR senior OR "aging population" OR "aged population")

5.3.2 Screening of papers

Screening of papers is the process where relevant papers are extracted from the rest of the search. We had some inclusion and exclusion criterias, which are explained further in the next subsections, that we applied to all the papers in order to end up with only relevant papers. The search initially yielded 343 papers. All these were imported into a desktop application named Mendeley. Mendeley [39] is a free reference manager and PDF organizer. All of the 343 papers were successfully imported into Mendeley for further screening, and none of the papers were duplicates. We went from 343 papers down to 16 relevant papers. Figure 5.1 shows the process from conducting the search to extracting relevant papers.

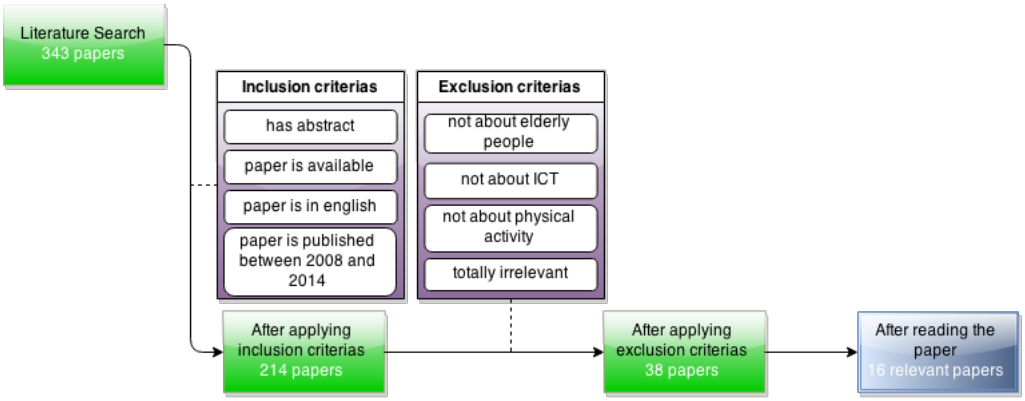

Figure 5.1: The process of screening the papers

Inclusion criterias

The following criterias were applied on the search result to screen out papers to include:

- The paper is published between 2008 and 2014
- The paper is available for students at NTNU
- The abstract of the paper is available in Mendeley

– The paper is written in English

We ended up with a total of 214 papers, after inclusion criterias were applied. 116 papers were left out since they were published before 2008. We put a minimum limit at 2008 to ensure that we had research which described updated technology. Smartphones have many sensors which are better utilized today than ten years ago. We justify our decision to put a lower limit to 2008 by taking this into consideration. 4 papers were left out since they were not available for students at Norwegian University of Science and Technology (NTNU). Additional 3 papers were left out since their abstracts were not available in Mendeley. Another 6 papers were left out since they were not written in English and this in total makes up for the 214 papers which were included from our initial search.

Exclusion criterias

The following criterias were used to exclude papers after inclusion criterias were applied:

– ICT is not the main part of the paper or not mentioned at all

– The paper is not about exercise or physical activity

– The paper is not about elderly people

Category	**Number of papers**
Not ICT	15
Not about exercise or physical activity	87
Not about seniors	25
Other	71

Table 5.3: Exclusion categories

We ended up with 22 papers after exclusion criterias were applied. As table 5.3 shows, we made four different categories where we sorted the excluded papers. It is possible to observe that the first three rows of the table correspond to the exclusion criterias mentioned earlier.

15 papers were excluded since the papers were either not mentioning the use of ICT, or ICT was used as a minor part of the solution. Some papers were, for instance, using a website to gather administrative information about participants. Papers like these got excluded due to the fact that they were not using ICT as the solution for their research.

87 papers were excluded since they were not including exercise or physical activity. Some of these papers mentioned "exercise" or "training", but the paper itself was not about physical activity, and was therefore excluded.

25 papers were excluded since they were not about elderly people. Some of these papers mentioned older people, but in context with that they observed "an increase in number of older people" etc. Other papers mentioned the word "senior", as a person who had more experience rather than an elderly person.

We can observe from table 5.3 that we have a category named "other". Papers got placed into this category if more than one of the exclusion criterias were applicable on the same paper. If a paper was mentioning something that had nothing to do with the exclusion criterias, it was also placed in this category.

As mentioned earlier, we ended up with 22 papers after inclusion and exclusion criteras were applied. We decided then to read these papers in depth, and discovered that some of them were not as relevant as we thought. We further excluded papers that targeted seniors with specific diagnosis and/or diseases and papers where the main focus was about topics not related to our research, e.g. nutrition programs. This resulted in 16 remaining relevant papers, which are summarized in table 5.4.

Source	**Type of technology**	**Age group**	**Findings from paper**

[3]	Website tailored to Physical Activity for Older People.	19-89	The elderly people increased the weekly physical activities more than to younger people. The elderly people also showed more interesent to continue to use the website. Fewer of the elderly people dropped out of the study.
[21]	ICT-system based on video game-based exercises and exergame technology focusing on balance and muscle strength.	65-	Not yet tested
[30]	Mobile-enabled Web app, iCanFit, to promote physical activity for elderly people.	60-82	Testing usability and acceptability is important when developing services for elderly people.
[38]	Theory-informed app designed to augment an intervention promoting wellness motivation in older adults with fall risk and low levels of physical activity.	60-81	A theory-informed app can be a good fit for promoting physical activity among elderly people with low-level of physical activity and the risk of falling.
[53]	Pedometer with an interactive website with strategies to increase physical activity.	50-	Having a pedometer and an interactive website leads to increased moderate physical activity.
[58]	A development processes of theory- and evidence-based tailored physical activity interventions.	50-	Not yet tested.
[59]	ICT-enabled home-care cardiac rehabilitation program using mobile phones and the internet.	59 mean age	Mentoring and interaction through mobile phones can motivate seniors to reach their cardiac rehabilitation (CR) goals, and home-based CR programs can be tailored to individual lifestyles.
[4]	Wrist wearable that captures the user's physical activity.	N/A	Patterns in behavior can be observed and used to indicate health status of that person.
[7]	Platform that supervises, motivates and helps the practice of physical activity with wearable sensor network.	60-85	The platform shows promising results in both the potential of the novel technology and the acceptance among the elderly population.
[35]	An automated telehealth counseling system, aimed at inactive midlife and older adults.	55-	An automated tele- health advice system can maintain physical activity increases at a level similar to that achieved by human advisors.
[60]	Mobile interface of a monitoring system that provides feedback to elderly people.	70-	Involvement of elderly users during the development process resulted in an interface with good usability.
[62]	The implementation forms a wireless platform of information connection system and medical data analysis.	45-85	Hydraulic resistant exercise can be recommended for those with osteoporosis for improving bone density.
[64]	A portable microprocessor-based accelerometry measuring device to implement real-time physical activity identification. An algorithm was developed to process real-time tri-axial acceleration signals.	N/A	High identification accuracy was obtained in performance evaluation. The device is technically viable for telemonitoring and real-time identification of physical activity.
[52]	Training application, running on a tablet, aiming at improving elderly's balance and strength.	70-	Social and emotional support can be used as motivation. The Active Lifestyle app motivated the participants to adhere a routine of physical exercises during the intervention period.

[23]	A Website to obtaining health education for elderly people.	65-	Elderly people were willing to enlarge their social circle. Elderly people regard themselves as having “no information” or “a little information” about subjects related to health, physical activity, and new technology. Elderly people were willing to receive education in subjects related to physical activity, leisure time, and recreational activities.
[51]	Tablet app. The same application mentioned in [52].	65-	Social motivation strategies proved more effective than individual strategies to simulate the participants to comply with the training plan. The adoption of assistive technology devices for physical intervention tends to motivate and retain older people exercising for longer periods of time.

Table 5.4: Summary of papers

5.4 Data analysis and extraction of relevant data

After we excluded irrelevant papers, we spent time reading the papers thoroughly. Two of us read all the papers with the subquestions in mind. We discussed which papers to look more deeply into and which papers to briefly cover. All three of us spent time discussing the results and findings from each paper and which results and findings we should take into consideration to answer the subquestions.

5.5 Results

The main focus of the 16 papers differs a lot from each other. Most of the papers are testing their intervention on seniors. Some papers are testing their intervention over a longer time-period, over 12 months, while other papers have more detailed testing, such as usability or acceptance tests. Some of the papers have implemented their own intervention, while other papers have used an earlier implemented intervention. 6 out of 16 papers explicitly stated that their intervention can promote or motivate seniors to increase their physical activity.

Some of the papers just describe the functionality of their intervention, without mentioning any testing or development at all. Many of these papers states that testing will be part of a later publication.

A couple of the papers, [58] and [60], are describing the development process of

the intervention as their main focus. These papers also states that involving seniors early in the development process is important to customize the intervention more towards seniors.

5.5.1 Including seniors in the development process

SQ-3-1 from table 5.1 looks at to which extent seniors are involved in the development process. Only 3 out of 16 papers ([60], [58], [23]) from table 5.4 uses elderly people in the early stages of the development process. The remaining papers either uses elderly people to evaluate the developed prototype, product or service, or don't mention any user involvement at all.

5.5.2 Technology and form factor

SQ-3-2 from table 5.1 looks at what type of technology researchers have used to develop tools for elderly people. Figure 5.2 shows technology described in the 16 papers. As we can see, 5 ([38], [52], [51], [59], [60]) out of 16 papers mention an application, either a mobile application or an application for a tablet. 4 papers ([3], [23], [30], [58]) mention a website as their type of technology, while other papers uses pedometers ([53]), wearables ([4], [64]), telehealth ([35]) or exergames ([21]). 2 papers ([62], [7]) are implementing a platform which consists of multiple systems, e.g. the possibility for healthcare professionals to follow up their patients exercise programs. As we can see, mobile applications and tablet applications seems to be the preferred type of technology to develop for elderly people.

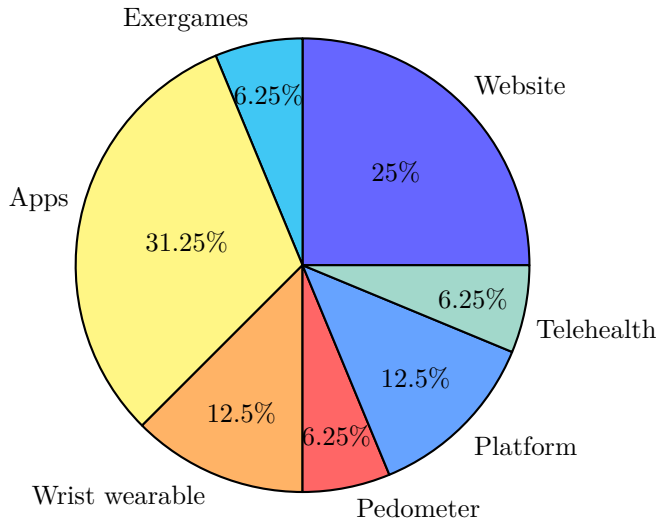

Figure 5.2: Different technology described in literature

5.5.3 Social aspect

SQ-3-3 from table 5.1 looks at the social aspect in the solutions from all the reviewed papers. 4 ([38], [23], [52], [51]) out of 16 papers are mentioning the social aspect of physical activity, but only 2 papers ([52], [51]) states having a social aspect in their intervention motivates seniors to comply with the training plan.

McMahon et al. [38] describes a wellness motivational theory where they suggest that older adults can share feedback and data obtained from their application. This would be shared within a social network as a platform to engage to discussion.

Gusi et al. [23] held 5 focus groups, each with 6-8 participants aged 65 or older. From these focus groups they found that the inner social circle of seniors was made up by relatives and neighbours. 80% of the participants said that their social circle was less than 15 peoples. 96% of the participants showed a willingness to expand their social circle.

Silveira et al. [52] [51] uses social motivational strategies to motivate seniors to be physically active. Both papers uses social motivational strategies which are

built on social psychology. The papers describes different strategies. For example "comparison" which allows other users to follow the same training plan to be informed of the workout session a user have completed. This is done by an automatic message posted on a "Bulleting board". Another example is a collaboration game, "To the Top" which aims to climb a virtual mountain top as a group. When at least 65% of the group members have done the scheduled workout, the group gets a new flag on the trail. The flag represents the progress toward the mountain top.

5.5.4 Design for elderly people

SQ-3-4 from table 5.1 looks at how the solutions in the literature are designed for seniors. Some of the papers are mentioning how they have designed their solution for seniors, although many papers aren't mentioning this at all. The main focus of the papers is on parameters concerning good usability, e.g. screen size, font size, picture size and video size, black text instead of white text, density of information and contrast levels.

The aspect of seniors and new technology is also discussed in several of the papers, e.g. Bleser et al. [7] mentioned that seniors should not be aware of the complexity in the interventions as it may scare them to use the intervention. Another aspect that can scare seniors to use the intervention is feedback regarding their physical functioning. Vermeulen et al. [60] mentioned that many seniors can be scared or wounded by honest and brutal feedback on their physical functioning. Many papers are also using gamification to motivate seniors, e.g. having a flower which bloom when the user has finished the goal of today.

The parameters concerning good usability is often figured out from testing the intervention on seniors, e.g. Bleser et al. [7] tested their intervention on seniors. They observed that seniors approached the screen when looking at pictures explaining the exercises. Hence, the pictures were too small for the seniors to be able to see them at a normal distance from the screen. Seniors also missed the opportunity to choose a level of instructions (e.g. beginner or expert).

5.5.5 Type of physical activity

SQ-3-5 from table 5.1 looks at the type of physical activity which are mentioned in the literature. 7 papers ([3], [4], [35], [38], [53], [59], [64]) out of 16 papers are looking at endurance training. 2 papers ([7], [62]) uses strength training, while 3 papers ([21], [52], [51]) uses both strength training and balance training. The remaining 4 papers ([23], [30], [58], [60]) are not mentioning the type of physical activity. Figure 5.3 shows the distribution of the different types of physical activity.

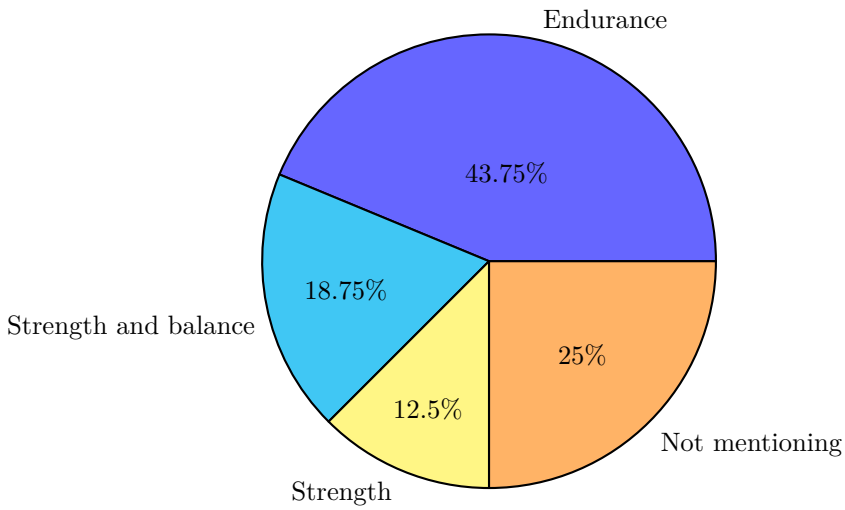

Figure 5.3: Different type of physical activity described in literature

5.5.6 Mentioning of fall or fall prevention

SQ-3-6 from table 5.1 looks at if the papers are mentioning anything about fall or fall prevention. 9 out of 16 papers are mentioning the risk of falling among seniors, but only 3 papers are discussing more on falls. Yves J Gschwind et al. [21] is "doing a study designed to evaluate the feasibility and effectiveness of an easy to administer ICT-based system for fall prevention in older people living independently at home". The study is based on the iStoppFalls system, which combines strength- and balance exercises from different exercise programs, e.g. Otago Exercise Programme which was mentioned in the pre-study. Yang et al. [64] is "presenting a real-time system using a single wearable motion detector for physical activity identification." The

identification algorithm detects different physical activities, e.g. walking, and have a capability to detect falls. McMahon et al. [38] is presenting a design process of an application to enhance motivation for physical activity behavior that reduces the risk of falls among older adults.

5.6 Discussion

We have found interesting and relevant papers with prototypes as a result, testing of prototypes as a result and papers which described a development process. The papers are interesting, because they differs a lot and have many differents approaches regarding ICT, seniors and physical activity. Some are doing research in conjunction with fall and fall prevention. Some are doing research on algorithms to detect different activities, e.g. walking. Some are doing research on social motivational strategies to get seniors to be more physically active. The fact that the focus of the 16 papers differs a lot is as expected when doing a literature review, especially when we don't omit papers with no scientific results. We think this literature review with a diverse variety of papers is a "good place to start" for both the workshop and our concept design.

5.6.1 Including seniors in the development process

Very few papers, which describes a development process, includes seniors during the process. This finding is also one of the main findings from the pre-study. Both interventions regarding fall and fall prevention and interventions regarding physical activity among seniors lack a good integration of seniors in the development process. This may be because the development team, researchers or the experts feel that they have better knowledge at interventions regarding both fall and physical activity than seniors, and decide to not include seniors in the development process. Another reason for not including seniors is that seniors may be a difficult user group to include in the development process. One of the reasons for seniors to be a difficult user group is that they may not have any overview over the existing interventions and are not following the rapid development and research regarding technology as close as the development team, researchers or experts.

5.6.2 Technology and form factor

The technologies and form factors of the commercial applications described in chapter 4 varies a bit. Although there is mostly smartphone applications, there exists interventions based on both websites, e.g. Dytt, and exergames. In the preliminary study, described in chapter 2, it was also a broader variety of form factors, but the technology used was mostly sensors and motion capture. With this in mind, we expected that the technologies and form factors would vary. As expected, the technology and the form factor of the interventions described in the papers differs a lot. Most of the interventions are based on an application, either made for smartphones or tablets. There are also many interventions based on websites. Both applications and websites are software, which might be more straightforward to prototype and test compared to other systems which may require additional hardware. Although seniors may not own a smartphone or a computer, they have most likely used a smartphone or a computer and can test a new website or a new smartphone application without having to adapt to new hardware, e.g. a new wrist wearable or a smart watch.

Many of the interventions are using gamification, but only 1 out of 16 papers describes an intervention based on exergames. We think this is a bit low considering the growth of gaming platforms which are using exergames. Maybe seniors don't find these gaming platforms fun and motivational. Maybe they don't like to jump and bounce around in their living room in front of the TV. The main user group for many of these gaming platforms is perhaps younger people, so it may be that seniors don't have tried the gaming platforms or heard of them.

Only 2 out of 16 papers describes an intervention based on wrist wearable, which seems to be low considering the growth and development of activity bracelets and smart watches over the past few years. Maybe we will see more research on wrist wearable in the future.

5.6.3 Social aspect

4 out of the 16 papers mention the social aspect of physical activity, but only 2 of those papers are presenting about how their intervention can motivate seniors to comply with the training plan. We are surprised that no more than these 2 papers are discussing about social aspect of their intervention. Especially with the upswing of social medias over the past years and the result from [23] which states that 96% of the participants showed a willingness to expand their social circle. Many of the popular and commercial applications, e.g. Endomondo, mentioned in chapter 4 shows that the social aspect is an important aspect of their application. It is important to notice that these interventions is research with prototypes and not finished end-user products, like Endomondo. Some of the prototypes test one or maybe a few aspects at the time. Silveira et al. [52] [51] are describing their social motivational strategies in their tablet application. The collaboration game is similar to Dytt, described in chapter 4, with the collaborative and social way of achieving goals.

5.6.4 Design for elderly people

The main focus is on parameters concerning good usability. These parameters mentioned in section 5.5.4 are parameters which we find important for seniors regarding their possible reduction of senses, e.g. sight. The screen should be big enough for seniors to be able to easily see it. The font should be big enough for seniors to easily read the text. The images should be big enough for seniors to easily see them, and so on. Although these parameters are often forgotten when designing interventions for younger people they are extremely important when designing interventions for seniors.

Good usability for seniors can be hard to define since seniors may have different views and opinions regarding usability compared to other user groups. Therefore it is important to include seniors early in the development process, or maybe even before the development process have started, to be able to understand their needs. We think that it is more likely to design an intervention which elderly people will use by including them early in the development process. However, we think it is difficult

to develop an intervention for the entire aging population. It is hard to define the user group "senior" and inside this user group there may be significant individual differences. Even at same age there may be both mentally and physically differences. A person in his or her early 60s may be very physical active and a person in his or her late 90s may be bedfast, or it may be the other way around. A person can get mentally problems with the memory, e.g. demensia or alzheimers. This may happen in the early 60s or in the late 90s, it is very individual. Also the reduction of senses, e.g. sight, may be very individual. As we can see, the user group is very complex which is important for us to include and remember further in the process when making concepts.

5.6.5 Type of physical activity

The applications mentioned in chapter 4 are mostly focusing on endurance training. Since both strength training and balance training also are very important for seniors, especially to reduce the risk of falling, we expected the types of physical activity in the papers to be diverse. There are some papers focusing on strength training, and some papers are combining strength training with balance training, although most of the papers are focusing on endurance training. The diversity of different types of physical activity can be good, especially regarding the motivation and to engage seniors to exercise. Some papers are not mentioning the type of physical activity at all, but describes a development process instead.

5.6.6 Mentioning of fall or fall prevention

Although several papers are mentioning fall or fall prevention, we had expected more papers to discuss more about fall. Especially since physical activity is one of the best interventions to reduce the risk of falls. There are many other reasons besides falls for seniors to held themselves physical active, e.g. other health benefits, social activities etc., but we find it odd that no more than 3 papers are discussing more in-depth about fall.

5.7 Conclusion

In this chapter we have looked at our conducted literature review. This literature review has consisted of SoTA research with the combination of seniors, ICT and physical activity. The literature review went from 343 down to 16 relevant research papers, and has given us helpful insight about interventions and tools for seniors regarding physical activity. The 16 relevant papers were read in depth and 6 subquestions was answered.

The fact that seniors are included in very few development processes regarding both physical activity and fall is one of the coinciding findings between the preliminary study and the literature review. We also found that few papers are doing research on the combination of both fall and physical activity regarding seniors and ICT. Only 3 out of 16 papers are discussing more about falls among seniors regarding physical activity and ICT. Regarding the technologies and form factors used, we found that mobile applications, tablet applications and websites are the most common technologies. Wrist wearable, e.g. a smart watches, are described in few of the papers. The social aspect as a motivational factor for physical activity among seniors are mentioned in few papers. Some of the papers are mentioning how their intervention is designed for seniors. They are mainly describing parameters for good usability, e.g. font size, which is important for seniors to be able to use the intervention. It is also mentioned that seniors should get informative feedback on their physical functioning without feeling scared or wounded. The type of physical activities which are described in the literature are cardio training, strength training and balance training.

Our key findings from the literature review are as follows:

- Seniors are included in very few development processes regarding physical activity.
- Mobile applications, tablet applications and websites are the most common technologies described in the literature.

- Wearable as a technology is described in few papers.
- Few papers are doing research on the social aspect as a motivational factor for physical activity among seniors.
- Gamification is used to motivate seniors to be physically active.
- Endurance training is the type of exercise we found in most of the papers. We also found strength training and balance training in some of the papers.
- Few papers are doing research on both fall and physical activity.

We think there is a need for more research combining falls and physical activity in relation to ICT and seniors. Especially with the inclusion of seniors in the development process. All of our findings from the literature review are findings which we will bring further into the following chapters.

Chapter 6
Workshop with seniors

6.1 Introduction

This chapter aims to thoroughly describe the workshop that we conducted. We will explain how we recruited participants, how we conducted the workshop, what methods we used, as well as the results and how we analyzed the huge amount of data collected during a three hour long workshop. First we will elaborate the background for why we actually chose to conduct a workshop with the seniors.

6.2 Background

As described in earlier chapters, we wanted to include the users, i.e. the seniors, in an early concept development phase. This to really allow the users to take a big part in this important phase. The thought of letting seniors be the designers was a natural answer to the findings found in this project pre-study, that showed that seniors were in a very small degree included in fall prevention and assessment research and development projects. This finding was also supported in the SoTA described in chapter 5. We therefore started to look for other projects that had done something similar.

We struggled to find similar projects, but our supervisor lead us to a very interesting paper describing how seniors designed their own fall rehabilitation tools. The paper, by Uzor et al., describes carefully how they included seniors in an early

concept stage of making exergames [56]. The authors had also observed that seniors were minimally included in development projects, and if they were, they were included in an relatively late phase. This late phase were typically in a test phase for developed game interventions, were the users could provide feedback on limited features of the games. The problem with this phase, according to Uzor et al., is that "the original idea for the games in such studies have always come from young designers, researchers or therapists.", and it is thus limited how much seniors can affect the actual final result. Uzor et al. wanted therefore to use the users actively in the early concept phase, and decided to use principles and techniques from Scenario and Participatory Design to let the seniors interact with the developers.

Scenario and Participatory Design are in fact pretty much the same as UCD, both typically use personas, scenarios and use cases as tools to let the users/participants interact in a design process. Personas [43] are created fictional characters meant to represent a major group of the end-users. They are often used in scenarios, which are narrative stories describing a persona performing a specific task to achieve a goal [29]. A use case [44] is a description of how the product should behave to fulfill a requirement and achieve a goal. The study by Uzor et al. consisted of several phases. The two first phases mainly consisted of discussions, where the seniors discussed past experiences and fictional scenarios and personas that were carefully developed by the researchers. These two phases helped the participants to light some of the main issues. It also allowed the participants both explain their own feelings and experiences, both by talking about themselves and by discussing the personas and scenarios, which were truly valuable for the researchers.

The two last phases were more interactive, first the participants were introduced to two prototype exergames, developed by researchers and developers, that they could test and play with. The intention with this test was to introduce the participants to exergames and let them have something to critique. This would also hopefully start a creative process to actually think of other games or solutions related to fall rehabilitation. This led to the fourth, and last phase, where the seniors were guided

through a real design workshop. Here they were encouraged to design a tool based on one rehabilitating exercise, by drawing sketches and annotations. The outcome of this workshop was an actual game, where the core mechanics were designed exclusively by the seniors in 20 minutes. This convinced the researchers "that seniors can play a very important role in the design process for rehabilitation tools", and we think that this can apply for ICT-based exercise tools as well. But first, we needed some participants.

6.3 Recruiting Participants

We believed that motivation for engaging in physical activity played an important role in order to encourage seniors who were less physically active to engage in physical activity. We believed that seniors who were physically active could provide us with valuable information on how they kept record of their activities and how they perceived today's fitness applications.

We made a poster (see Appendix A) which we hung up on several gyms, a voluntary organization called "Seniornett" and a café driven by an organization for pensioners called "Hornemansgården" to get participants for the workshop. Each participant who called and expressed their interest in participating, were further explained and informed about the workshop, and what they could expect.

At least ten seniors showed interest in the project, but only three seniors were able to participate in the workshop. We noticed that some seniors were hostile to participate in workshops. One of them said that he participated in a workshop where he was in pain several days after the workshop was completed since he had to lift heavy weights and was pushed to his limits. Some participants thought they were offered free training hours for participating in the workshop, and when they learned that this was not the case, they were not interested to participate. Others did not have time or were out of town during the period when the workshop was held. An introduction to the three participants that actually did participate can be found in section 6.6.1.

6.4 Workshop overview

The workshop was held at "SINTEF" on April 22nd, 2015, and consisted of several phases. Seniors were invited and the goal of this workshop was to find out about senior's ICT and exercise habits. The workshop consisted of three moderators and three participants and the workshop lasted for approximately three hours. Each participant was asked to read through a consent form and sign it. They were also notified that the workshop were going to be recorded on tape. The consent form can be found in Appendix B.

Table 6.1 summarizes the main parts of the workshop and rationale for doing each phase.

Part	**Rationale**
Focus group	To create a discussion around exercise habits, ICT use in general and ICT use related to physical activity among seniors. To find out if there are any challenges they have related to physical activity or barriers to overcome, and what motivation they have to perform physical activity.
Introduction to concepts from popular training applications	To present concepts that are common in popular training applications for smartphones. This to highlight some of the opportunities one have when designing exercise applications, and to hopefully start a creative process to actually think of new solutions related to their challenges and barriers.
Co-design	To include the seniors in an early process. We wanted to let the seniors provide input before we started to develop our own concepts.

Table 6.1: Workshop procedure with the main parts

6.4.1 Part 1 - Focus Group

The first part of the workshop was organized as a focus group. A focus group is a small group discussion guided by a moderator. The focus group method yields qualitative data, and is typically used when you need to learn more about opinions on a specific topic, and especially when the opinion is hard to numerate. In our case we wanted to learn more about the situation among seniors when it comes to exercise,

ICT use and the use of ICT together with exercise. Particularly we needed to find out more about seniors challenges and motivations to perform physical activity, in order to be able to know what to focus on when coming up with new concepts.

In a focus group, the participants are free to speak their mind, as well as discussing other participants thoughts, about a certain topic. The discussion part, and the element of listening to others opinions, can help participants to really know what they think and feel. We thought this was especially important, considering the creative part of this workshop, Part 3 - Co-design.

The main goal for this part was to help us answer research questions RQ-1 , RQ-2 and RQ-4 , defined in table 1.1 in chapter 1. To generate topics and questions, we first defined topics and more detailed thoughts and questions that could be used in the actual execution, shown in table 6.2.

Research Question	**Theme/topics**	**Questions and thoughts**
RQ-1 : What do we know about physical activity, exercise and seniors?	A day in your active life	– Take us through your day considering your physical activities – It is important to cover the following fields ◦ Planning ◦ Tracking ◦ Logging ◦ Feedback ◦ Social aspects
RQ-4 : What kind of ICT tools do active seniors use in conjunction with physical activity?	The use of ICT among seniors in an exercise context	– Do you use the ICT in an exercise context? – What do you use the internet for? (social, news, entertainment) – Do you have any electronic devices (eg. smartphone, activity bracelet)?
RQ-2 : What motivates active seniors to exercise or perform physical activity?	Motivation	– Social aspects? – Medical reasons? – Fun?
	Challenges	– Do you have any challenges with your exercise? – Have/had any barriers to overcome?

Table 6.2: Focus group - themes and thoughts

6.4.2 Execution of part 1

The focus group were located in a medium sized meeting room at SINTEF ICT, Trondheim, and started right after a short introduction of the workshop, and it was planned to last for about 60 minutes, 15 minutes per theme. Including the three participants, one of us was the moderator, the person to lead the discussion, one was a side-kick, a person to help the moderator if he got stuck, and the last person took notes.

The focus group was divided into three phases; opening, discussion and closing. The following subsections gives a detailed plan for each of the phases

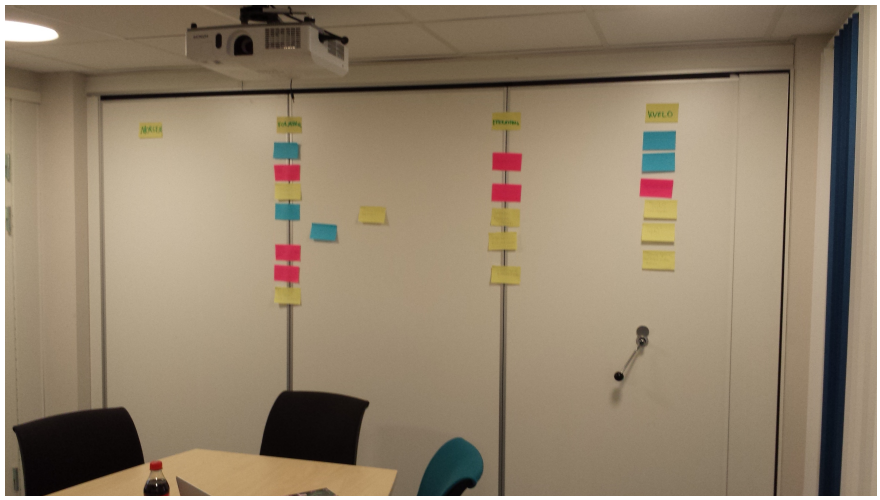

Figure 6.1: Focus group in progress

Opening

The moderator introduced the nature of a focus group, and how it worked. It was also important to explain what we were planning to do with the data collected, as well as introducing the purpose and the context of the focus group.

Discussion

After the brief opening, the moderator started asking the prepared questions. The questions were made with table 6.2 in mind. Follow-up questions, so called probes,

were also made to help the participants to think more deeply about the question at hand. The main questions, and probe questions are listed in table 6.3.

Question	**Probes**
One of the reasons why you are here is that you are more or less physically active. Could you please take us through one of your active days.	– *How do you plan it?* – *How do you execute it?* – *Are you logging your activity, if yes, how?* – *Could you explain more about that tool you use?* – *Are you social while you are physically active? Or before or after? How important is this?*
Physical exercise can both be very easy and intuitive, and very complex. We wonder if you have any challenges with your exercise?	– *Considering the type of physical activity you practise, do you feel that you have the information you need?* – *Did you have (or had) any barriers to overcome?*
Why do you exercise?	– *How and why did you start to regularly exercise?* – *Do you think exercise is fun?* – *What is your main motivation for exercising?*
We are all very interested in the use of ICT, and we think that ICT can play an important role in both helping people to start being physically active, and to keep them physically active. We therefore wonder if you have any experience in using ICT in an exercise context?	– *In what other context do you use ICT tools?* – *What do you use the internet for? (social, news, entertainment)* – *Do you have any ICT devices (eg. computer, smartphone, tablet, activity bracelet)?*

Table 6.3: Focus group - questions

Closing

This part were used to thank the participants, and to give them a last opportunity for further input. Right after this, we had a 10 minutes break, where the participants could stretch their legs and get some refreshments and snacks, before the next part. This short break was also important for us to prepare part 2.

6.4.3 Part 2 - Introduction to elements in popular training applications

Part 2 was organized as a presentation of elements that could be found in commercialized popular training applications such as “Strava”, “RunKeeper”, “Endomondo”, “Moves” and so on. The elements “planning”, “tracking”, “logging”, “feedback” and “the social aspect” were presented.

The goal of having this presentation was to enlighten the seniors of how popular training application works and show them some of the possibilities exercise applications have. Another reason for having this presentation was too hopefully start a discussion around the presented topics and to start a creative process to actually think of new solutions related to their challenges and barriers, that we talked about in part 1. This idea was taken from the latter introduced study by Uzor et al., found in section 6.2.

6.4.4 Execution of part 2

The presentation was held in the same room as the focus group and began after the participants had a short break. The presentation lasted for about 20 minutes and the participants were encouraged to ask questions during the presentation to rather make it a dialogue between the moderator and the participants than a monologue. The following subsections presents each element from the presentation and a description of presented themes.

Planning

When presenting the element planning, concepts such as “training plan” and “goals” were explained. An example of how to select a training plan were showed to the

participants with the training application “RunKeeper”. Participants were also shown how to select existing routes added by other users. This was done with the help from the training application “Endomondo”. After that the purpose with setting up goals were explained and how to set up goals and track progress of each goal were shown.

Tracking

When explaining the element tracking, screenshots from “Endomondo” and “Moves” were used as examples. We showed the users what type of information were commonly tracked from these applications. The topics *duration*, *distance*, *calories* and *average pace* were explained and shown using screenshots from several applications.

Logging

When talking about the element logging, the participants were shown several screenshots form different applications showing today’s activity and previously performed activities. The participants were also shown how to get graphical representation of the activity performed in form of a map showing the path taken or charts showing the speed and elevation during the activity.

Feedback

In this stage we introduced the concept of a digitized “personal trainer” that provides feedback during and after exercise. Screenshots were shown where the application was trying to mimic a personal trainer. It was explained that feedback were often given in form of motivating messages. These messages could be sent as written texts, audio tracks or video clips while performing an activity.

The social aspect

During this part, the participants were shown examples of how the training applications were integrated with social media, and how to share their activities in a local feed in the application. The application “Endomondo” was highlighted in this part, since this application has a feature, which distinguishes it from other applications where one could set up a competition between friends.

Devices used for physical activity

During this part, participants were presented to smartphones, wristbands and smartwatches as devices used for physical activity. It was then explained that even though these devices were common today, one were not limited to only use these devices when designing interventions for physical activity. This was further illustrated with a scenario where one had performed a hip operation and needed to exercise the hip muscles. Images, where some researchers had mounted sensors on a training equipment, were shown and it was explained how doctors and physiotherapists could follow your recovery process [62].

6.4.5 Part 3 - Co-design

Part 3 was planned to be a co-design between the participants and the moderators. Co-design is the process where the users themselves are involved in developing the product. Earlier studies [15] shows that seniors are not included in the development of fall risk assessment and fall prevention technology. This agrees well with other studies pointing at seniors feeling that services were doing things for them, rather than working alongside them and asking them what they want. Our belief was that by letting the seniors be the designers, it would gain them a feeling of inclusion and hopefully result in a concept that the seniors themselves would use.

This part was planned to be based on an innovation technique called “product box” [33]. Product box lets the participants decide what kind of features and qualities a product should have, typically by drawing on a blank cardboard box. The box is a thought representation of the product, and is presented at the end to the other participants, preferably as a sales pitch. This part was planned to help us answer research question RQ-5 , “What kind of functionalities do the seniors want in an exercise concept?”.

6.4.6 Execution of part 3

It was planned that this part were going to take around 60 minutes, but right after the presentation of elements from training applications, we realised that we only had

30 minutes to perform the product box. Since we had limited time to perform the product box, we decided to give the participants a small introduction to product box instead. We then asked the participants to discuss and share their thoughts around a scenario that we had prepared, and which was the following: "You want to train balance, but you do not know how to do it. The solution should use ICT, with no further constraints."

6.4.7 Evaluation of the workshop

The participants had the opportunity to give feedback on the workshop at the end. Some of the feedback they gave were that they felt comfortable in participating in the workshop, but that product box was a bit difficult to understand. All in all they thought it was a interesting and rewarding workshop to attend.

6.5 Data analysis and extraction of relevant data

During the workshop there were at any time two persons who took notes. The notes consisted of interesting topics, short sections of summaries of what the participants had said and uttered, and quotes. After the workshop was done and the participants had left, we spent some time to review the workshop. We went through each section of the workshop and discussed what was written in the notes. While discussing, we wrote down statements we thought were important, and we finally made an abstract, which can be found in Appendix C. We later found out that the abstract was a bit deficient, and since the workshop was recorded on tape, we decided to go through it once more. Each of us listened to the tape, and took meticulous notes, including important topics and direct quotes. It is not a transcript, but it is meant to be a relatively accurate representation of the workshop, and can also be found in Appendix C. We then gathered together, and presented, one by one, what we thought was the most important findings, and we further came up with the most important topics and subtopics through discussion, presented in the next section.

6.6 Findings and results

This section presents the results and findings from the workshop.

6.6.1 Seniors and active life

We sought participants who were physically active. We quickly found out that our participants were not only active, but super active. One of the participants lived in an apartment complex specially designed for active seniors, where the residents have access to a private fitness center, ski preparation facilities, a bicycle repair shop etc.. The two others, which were married, were eager orienteers, who attended several orienteering competitions every year.

We asked the participants to take us through a typical active day in their life, by writing Post-it notes. A total of 20 Post-it notes were made, placed on a timeline, representing the day, and presented by the participants. What we found was that their days consisted of a lot of different types of activities, presented in figure 6.2. Figure 6.3 presents the same activities, but sorted on the type of activity.

Morning	Midday
	Jogging in the woods, about 1 hour
	In the winter. Skiing, abut 2 hours, nearly every day
	Snow shoveling / gardening, about 3 hours
	Gym, 2 times a week
	Fitness room in the basement, 2 times a week (intervals in the treadmill
	Summer, one tour in Estenstadmarka or Bymarka pr. week
	Skiing in Bymarka
	Go to the "city", roundtrip, Moholt - Sentrum
	Training at home, stretching
Afternoon	**Evening**
Cycling	Gym, Strength
Orienteering, 2-3 days a week	Evening trip with cohabitant 4-5 times per week
Jogging, home - Moholt	Trip with friends, 1 times per week, 2 hour
Jogging in Estanstadsmarka (rarly Interval Training)	Training on Impulse (fitness center), Most strength
Orienteering, company sports	Training at home, strength
	Training at home, some yoga exercises, balance

Figure 6.2: Activities presented by participants on a timeline

Endurance	Strength	Homework
Running/jogging	**Gym / equipment**	**Miscellaneous**
Jogging in the woods, about 1 hour	Gym, Strength	Snow shoveling / gardening, about 3 hours
Jogging, home - Moholt	Gym, 2 times a week	
Jogging in Estanstadsmarka (rarly Interval Training)	Fitness room in the basement, 2 times a week (intervals in the treadmill	
Walking	Training on Impulse (fitness center), Most strength	
Summer, one tour in Estenstadmarka or Bymarka pr. week	**Simple exercises**	
Evening trip with cohabitant 4-5 times per week	Training at home, some yoga exercises, balance	
Trip with friends, 1 times per week, 2 hour	**Balance**	
Go to the "city", roundtrip, Moholt - Sentrum	Training at home, strength	
Skiing	**Stretching**	
In the winter. Skiing, abut 2 hours, nearly every day	Training at home, stretching	
Skiing in Bymarka		
Cycling		
Cycling		
Orienteering		
Orienteering, 2-3 days a week		
Orienteering, company sports		

Figure 6.3: Activities presented by participants, sorted on type

As we see in figure 6.3 most of the activities, 13 out of 20, are endurance training. The endurance training range from just simple walking to orienteering and skiing. We can further see that 7 out of 20, are strength training, while just one activity had something to do with balance. One of the participants also had shoveling snow and gardening as an activity, and mentioned that she had worked five hours in the garden the day before.

The something peculiar Norwegian word “tur” were mentioned several times, the word can be translated to hiking, but as Norwegians we will say that the word “tur” is something a bit different. 7 out of the 20 activities had something related to the word “tur”, and were used in a positive way, one said that “I feel well and happy when going for a tur”, and especially when combining it with nature and wilderness. The participants uttered a special liking for another typical Norwegian word “skog og mark”, which can be said to have something to do with nature and wilderness. The participants also said that a majority of the activities had to be pleasurable (the Norwegian word “lystbetont” were used). Another important part was the social part, before, during or after doing physical activities. The married couple attended several orienteering competitions each year, as mentioned, where the social part was important. The other participant attended a weekly hiking (the word “tur” were used) that was organized by some of his friends.

The participants were asked if they logged any of their activities, or if they had

any plan for what they were doing. Just one of the participants had an actual workout routine, but he did not keep any records of the progress. He said that he had everything on the "hard disk" while pointing to his head.

6.6.2 Motivation to perform physical activity

When we asked the participants their motivation to perform physical activity, the participants agreed on that welfare and a better life were their main motivational factors. Some of the participants said that they had been physically active their whole life and that performing physical activity was a routine. One participant said that "a day without training is a day without meaning", which is a well known Norwegian phrase that rhymes. Another participant said that "it is simply to get a better life" and "I exercise to avoid falling, that is an important factor. Wellness.", and another participant instantly replied "I agree. I am used to do some kind of movement. And if I do not I feel bad, because I need it and I know it is good. I feel well when I have been physically active".

Progress was also an important factor, at least for two of the participants. One of them said that "I look at the watch at certain points, so I have a compulsion to measure progress", and the other said that "it is motivation when it manifests through the weights. Satisfactory when it gets lighter". The third participants uttered that it was not necessarily progression that was the most important, but that one maintained what one had.

Another factor that motivated them was the environment around them. The participants had friends or a partner who was physically active. They pushed each other to be physically active by taking a walk or workout at a fitness center. In other words, the social aspect of performing physical activity was a major motivational factor to perform physical activity. They also agreed that their parents had been a big influence, where one of the participants said that it was a type of lifestyle that the parents had given her.

One of the participant has had two fall incidents during a short period and

said that avoiding injury and future fall incidents were also motivational factors for performing physical activity. The participants agreed that avoiding injury was a challenge, but also a reason for performing physical activity.

6.6.3 Challenges faced by active seniors

As we saw in the last section, an important motivating factor was to avoid injury and future fall incidents. This was also pointed out as a challenge. When the participants were asked for what kind of challenges they had related to their active life, one said "avoiding injury". This was in context with doing strength exercises at the gym, and he told that he was careful doing warm up before each exercise. The same person also mentioned that he had done the same workout routine for a whole year, and started to get tired of it, and that he wanted a new one.

When we asked if any of the participants thought about the fall risk when they planned their active day, one of them said plain "no". Another said that he thought that one actually should fall more, because he believed that one typically gets too wimpy and passive. "One should push the boundaries a bit more" he said. The last one said that "when it comes, it comes like the Christmas Eve" (a known phrase in Norwegian "når det kommer så kommer det som julekvelden"), and thought of fall incidents as pure accidents which are hard to prevent.

We then asked if they thought if their active life would look different in ten or more years. One said "I hope not", while another thought that he would do more balance and stretching exercise, and perhaps less endurance training.

6.6.4 ICT use among seniors

Each participant used a smartphone, but only the basic functions such as to call, text and check e-mails were utilized. The participants felt that they had to struggle to install an application and saw this as a barrier. On the other hand, some of the participants used heart rate monitors and one participant used a Garmin watch, where she could see the route taken afterwards. She said it was "most for fun", and did not utilize the many functions such application has. Another said that he had

tried to install “Polar personal trainer”, an application by Polar that let the user create a training program, log and analyze the result and more, but could not make it work. He also said that he was not really interested in using it, and said that “it is interesting to use some time on it, but then I would have to spend less time on other things that I would rather do”.

Some of the participants used a PC or a tablet to find suitable routes to walk or run, or to find other activities to do. When asked if anyone did use the Internet to look for training related information, one said “I do it quite a lot, I am interested in how top athletes exercise, and to find new impulses for how I can do exercise better”.

Apart from the training aspect, the participants used the Internet to read news and check their e-mails. One of the participants said that he was using Facebook, but rather as passive user than an active one. Two of the participants read tweets, but were not members themselves and one participant had a WiMP subscription.

6.6.5 Other findings and recommendations from the seniors

The presentation of concepts did not yield as much as we had hoped, but the participants seemed very interested, and took notes diligently. When asked if they thought the concepts were interesting, a participant said that one need to get over a certain threshold to get into it, and that it would be “damn fun” to use it.

The Co-design part was partially done, but the product box had to be omitted due to time constraints. We managed to start a discussion around the presented scenario, and one of the participants suggested a concept involving a balance board, where ICT was used to monitor how well and how long the user was able to balance on the board. The participant mentioned that one of the biggest challenges with balancing on a board is that one must be able to recover if one starts to lose balance.

6.7 Discussion and conclusion

Our aim with this workshop was to include the seniors in an early phase of a development process. We wanted to learn from the users, and to get input on

everything from their daily active life to concepts regarding ICT and physical activity. We designed the workshop with our research questions in mind, and focused especially on RQ-1 , RQ-2 , RQ-4 and RQ-5 defined in chapter 1 and table 1.1.

As mentioned, our participants were super active. During the five minutes session with making Post-it notes, our participants managed to make 20 Post-it notes representing their active daily life. The activities can be said to be quite diverse, but with an emphasis on endurance activities. We had expected more on balance and strength training, but just one of the activities had something to do with balance training. This agrees well with the fact that they did not think a whole lot on the risk of falling, although the risk of falling was seen as an challenge. This also agrees with what we found in the commercialized applications, as well as the reviewed applications from chapter 5, namely that the majority focuses on endurance and cardiovascular exercise.

Their main motivation for exercise can be said to be both physical and mental wellness, thus simply getting an easier and better life as seniors. Other important motivations were to see some progress and improvement in the activities they were doing, as well as avoiding injury.

Avoiding injuries were both their motivation for doing physical activity and at the same time one of their challenges. There was mentioned in chapter 2 in sub section 2.2.1 that fear of injuries was one of several common identified barriers for seniors. We can observe that seniors themselves agrees on that fear of injuries is one of their challenges, which is also supported by literature. What surprised us was that literature mention several barriers that seniors have, while our participants from the workshop did not have any other challenges. A reason for this could be that the seniors who participated in our workshop were very active persons, while literature looks at people who are not as active as the ones we had in our workshop. Another barrier that is mentioned in chapter 2 is fear of getting injured from fall incidents. It surprised us that one of the seniors recommended elderly people to fall more, to get rid of the fear of falling and becoming wimpy. The same person also said that it was

important to learn to fall correctly to avoid getting injuries, especially during winter time.

Many popular and best selling exercise applications on the application market today, mentioned in chapter 4, incorporate social elements. It is, for instance, possible to share activities on social networks such as Facebook and Twitter or make a social competition with friends with such applications. Dytt, the web application presented in chapter 4, is for instance one application where the main focus is to make physical activity social. Every participant in our workshop expressed that the social part of doing physical activity was important. One of the participant went for a walk every week with his friends and uttered that he went for these walks because of the social aspect with it. The social aspect of performing physical activity is really important, since it can motivate elderly to perform physical activity, which is also shown by some of the papers from the literature review we did in chapter 5. A paper by Silveira et al. [52] mention a social collaboration game, which seems to be based on the same concept as Dytt, where the users have to work together to reach a goal. As we can see, many popular applications uses social media and other social features to keep users engaged and motivate them to perform physical activity. Seniors themselves says that the social aspect of performing physical activity is important and motivates them to do physical activity.

It was very interesting to gain insight in the seniors use of ICT. We did not really have any expectations when it came to the use of smartphones, computers and Internet, but they all seemed quite capable and curious about the use of ICT. They all had smartphones, although they all needed some help with using mobile applications, which they were very interested in learning more about. They did not use a whole lot of time on utilizing the functions that today's applications have to offer when it comes to exercise. Two of the participants did use up-to-date GPS and heart rate monitor watches, although they did not take advantage of the more advanced features these devices have to offer, such as logging and analysing the results.

6.8 Evaluation of the workshop

There are some limitations with the workshop that we held. First of all we have the number of people who participated in the workshop. There were only 3 participants who had the opportunity to participate. We were hoping for 5-6 participants to get a more diversified results. The problem of having few participants is that the opinions and results gathered from those participants can not be generalized to include all seniors. Another limitation is that the participants who participated had almost the same mindset. The selection of participants were not wide enough to get diversified results.

Another limitation with our workshop is the amount of available time. Due to time constraints, we were not able to perform the planned product box exercise, which could have given us a more concrete concept made by the participants. We had short discussion, which gave us valuable information on ideas to several concepts.

Table 6.4 highlightes what went well and why it went well, and table 6.5 highlights things that didn't go so well, why it didn't go so well and suggested improvements.

We would say that the workshop went pretty well and that we gained a lot by having one. We were able to gain insight in the everyday life of some active seniors, and their input and suggestions gave us many ideas to work with.

What went well	Why it went well	Any improvements
Have the participants go through their active day	By creating a timeline with Post-it notes made the exercise interesting and more interactive. The Post-it notes concretized each activity the participants performed and it was easier to refer to those activities later in the workshop.	More time should have been allocated since there was not enough time to go through every activity for each participant
Keep the conversation going.	The participants were good at expressing their opinions and to comment on claims provided by the moderator.	
Every participant were able to express their opinion.	The Moderator was good at asking each participant about their opinion. The participants themselves were extroverted persons, who were not afraid to take the lead in a discussion	
Each participant was present and eager during each part of the workshop.	We had a break between the focus group and the rest of the workshop, and provided the participants with snacks and beverages.	

Table 6.4: What went well with the workshop

The seniors who participated in the workshop were very good at talking and kept the conversation going. The use of Post-it notes worked pretty well and worked as a good icebreaker. Having an interactive part, such as creating a timeline with Post-it notes, made the whole workshop more interesting for the participants.

What didn't go well	Why it didn't go well	Any improvements
The focus group took 50% more time than expected.	The participants had too much to tell and the moderator did not stop them from telling their stories.	The moderator could have been more strict by giving each participant limited time to tell his/her story.
It was a bit difficult to start a discussion during the focus group.	The participants were agreeing on most of the statements and did not disagree with each other.	Have several questions or statements that leads to a discussion, or participants from different backgrounds.
Few participants.	We had only 3 participants, where two of them were husband and wife.	Recruit more participants and have more divers participants.
Not enough time to perform the product box.	Used too much time on the focus group.	Be more strict on keeping the allocated time, or extend the timeframe of the workshop.
Some notes did not have timestamps.	The notetaker forgot to write timestamps.	It is important to use the same format on the notes when different people take notes.
Make the participants understand what product box is.	The participants said that product box sounded difficult.	Give more time to introduction of product box and explain it more detailed.
Recruiting participants.	It was difficult to recruit participants for a large program.	Try to recruit participants from the same environment or association.
The workshop started 10 minutes later than planned.	One of the participants came 10 minutes later.	Put a buffer on 15 minutes at the start of the workshop.

Table 6.5: What didn't go well with the workshop

A lesson learned to consider next time, is to have more participants and more diversified participants to be able to generalize the findings. One might consider to recruit from the same environment or association to get more participants.

We were able to gather many important findings by having this workshop. Having input from seniors, how they think and how their knowledge about ICT is, was very important for us. The next step was to take these findings and transform them into several concepts, which we will see in the next chapter.

Chapter 7
Concept design

7.1 Introduction

Based on results and findings from chapter 5, which is a state of the art literature study on physical activity, seniors and ICT, and chapter 6, which describes the workshop conducted, we felt that we had enough information to start developing our own concepts. This chapter aims to thoroughly describe the concepts that we developed, as well as the rationale behind them.

The following developed concepts will be introduced:

Concept:

- Otago Digitized
- Exercise Program Generator
- Balance Board
- Balance Bracelet

Each of the concepts has very early-stage mockups shown in each subsection below, which must not be confused with a final product. The mockups are intended to give a more concrete idea of the core functionalities of the concepts. All of the mockups were made with Balsamiq Desktop application [6], which is an easy and

intuitive drag and drop interface mockup builder. Balsamiq can be seen as a digital sketch program, which we used to refine the initially sketches showed in figure 7.1.

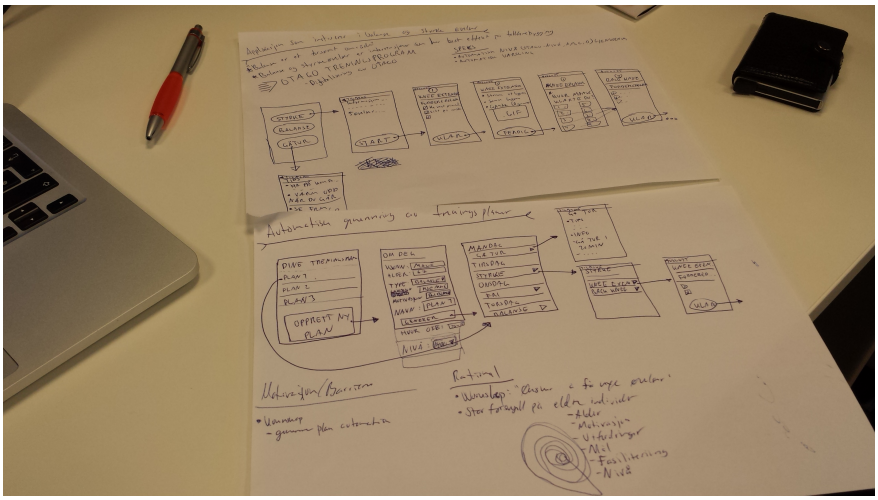

Figure 7.1: First sketches of some of the concepts

7.1.1 Common features for all concepts

There are some common features for all of the concepts that are made. Each concept is either based on balance training, strength training or both. These types of exercises have proven to be important fall preventive methods, and that is why our concepts are focusing on balance or/and strength training. Table 2.1, in chapter 2, presents some of the best practice recommendations for designing concepts regarding fall prevention. We have done our best to take these recommendations into consideration when we designed our concepts.

Balance and strength exercises

A recurring concept, both through the pre-study and the previous chapters, is balance and strengthening exercise. One of the findings in the pre-study was that balance and strengthening exercise is one of the best intervention for fall prevention, and one of the participants at the workshop believed that “balance training is a neglected area”. So, why does not all seniors in risk of falling just exercise their balance and strength? One reason is the fact that many seniors do not look at themselves as old, as we saw

in chapter 2, and thereby in the risk of falling. Another reason is the information barrier, who knows how to do balance exercise? None of the popular applications found in section 4.2, in chapter 5, includes balance training. Young people, would probably look it up online, and as a matter of fact, the three first hits we get on Google, when searching for "balance training" are "Stability and Balance Training Exercise" by Fitness Magazine, "Balance Training 101" by SparkPeople and a video on YouTube called "Balance Training Exercise". All of the hits are great sources for balance training, and probably many good suggestions for balance exercises, even many with good video instruction, for instance the "Liftoff" exercise from Fitness Magazine illustrated in figure 7.2. The problem here is that the suggested exercises can be said to be not very senior friendly. One could probably just add the word "senior" to the search string at Google, but still, one would have to check out several resources and the quality would be varying. The resources are also limited to the seniors who knows how to use the Internet, referring to chapter 2 where we presented a study showing that 55% of the participants answered that the problem with Internet is that they "did not know how to use it" [22].

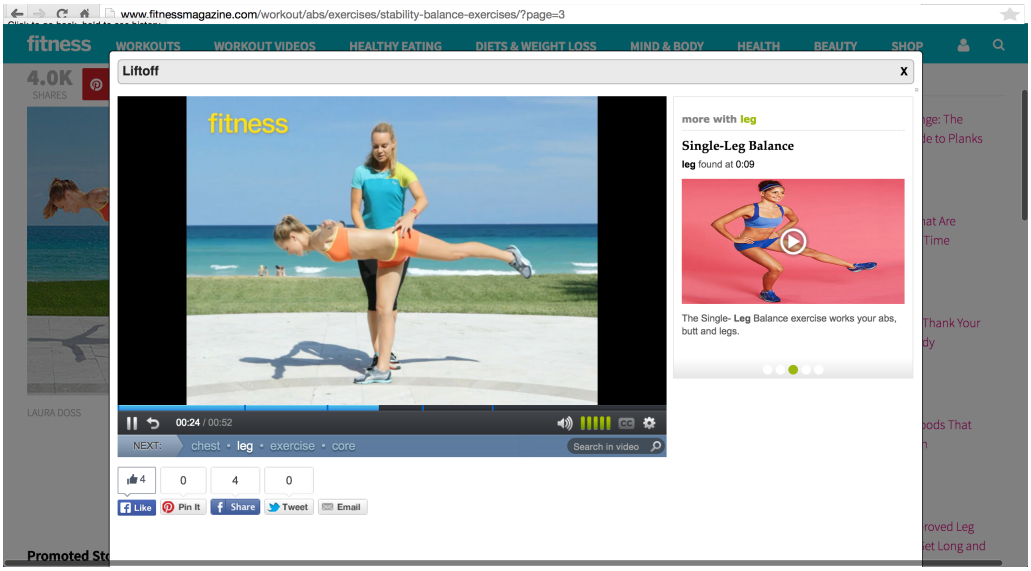

Figure 7.2: Liftoff, balance exercise, by Fitness Magazine

User empowerment

Another motive for making these concepts is to empower the user. User empowerment is when the user takes an active role and becomes a decision-maker. Related to health, this means taking responsibility for their own health maintenance. One way of empowering the user is to educate them on essential elements, for instance to inform the user on how to make better choices about his or her health and lifestyle options [14]. One of our reasons for focusing on empowering the users is that some participants expressed during the workshop that they were not aware of how important balance training was related to fall. The participants from the workshop were interested to learn how balance exercises could reduce their chances of falling and that is also another reason for both focusing on balance training and user empowerment.

Home-based interventions

We put importance on that each concept should be home-based interventions and there are several reasons for this motive. One of them is that, in chapter 2, elderly people identified lack of time as one barrier to perform physical activity, and some elderly people mentioned that they felt uncomfortable to go to a training facility. Home-based interventions solves both of these problems. Elderly people could perform physical activity at home, and they don't need to feel uncomfortable or stigmatized, and they can still perform physical activity at any time they want.

7.2 Otago Digitized

A very interesting home-based training program, called Otago Exercise Programme, from the University of Otago in New Zealand, was investigated in the pre-study. The program is specifically designed to prevent falls in older adults by introducing leg muscle strengthening and balance retraining exercises, and a walking plan. The program was evaluated, both with research and routine health care service, with 1016 people aged 65 to 97 living at home, and it proved to reduce the number of fall and the number of injuries resulting from falls by 35% [10]. The result seems great,

but there is a small catch. The program is delivered at home by trained healthcare personnel or trained instructors. We think that there are many seniors out there who would have benefited greatly from this program, but the problem is that not every senior can afford, or have the rights to be assigned instructors who could implement the Otago program in their daily routine. We think that ICT could be a solution to this problem, since every senior could then have access to the Otago program.

We believe that an application, for instance a mobile or tablet application, could instruct and help seniors to conduct the Otago Exercise Programme, i.e. to digitizing the Otago program. Mockups of the concept can be seen in figure 7.3. The original program consist of 5 strength exercises, 12 balance exercises and a simple walking program. This concept aims to copy all the exercises and present them in an intuitive and easy way to the user. As we see in the mockups, figure 7.3, one could start either the strength program or the balance program in the menu. Each of the program starts with an information screen, that informs the user about the upcoming exercises. Further the exercises are presented with a preperation screen, letting the user prepare for the exercise, an instruction screen, telling the user how to actually perform the exercise, including a video and Graphics Interchange Format (GIF) file. When the user is done with one exercise, he or she will have to tell how many repetitions he or she managed to do, this to support the individually prescribed exercises and difficulty that the original Otago Program supports. Other important features that the application easily could support are scheduling, automatically notifications according to the schedule, feedback on progress, general guidance about fall prevention and risk assessment methods, etc..

The lists below summarizes our reasons and motivating factors for designing Otago Digitized.

Rationale:

– Balance training is an important fall prevention method.

- The Otago program is based on scientific research that has proven to be an intervention that reduces number of falls.

Motivating factors:

- The fact that the program is made by researchers is itself motivating.
- The Otago program offers different levels, that makes the users able to measure progress

Figure 7.3: Otago Digitized Mockups

7.3 Exercise Program Generator

Much like in the former subchapter, about the digitization of the Otago Program, knowledge about how to find related information and knowledge about exercise and physical activity is important. If you have a challenge or a certain physical part you want to improve about yourselves, you need to do some kind of targeted exercises. If one, for instance, want to reduce the risk of falling, one can not just start doing whatever exercise that best suit their liking. You either have to gather knowledge, or you have to ask for help, in order to generate a targeted exercise program. This concept aims to empower the seniors and make them able to both generate and to conduct personalized and targeted exercise programs.

In chapter 2 we give a fairly generalized description of the seniors as a demographic group, but in reality they are very complex and different from each other. The group includes a wide range of completely different people, from the vigorous person in the sixties to the tired and weak in the nineties (this may even be the opposite). You can not simply make the same exercise program to both the healthy and the strong, and the tired and the weak. The program needs to be personalized.

This concept, which can be a mobile or a tablet application, asks the senior to fill out information about themselves, their goals, their challenges, their opportunity of facilitation, their level of experience, etc.. With this information we think that one could build a system to generate an exercise program, far better suited for that individual person than one self could find online, or on level with an expensive personal trainer.

During the workshop, we experienced that one of the participants was fed up with the training program that the gym had recommended. The program itself was good, however a pretty standard one, no hocus-pocus, but one tends to get tired of doing the same exercises over and over again, and one therefore needs new exercises and challenges once in a while. The participant said that it would be better if he could do other exercises to get a diversed training. The thought with this concept is that

one could easily change the exercises, for instance by bumping up your experience level, and thereby generating more challenging exercises.

As figure 7.4 shows, the concept consist of a generator, where the user first tells the system about himself and then asks the system to "generate" a plan. The generator should make a plan that matches the user's needs and preferences. The concept also consist of a digitized training schedule for each of the plans the user generate, where the user also can get instructions on how to execute the generated exercises or activities, as shown in the three lower sketches in figure 7.4.

Figure 7.4: Mockups of the Exercise Program Generator

The lists below summarizes our reasons and motivating factors for designing Exercise Program Generator.

Rationale:

- Builds on a statement from one of the participants from the workshop
- There are big differences between individuals among seniors

Motivating factors:

- Varying and customized program
- Easy to change the content of the program
- This application contains endurance, strength and balance training

7.4 Balance Board

We talked about exergames in chapter 4 and how exergames could be considered as a fall preventive method. An inconvenience with exergames is that it requires some sort of gaming console, such as the Microsoft Xbox or Nintendo Wii to play these games. We found out that seniors who participated in the workshop had both smartphones and tablets. We believe that it would be easier and less awkward for a youngster to go and buy a gaming console than for a senior. By taking this into consideration, we decided to make a concept based on exergames and a tablet.

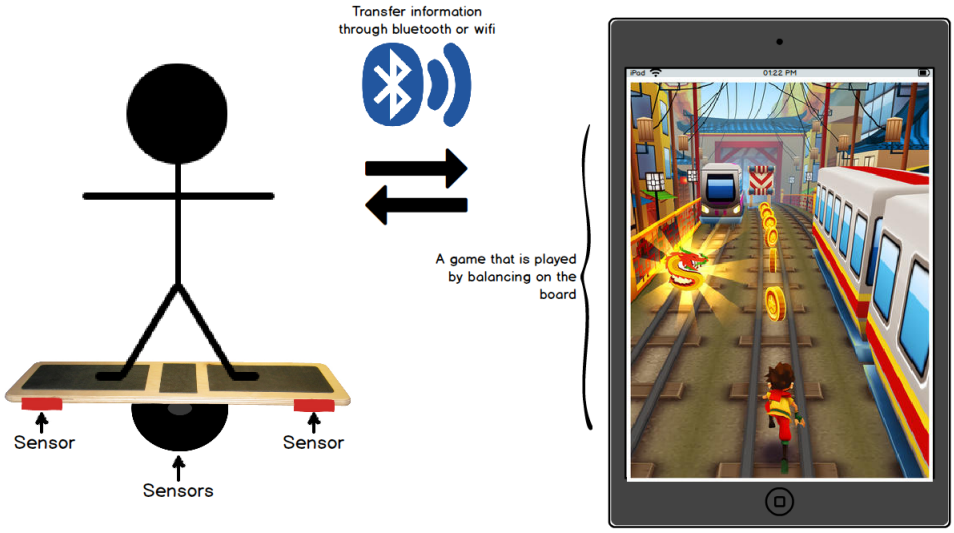

Figure 7.5: Mockup of concept with a balance board

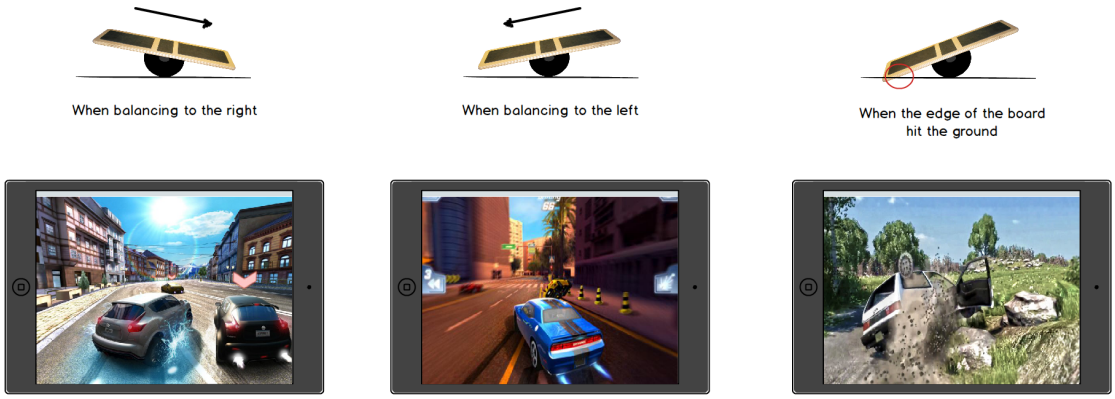

Figure 7.6: Gameplay with a balance board

The concept “Balance Board”, shown in figure 7.5 and 7.6, is based on an idea a participant from the workshop came up with. A balance board, which is a device used to develop balance and coordination skills, is the main component which has sensors placed on each edge of the board. The board works with an application which is

installed on a tablet or smartphone. The application is a game where the user uses the board as a controller to control the gameplay. The game itself could be anything as long as it involves controlling an object with the use of the balance board. The game works as a means to do balance exercises, in other words this concept incorporates a persuasive element called exergame. As mentioned in chapter 5, exergames can be used as a fall preventive method since it improves the users physical and mental condition. When the user balances towards left, the character in the game turns left and vice versa if the user balances towards right. If the edge of the board hit the ground, the character, for instance, in the game falls and loses a life or points.

The main rationale for making this concept is that one of the participants proposed balancing board as a solution to perform balance exercises, and the fact that balance training is an important fall prevention method. Our reasons and motivating factors for designing this concept are summarized below:

Rationale:

- Builds on an idea presented by a participant from the workshop.
- Made as an exergame, which has proven to be a good intervention for improving balance abilities.
- Balance training is an important fall prevention method.

Motivating factors:

- Uses gamification in form of an exergame, which makes it fun to do balance training.
- The concept can be used as a means for social competition.

7.5 Balance Bracelet

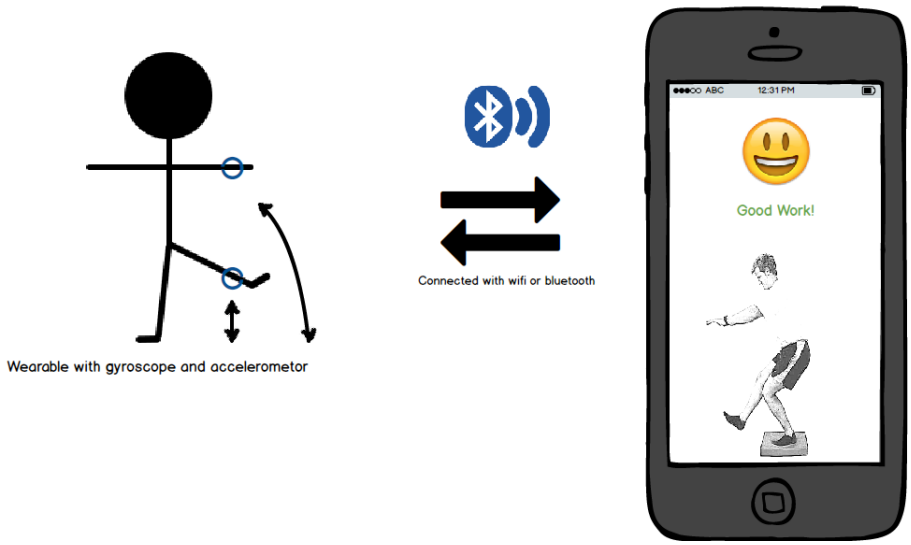

Figure 7.7: Mockup of concept with a wrist wearable

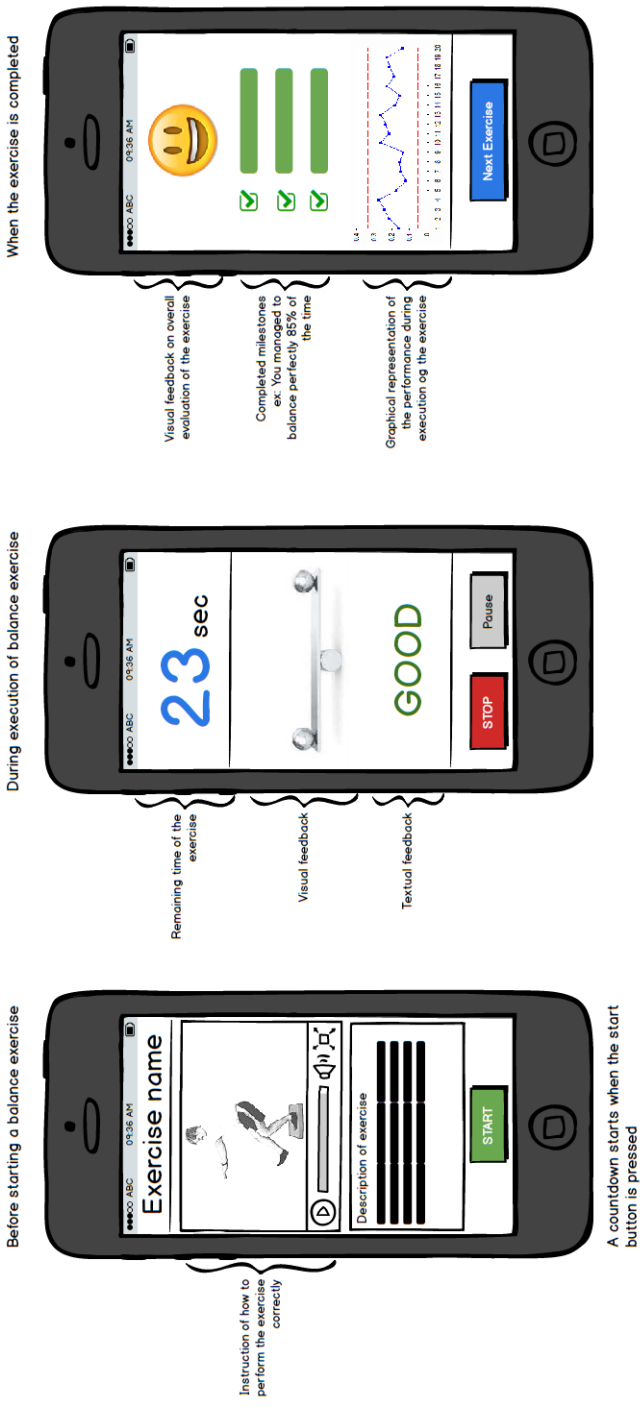

Figure 7.8: Balance Bracelet application

"Balance bracelet" is the concept shown in figure 7.7 and 7.8. This concept is based on a wearable bracelet that has gyroscope and accelerometer inside it which constantly measures the movement of the user. The bracelet is connected to an application which shows the user how to perform different balance exercises. Before the user starts to perform a particular balance exercise, the user is shown some images or a video of how to correctly perform that exercise along with a textual description. When the user presses the start button, a countdown is initiated, and the user can take the correct position to perform that exercise. While performing the exercise, the user is shown a timer of how long it is until the exercise is finished. The user is also shown a visual feedback and a textual one on how well the user is performing the exercise. When the user is finished, a visual feedback on how well the user performed totally, along with a graphical representation and milestones that were completed during the exercise are shown to the user. Since the bracelet contains a gyroscope and an accelerometer, every hand and foot gesture done by the user is captured. The thought is that a user performs the exercise correctly if the hand or foot does not move much. If the user performs big hand or foot gestures, it is considered as if the user loses his/her balance.

One of the main motivations for making this application is that the application empowers the user, in other words, the application makes the user realise how these exercises can help them and they are able to perform each exercise without any outside help. Our reasons and motivating factors for designing this concept are summarized below:

Rationale

- Balance training is an important fall prevention method.
- A wearable device is easier to carry around than a smartphone, and lower threshold to wear it everywhere.
- The training could be done at home, no need to go to a training facility.

Motivation

- User empowerment: the user learns about different balance exercises and what this exercise is good for.
- The user could use this application without any prior knowledge.

7.6 Discussion and conclusion

This chapter looks at concepts generated based on feedback from users who participated in the workshop and from results from the SoTA which we performed. Each concept describes motivation and rationale for why we made this particular concept.

In chapter 5 we found several interventions from the reviewed papers. Many of these interventions have aspects which are somewhat similar to our concepts. We will discuss some of the differences and similarities between a few of those aspects.

Our concept Otago Digitized is a conceptual application with information about strength exercises and balance exercises from the Otago Exercise Programme. Gschwind et al. [21] also uses exercises based on Otago. Our concept just gives instruction and does not monitor how the user performs the exercise. Gschwind et al. are using a Senior Mobility Monitor (SMM) and a Microsoft Kinect to monitor the user and give the user real-time feedback on his or her progress viewed at a TV. Although we believe that this feedback can motivate seniors to perform the exercises, we think there may be too much technology and devices for seniors to be able to use the system alone. We think seniors might be frightened by having a computer connected to the TV, Kinect, Google TV and SMM. There is even an android tablet working as a second screen input. We believe this is a bit over the top for seniors to handle themselves. Our concept is more simplified and focus on giving seniors the information they need to be able to perform the exercises without monitoring and giving feedback.

Gschwind et al. [21] also uses exergame as their technology. They have several games which seniors can play to train their balance and strength. Seniors are controlling a character, e.g. a downhill skier aiming for the gates. This is a bit like our concept balance board, which is using a balance board to control the gameplay

on a smartphone or a tablet.

Our concept balance bracelet uses wearable devices which are connected to a smartphone or a tablet running a conceptual application. The concept has some balance exercises which the user will be guided through. The user receives real-time feedback on the screen based on the movement of arms and legs. Bleser et al. [7] are also using wearable devices to give the user feedback. They have developed a system for strength training where the user have a wearable network of up to 10 wearable devices placed on his or her body. These wearables have an accelerometer, gyroscope and a magnetometer embedded. The main differences between this intervention and our concept is that, in this intervention, the feedback is presented on a TV rather than a smartphone or tablet, the number of wearables and the type of exercises. Although the feedback will likely be more accurate with more wearables, we think having 10 wearables stucked to your body can be a bit challenging when doing exercises. Therefore we believe that our concept is a better solution. Our concept also consists of only wearables and a smartphone or tablet, while [7] has multiple components for data presentation, data management, data collection and data processing. Every component is connected through the Internet with the possibility for healthcare professionals to follow their patients. The system described in [7] is a bit more complex than our concept.

For the exercise program generator we have not been able to find any intervention, application or concept to compare with. Although many of the training application mentioned in chapter 4 have the ability to join a pre-defined training plan, we have not been able to find an application which generate a personalized training plan based on the user's input.

The next stage is to get feedback on these concepts. Getting feedback is the next phase after designing the concepts, which is shown in figure 3.2 in chapter 3, which describes the iterative development process. In conjunction with this, we decided to evaluate the concepts with experts.

Chapter 8
Evaluation of concepts

8.1 Introduction

While the previous chapter describes some concepts we developed, this chapter will describe the evaluation of these concepts. This chapter will be the last part of the first iteration of the concept development process.

We chose to use experts to evaluate our developed concepts, in order to get a quick and qualitative evaluation. We managed to get hold of two experts, a Professor in Human Movement Science at the Department of Neuroscience at NTNU, Helbostad J., and an Assistant Professor at The Faculty of Health Education and Social Work at Sør-Trøndelag University College, Bredland E. Bredland is also an experienced primary care practitioner in the municipality of Trondheim, who has had long experience with elderly, and has organized exercise and physical activity events for seniors in Trondheim. Both of the experts were physiotherapists, with special focus on seniors. We decided to interview the two experts one by one, and the feedback they gave were quite interesting.

8.2 Evaluation by interview

We did a semi-structured interview with the experts to get their opinions on each concept. One benefit of doing a semi-structured interview is that the interviewer is able to prepare questions ahead of time. Another benefit is that a semi-structured

interview allows the participant to express their views in their own terms. A semi-structured interview is best used if you don't have more than one chance to interview the person [13]. A difference between structured interviews and semi-structured interviews is that the interviewer, in a semi-structured interview, follows a list of questions that are to be answered by the interviewed person, but the interviewer is able to follow up on topics that arises during the interview. The semi-structured interview is not as strict as the structured interview. There was made a loose interview guide before the interviews, to help us to direct the conversation towards getting feedback on relevant topics.

The interviews started by reading and signing of a consent form, which can be found in Appendix D, and the experts were notified that the interview was going to be audio recorded. We introduced ourselves, and the context of the project. The main part of the interview consisted of us presenting the concepts, one by one, followed by a discussion around the concepts.

The following questions were used as a guide during the interview, and were asked during the discussion after presentation of each concept:

- Do you see any benefits with this concept? What are those?
- Do you see any disadvantages with this concept? What are those?
- Do you think this concept will motivate or engage seniors to perform physical activity? Why?
- Do you think seniors will use this concept over longer period of time? Why?
- Is there any features you miss in this concept?

When the expert had given her thoughts on each concept, the expert was asked to choose one concept which she felt was the most suited one for seniors and explain why that particular concept was chosen.

8.3 Data analysis and extraction of relevant data

Two of us took notes of what the expert said throughout both interviews. Each notetaker noted timestamps whenever the expert said any quotes or expressed their meaning. We gathered around, after each interview was done, and discussed main findings and wrote them down. We also discussed what the expert had said about each concept and wrote a small report for each interview. We later found out that these notes were not sufficient enough, so we decided to go through each interview which we had recorded on tape and take more detailed notes. Each of us listened to the recordings and wrote separately more accurate report of each interview. The report followed the layout of the interview, and consisted of timestamps with feedback and quotes by each expert. We later merged each report together and ended up with one report for the interview with Helbostad J. and another one for Bredland E., which can be found in Appendix F and Appendix E. We then gathered together, and presented, one by one, what we thought were the most important findings, and we further came up with the most important topics and subtopics through discussion, which are presented in the next section.

8.4 Results

This sections will try to summarize each expert's opinion on each of the concepts. The summary is a short excerpt from the discussion that found place, and is concentrated to what we thought was relevant.

8.4.1 Otago Digitized

The first expert, Bredland E., thought that this was an important concept, and that it would be appropriate for some seniors. She agrees that the Otago program could benefit many seniors, but she was afraid the program could be demotivating. Bredland thought that this concept was best suited for those who liked to have a strict routine in their everyday life. Bredland thought that the program could be ok to use for a couple of week, but hard to conduct over a longer period of time. She also thought that the trained instructor, as one of the original Otago program

premisses, played an important motivating part since they would then have a person who could cheer and motivate them through each exercise.

The second expert, Helbostad J., thought that this concept was really interesting. It should be said that she has worked with the program before, both practically and theoretically. She is also a contributor to a Norwegian translation of the original Otago program. Helbostad thinks that the concept is highly achievable, and that the seniors easily could manage to conduct the exercises that the original Otago program facilitates. She mentioned that the program is made for the more frail seniors, which you typically find in the higher age groups, a group which is not as good at using smartphones and tablets compared to younger age groups of seniors. Just as Bredland thought, Helbostad also thought that the lack of an instructor was negative and said that it would be good to have a distance contact who could replace the active instructor. The user could send the distance contact a video or have a phone conversation to find out if the user was performing the exercise correctly. She also thought that the concept could be enhanced by more motivational features, e.g. collaboration with other seniors. She mentioned that feedback could be used as a motivationl factor, for instance by letting the participant know how many repetitions he or she has to do of each exercise to reach a certain safety level for not falling. Another way to motivate the seniors, suggested by Helbostad, was to make each exercise as a contribution to, for instance build a digital city. Each exercise could contribute in a different way, where some exercises could build smaller structures, while other exercises could build larger buildings. This type of feedback could motivate the seniors, since it makes them feel they are a part of a larger community, and that they are contributing to building up a community.

8.4.2 Exercise Program Generator

Bredland thought this concept was better than the Otago Digitized, due to the individualization. During the discussion she uttered that she was not very enthusiastic about indoor training, for instance at the gym, and told that she thought it was the daily physical activity that was important. She said that elderly people do not

usually prefer to do fixed programs, and suggested that this type of application should rather monitor their daily activity and then based on their activity feed suggest activities they had done little of. Bredland thought that the word "exercise" could sound negatively and suggested to rename the application to "Activity Calendar". She thought that an exercise program generator could motivate some, but not all and that you had to generate various exercises to keep them engaged to perform physical activity over a longer period. Bredland recommended having a feature for doing "dugnad", which is a Norwegian term for voluntary work done together with other people. She thought that many men would engage in this activity.

Helbostad also liked the idea of individualization, and she thought that feature of easily changing the plan, for instance to a more challenging one, could be a big motivational factor to continue to actually conduct a plan over longer periods. Helbostad said that men prefered to choose activities which they felt were purposeful, while women chose activities which were more social, and suggested that this concept should have a feature involving social activities. She also suggested to make the concept incorporate feedback feature to motivate the seniors, for instance by asking the user if he or she wanted to change their exercise program after a period. She said that she had experienced that some would prefer to compete with themselves while others would like to compare themselves with others. She said that men tends to compete more than women, while the social aspect is more important to women than men.

8.4.3 Balance Board

"A concept that is both fun and challenging", Bredland said. Bredland thought that exergames could make the seniors take their minds from doing pure balance training and onto something fun. It could even help tying generations together by playing with children and grandchildren. Bredland proposed to add a second degree of freedom to the board, by going back and forth, to for instance accelerate or decelerate.

Helbostad liked the use of exergames, and agreed that this could increase the motivation, at least for a period of time. She wished to see more relevant games for

seniors, and meant that the seniors preferably had to recognize themselves in the game concepts. Further she thought that the Balance Board could be too static, considering that the user only does limited movements. She also thought that the Balance Board could be too challenging for the higher age group, and suggested to consider pressure mat or camera technology, like Microsoft Kinect. Helbostad stated that "to train the balance, it is important to be able to do several things at once", but that seniors might not prefer to do so.

8.4.4 Balance Bracelet

Bredland thought that the former concept, Balance Board, was a better concept. She meant that one should add something more to the concept, and wished that the concept could be more challenging. Another response was that it could be a bit boring, both considering that one typically would be alone and that the exercises could be too static, and not adapted to the real world balance challenges. On the other hand, she said that this application could provide a double profit by requiring the seniors to use a smartphone so they could be introduced to the world of smartphones and at the same time do balance exercises. Bredland said that the seniors should have an application with large buttons and that we should consider people who were color blind too.

Helbostad liked the concept of getting instantaneously feedback, and thought that this could help the user to execute the task correctly. On the other hand, she thought that it could be hard to both do the task as well as looking at a smartphone or tablet, and she therefore suggested to use auditory feedback. Further she wondered what the bracelet actually should measure, and how the data could help the system to assess the conducted exercise or the user's balance skills, which we honestly could not answer. She said that "it is quite demanding to know what to measure when doing balance training" and believes that balance is more on how to control your body. She also said that it could be challenging to make the user perform activities over longer period, and we had to first change the user's behavior. Helbostad said that this concept could motivate seniors if it gave feedback and showed statistics on

the user's progression. Helbostad suggested that the user should be able to choose the level of difficulty and that the application should be individually customizable by for instance starting with a test to measure your own level.

8.5 Discussion

It was interesting to hear the thoughts of two different experts, especially since they had been working with different kind of seniors. Bredland, for instance, had been working with the more healthier part of seniors, while Helbostad had been dealing with the more frail part of the seniors. It was therefore interesting for us to see if they shared some opinions of the concepts or whether they had completely different opinions.

We could perhaps start with the more common views. Each interview started by a presentation of the Balance Bracelet and a following discussion. A reason for the relative small amount of feedback on this concepts could be the fact that both started to talk about the challenges regarding seniors and ICT. As we also experienced at the workshop, and have seen throughout this project, is that seniors have real challenges with following the rapid technological growth. Just to understand the concept of mobile applications can be frustrating, and how to install and use them even worse. But, as Helbostad mentioned, the age span in seniors is big, and she had noticed that the persons in the lower age group had substantially more experience with the use of technology. What is interesting to observe is that many researchers develop ICT solutions for exercise and seniors, as we can see in chapter 5, but experts experience that seniors sees ICT as a challenging area.

They both agreed on that balance training was an important fall preventive method and were pleased that many of the concepts were focusing on balance training. Helbostad was pleased that we focused on physical activity rather than fall, even though each concept was meant to reduce fall among seniors. As Bredland expressed, the media was creating fear amongst seniors by reporting that there had been more fall incidents lately and that fall incidents could lead to death in the worst

case. Bredland had experienced that more seniors were afraid to go out, especially during the winter. She thought that the seniors should experience to fall and get over the horror of falling. She meant that they should rather train to fall correctly than be scared of going out during winter time. Both Bredland and Helbostad were positive to that most of the concepts were focusing on balance training.

Despite agreeing on many things, they had some differences as well. They had different opinions when we presented the concept of a digitized Otago program. Helbostad, who previously had worked with this program, was very positive to this concept, while Bredland thought this concept could be boring for the seniors. Their difference in work background could be a reason for having different opinions. Helbostad, who works with the more frail group of seniors, may see this concept as a good intervention for this group of seniors to be more physically active. This group of seniors may also include seniors who have already had one or several fall incidents, and seniors who are not physically active. Bredland who has worked with more healthier seniors, would naturally see this concept as a boring one, since it only provides some exercises to do, and does not challenge the user.

Bredland highlighted that the user should have fun doing exercise, and divert their mind from doing exercise to having fun. She was positive to the concept Balance Board, as it was a form for exergame, which she thought seniors would enjoy and have fun, rather than think that they were doing exercises. She said that elderly people often were pushed and encouraged to do more physical activity by health professionals, but what they did not know was that the elderly people already did a lot of physical activities such as mowing the lawn, shoveling snow, dance, go up and down stairs, etc.. Bredland was more onto that one should measure and encourage seniors to do more of their daily activites, and then suggest activities they did little of. Helbostad, on the other hand, meant that seniors should be aware of why they are doing specific balance exercises and what they gain from doing such exercises. She said that each exercise should be meaningful and demanding so seniors were motivated to do physical activity. We can again observe that their opinions differ

in what they think is important for seniors, which also can be related to their work experience and background.

At the end of each interview, we asked the experts to pick one of the concepts as the best suited one for seniors. Both experts were not able to pick one as the preferred one, but instead said something about all of them. Bredland favoured the Balance Board and the Exercise Program Generator. She ended up on choosing the Exercise Program Generator if the name was changed to Activity Calendar and if it were able to track everyday activities of elderly people and summarize their activity at the end of the week and suggest activities they did less of. She said that she missed this type of application and that was the main reason for choosing the Activity Calendar. Helbostad, on the other hand, said something about each application, but it seemed to us that she favoured the digitized Otago, since she mentioned that this concept was the easiest one to make a product of. It has to be said that it is difficult to choose one of the concepts, since each of the concepts looks at different perspectives of challenges the seniors have.

8.6 Conclusion

We gained a lot from having experts evaluating each concepts that were made. They had many important feedbacks on each concept and it benefited us that they suggested improvements for the concepts, considering the fact that they have had a lot of experience with working with seniors. Since they had experience with different group of seniors, due to their work background, we were able to get diversified results which should be considered when we refine our concepts. It emerged from the interviews with experts that two concepts had best potential to satisfy the needs of the elders. One concept is the Exercise Program Generator, if it was changed to an Activity Calendar, and the other one was the digitized Otago Program.

Chapter 6 looked at what some active seniors wanted as a concept and what their motivation and challenges were. This chapter looked at some thoughts two experts provided on concepts we generated based on findings from the SoTA and results

from the workshop, but there is one thing we don't have looked at yet. Does the active senior's thoughts differ from what the experts think? Do they have the same opinions on what is important when it comes to fall prevention or do they think similarly?

Chapter 9
Discussion & Conclusion

9.1 Introduction

This chapter summarizes our Master's Thesis, and discusses our results from our literature review, workshop, and evaluation of our developed concepts. Furthermore, limitations of our work and recommendations for further work are presented.

In chapter 1 we are addressing a big health risk for seniors, namely falls. From our preliminary study, we found that exercise, with an emphasis on balance and strength, would be an effective intervention for fall prevention. We therefore started out with a goal of developing one or more concepts that was focusing on fall prevention and exercise. An important premise was to use user-centered methods, in order to include the seniors in an early phase in the development of concepts.

9.2 Summary

We started in chapter 2 by introducing the seniors and their challenges, as well as giving an introduction to exercise and fall prevention. Chapter 4 presents how the industry have combined the evolution in ICT and exercise, and shows that popular exercise applications are downloaded over 10 million times, just on the Android application store. These well developed applications are mostly focusing on endurance training, and not balance and strength exercise. The found applications developed

especially for seniors are in our opinion not good enough, which the numbers of downloads of the given applications supports.

We turned our attention to existing research comprising seniors, ICT and physical activity, and conducted an extensive literature review to document the SoTA, described in chapter 5. Here we found, among several other findings, that seniors are little included in development processes, which also supports one of the findings from the preliminary study. Very few papers related to ICT, exercise and seniors are about fall or fall prevention.

Our promise to include the seniors, which earlier studies lack, was ensured for by performing a workshop with seniors. We managed to recruit three active seniors which were happy to share their motivations, challenges and general thoughts about ICT and physical activity.

We took our new knowledge from the SoTA and workshop and came up with our own concepts. Our concepts, four in number, were further evaluated by two experts, presented in chapter 8. The experts had many opinions, and came with valuable insight about the seniors and our concepts. They even proposed several suggestions and recommendations for further development. Some of the perspectives from the experts were similar, but also quite different from each other.

9.3 Discussion

We chose to focus on exercise and physical activity as our intervention for fall prevention. From the preliminary study, we saw that there were several other interventions that we could use. Other interventions could have been medical assessment, that Chang et al. [12] pointed out as an intervention that has statistically significant beneficial effect on the risk of falls. Another important interventions is multifactorial prevention programs. A multifactorial prevention program, a program that combine several interventions, were studied at 9 residential care facilities in Sweden [34]. It showed that it could reduce the number of residents who fell, the total numbers of falls, the time to first fall etc., and is also pointed out by Chang

et al. [12] to be a promising intervention. So why did we chose exercise? The main reason is that it also have proven to be an essential intervention to prevent falls. The intervention is also rather easy for the common guy to understand and comprehend, and should be quite easy to implement in the everyday life without big changes. Our interest for exercise and physical activity is of course another important factor for choosing this.

In the introduction, in chapter 1, we declare that our main research aim is "how to encourage physical activity with the use of ICT, in order to reduce the risk for falling among seniors". Here we emphasize encouragement and motivation as main drivers to get seniors to exercise, but to what extent have we achieved this? We looked at some challenges and barriers seniors had to perform physical activity in the subsection 2.2.1 in chapter 2. Lack of motivation was one of them, pointed out by Brawley et al. [8], and it was suggested to change the behavior towards physical activity, which could be a challenging task. In retrospect we realise that our SoTA should have focused more on the motivational part related to physical activity rather than just exercise, ICT and elderly people. We also realise that a search for papers regarding motivation, exercise and elderly people could have given us many advantages. We compensate somewhat for this limitation by bringing up the motivational aspect with physical activity in our workshop with active seniors. In addition our concepts have focused on motivating seniors to do physical activity and the motivational aspect in each concept was evaluated by experts.

The SoTA consisted of a literature review on exercise, ICT and elderly people. As mentioned in the previous paragraph, there are some limitations with this literature review. Another limitation is that everyone did not read every paper during the screening process in the SoTA. We did it this way to save time which we in retrospect see might not have led to a fully objective result of relevant papers. Having that said, we think that our findings are quite interesting. One of them is that very few of the papers, 3 out of 16, did include the seniors in an early phase of the development, which again supports the findings from the preliminary study. The other main finding

was that just 3 out of 16 did discuss falls as an important part of the intervention. We think that this is a bit strange, considering that we think it is a very important part of why seniors should stay physically active. On the other hand, we also discovered that the seniors that attended our workshop neither did have a strong focus on falls.

The workshop we conducted was very interesting, and it gave us young students a valuable insight in the daily life to three active seniors. We felt that it made us better equipped to handle the challenge to develop our own concepts. If we have to point out a downside with this workshop, it is the number of participants who participated. The ideal participant count would have been around 5-6 seniors, as well as additional workshops with other groups within the senior community. We were not able to generalize the participant's answers to include all seniors since we only had 3 seniors who participated. This limitation resulted in that we had to supply with additional literature to support the results from the workshop to develop concepts.

We were able to create four different concepts based on results from the preliminary study, done prior to this thesis, results from the SoTA and from the workshop. It may be possible that some of the concepts are biased from our side, since we were not able to get many ideas from the workshop alone. Despite this limitation, the concepts themselves got positive feedback from experts and we were able to use these concepts as a platform to discuss seniors and their needs.

Two experts, a Professor in Human Movement Science at the Department of Neuroscience at NTNU, Helbostad J., and an Assistant Professor at The Faculty of Health Education and Social Work at Sør-Trøndelag University College, Bredland E. evaluated our concepts. We got many comments and suggestions for improvements from these experts, but the most interesting part with the evaluation is how their opinions differed from each other. We suspect that their difference in opinions are due to their difference in work background and the fact that they have been working with different types of seniors.

The experts gave different opinions on what they thought were important for

seniors and what type of motivation they thought would work for them. Seniors from the workshop were a different type of seniors than what the experts were accustomed to. This makes us think in retrospect that we should have defined the user group more clearly. Maybe we should have concentrated on a specific age group or a particular type of seniors. The seniors from the workshop could be seen as super active seniors, whereas the seniors Bredland had worked with were regular active seniors, while Helbostad had experience with the more frail group of seniors. We made table 9.1 which shows the differences and similarities between the opinions of the seniors and experts, as well as the literature studied in this thesis. The table looks at motivation, challenges, type of exercise and the use of ICT, in context with physical activity.

Topic	**Literature**	**Seniors**	**Experts**
Motivation	Social aspects in an application can be used to motivate seniors to be physically active	Wellness, social aspects, progress and avoiding injury	Involving social activities, feedback on progression
Challenges	Overperforming, not knowing their own capabilities, internet use, stigma, fear of injury, falls etc.	Injuries and some ICT use	The use of ICT, keep seniors engaged over longer period of time
Type of exercise	In our SoTA we found that a majority were focusing on endurance, while literature that are especially focusing on fall prevention are focusing on balance and strength	Mostly endurance, some strength	General daily activity (Bredland) and balance and strength (Helbostad)
ICT use	The SoTA shows that the majority is focusing on mobile and tablet applications	Somewhat up to date, problems with troubleshooting and mobile applications	Points out that ICT is a troublesome area

Table 9.1: Differences and similarities between the literature, seniors and experts, regarding motivation, challenges, type of exercise and the use of ICT, in context with physical activity

As we see in table 9.1, the social aspect seems to be emphasized as one of the

main motivators for performing physical activity. Literature found in chapter 5 suggests that having social aspects in their intervention can motivate to perform physical activity, but only few papers mention the social aspect. Seniors themselves expressed in the workshop we held, that the social aspect of performing physical activity motivated them to continue with physical activity. They also said that they did exercises to avoid injuries and in general feel well. One of the participants uttered that being able to see progression motivated him to keep pushing himself to perform physical activities. Being able to get feedback on progression was also highlighted by the experts, who said that feedback could motivate seniors to perform physical activity. As well as both literature and seniors, experts did also suggest that involving social aspects would motivate seniors to exercise. We can therefore conclude with that the social aspect is an important motivational factor for performing physical activity.

Literature lists up many challenges seniors have to face every day regarding physical activity. A paper by Brawley et al. [8] mentions several barriers seniors have, among them fear of getting injured during physical activity. Another challenge many papers mention is that seniors have little experience with the use of ICT. When we asked the seniors in our workshop, they said that they were familiar with many ICT tools like smartphones, the Internet, tablets and so on, but they also mentioned that they struggled to exploit the potential in some of these devices. Seniors themselves thought they did not have any other challenges, and it was difficult to get this out from the seniors. We think this could be due to their own impression of themselves, and that they believe that they don't have any challenges or weaknesses. If we look at seniors from an objective perspective, we can observe that many seniors have problem with keeping up with the technological evolution, and experts agrees on that many seniors struggle with ICT tools. Another challenge regarding physical activity, highlighted by experts, is to be able to engage seniors over a longer period of time to perform balance exercises or strength exercises.

The preliminary study showed that both balance exercises and strength exercises

were preventive methods that had greatest benefits. What surprises us is that most of the papers in our literature review focus on endurance training, while only those papers which focus on fall prevention, talk about balance exercise and strength exercise. It seems like balance exercise is given low priority among seniors as well. The seniors who participated in the workshop did mostly endurance training, but only one of them followed a regular strength exercise program. When we asked experts what they thought about type of exercises seniors should perform, they were divided in what they thought were important. One of the experts thought that doing general daily activities were enough while the other expert thought that seniors should focus on strength and balance training. We observe that experts' opinions differ from seniors and one reason could be that experts are able to observe seniors from an objective perspective.

Another finding that is interesting to observe is that many papers from the conducted literature study in chapter 5 shows that mobile and tablet applications is the preferred type of technology to develop for seniors, despite that both experts agree on that seniors sees ICT as a challenging area. We also focused on mobile and tablet applications in our concept generation. This is a dilemma; everyone is trying to make interventions for seniors with the use of ICT, although seniors are complaining about how difficult and baffling it is to use ICT. Admittedly did our seniors say that they felt quite comfortable using ICT, but as mentioned in chapter 2, the majority of the seniors reports that is too hard to even use the Internet. When that is said, we don't think that one should completely stop trying to develop ICT-based solutions for seniors, but it underlines the importance to have the user in the center, for instance by using user-centered methods, when designing new and innovative solutions for seniors.

9.4 Further Work

The research presented in this thesis tries to answer research questions presented in chapter 1. The questions are addressed, but to what extent do we answer them? When are the questions really answered? Is it possible to get a hundred percent

accurate answer?

Homo sapiens are a rather peculiar species to work with, and one must take into account that none are alike. Seniors are a big demographic and complex group and this makes seniors an extra difficult group to work with, especially when we are in a different age group ourselves. We tried to solve this problem by including seniors in a very early phase by conducting a workshop. Using user-centered methods like focus groups and co-design enabled us to gain insight in seniors' active daily life and at the same time include seniors in a development process. Our suggestion for further work is to take this one step further by conducting workshops with seniors on a larger scale. Since we were only able to be familiar with a homogeneous group, those we call "super active", we propose to conduct workshops with different groups of seniors, e.g seniors with different activity levels and seniors in different age groups.

We would love to see that someone improved one or more of our concepts further. We have laid a base for several concepts, which can be taken further. An important aspect here is that we think that one have to narrow the scope to consist a more specific group of seniors. Our suggestion is that the next iteration should aim to develop a more functional prototype of one of the concepts, and to evaluate it by performing a usability test.

We asked earlier if we were able to fully answer our research questions which we first presented in chapter 1. The truth is that it is not possible to fully answer these questions, but we have been able to address the questions to an extent. Table 9.2 shows to which extent we are able to answer the research questions and at the same time highlighting some of the findings, limitations and further work for improvement.

RQ	Findings	Limitations	Further work
What do we know about physical activity, exercise and seniors?	17 out of 20 activities active seniors from the workshop conducted were endurance training ranged from simple walking to orienteering and skiing. 7 out of 20 activities were strength training and only 1 activity had something to do with balance training.	We were only able to look at a narrow group of seniors who were very active.	Observe other types of seniors and compare activity levels of different groups.
What motivates active seniors to exercise or perform physical activity?	Activities involving social interaction, keep a healthy life	Only 3 active seniors provided us with their motivations.	Have workshop with more participants and have several workshops with different groups of seniors.
What are the characteristics of ICT tools designed for seniors in relation to physical activity reported in the literature?	Applications and websites are the most common technologies. Wearable is described in few papers. Social aspect are discussed by few papers. Gamification is used for motivation. Cardio training is described in most papers. Seniors are involved in few development processes. Few papers are doing research on both fall and exercise.	Used only one search database. Not everyone read every paper in the screening process.	Use multiple search databases. Search for literature related to both physical activity and fall. Conduct a search on motivation, exercise and seniors.
What kind of ICT tools do active seniors use in conjunction with physical activity?	Heart rate monitors, the Internet	Only few and very active seniors provided us with information.	Observe if other groups of seniors use any ICT tools.
What kind of functionalities do the seniors want in an exercise concept?	Use of a balance board to improve balance abilities.	Limited feedback from the seniors who participated in the workshop.	Try to run a product box session with seniors to see if they are able to present several concepts.

Table 9.2: To what extent the research questions are answered

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Appendix A

Poster for Recruiting Seniors

Figure A.1: Poster for recruiting seniors

Appendix B

Concent Form for Workshop

Forespørsel om deltakelse i forskningsprosjekt

om trening, IKT og eldre

Bakgrunn og formål

Formålet med studiet er å utvikle et konsept gjennom en brukersentrert utviklingsprosess. En brukersentrert utviklingsprosess vil si at man tar med brukernes meninger og synspunkter i en tidlig fase i utviklingen av et produkt. Konseptet er en del av en masteroppgave om fallrisiko og forebygging av fall. Masteroppgaven skrives for NTNU i samarbeid med SINTEF.

Tidligere forskning viser at fysisk aktivitet er en stor bidragsyter til å forebygge fall. Vi ønsker å bruke aktive seniorer, heretter deltakere, sine holdninger og erfaringer, med tanke på å holde seg i god fysisk form, i en prosess for å utvikle et konsept som kan hjelpe andre mindre aktive seniorer.

Hva innebærer deltakelse i studien

Studien vil bestå av en samling, også kalt workshop, som vil inkludere en fokusgruppe. Temaene som vil bli tatt opp omhandler deltakernes relasjon til fysisk aktivitet og teknologi samt egenskaper deltakerne mener man kan dra nytte av i en tjeneste som skal ha som formål å motivere og oppfordre til fysisk aktivitet.
Studien vil hovedsaklig bli drevet av erfaringer og synspunkter fra deltakerne. Data bil bli registrert som notater og lydopptak.

Hva skjer med informasjonen om deg?
Alle personopplysninger vil bli behandlet konfidensielt. Det vil bli innhentet navn, e-post og telefonnummer til deltakerne. De som har tilgang til personopplysningene er prosjektgruppen, bestående av studenter og veileder fra instituttet.
I utgangspunktet vil alle opplysninger være anonymisert, hvor et separat skriv vil inneholde koblingen mellom identifikator for deltakerens personopplysninger og dens svar. Deltakeren vil ikke kunne gjenkjennes i masteroppgaven, kun alder og kjønn vil bli publisert sammen med dens svar. Alle personopplysninger vil bli slettet ved prosjektslutt, som er 16.06.2015.

Frivillig deltakelse
Det er frivillig å delta i studien, og deltakeren kan når som helst trekke sitt samtykke uten å oppgi grunn. Dersom deltakeren trekker seg, vil alle opplysninger og svar om deltakeren bli anonymisert, og personopplysninger slettet.

Dersom du ønsker å delta eller har spørsmål til studien, ta kontakt med Truls Hamborg på trulsbjo@stud.ntnu.no eller telefon 95 99 50 29. Eventuelt kan veileder for prosjektet, Babak A. Farshchian kontaktes på babak.farshchian@sintef.no.

Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS.

Samtykke til deltakelse i studien

Jeg har mottatt informasjon om studien, og samtykker til å delta

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(Signert av prosjektdeltaker, dato)

Appendix C
Workshop abstract

Workshop abstract - ICT, seniors og exercise

Duration: 3 timer, 12:00 - 15:00
Date: 22.04.15
Location: Vold, SINTEF ICT, Trondheim
Workshop leder: Truls Hamborg
Moderators: Truls Hamborg, Nitharshaan Thevarajah, Odd Fredrik Mørch Rogstad
Observers: Ingen
Participants: Three , two men and one woman. Age: 67, 76 og 72. The participants saw themselves as physically active.
Purpose: This workshop is held to explore behaviors regarding ICT and exercise among elderly people. Participants will be asked about their exercise behaviors, their experience with ICT and at the end challenged to design their own exercise application. The workshop consists of two parts, where the first part will be organized as a focus group, while the second part will be organized as a design workshop.

The rest of this abstract will be in Norwegian. The abstract were made with the notes that were taken during the workshop. We also made a more thoroghly review, something between an abstract and a transcription, and can be found at the last chapter of this document.

Introduksjon

Leder: Truls Hamborg
Varighet: 10 minutter (planlagt: 10 minutter)

To av deltakerne kom 11.58, mens den siste var litt forsinket og ankom 12.09. De fikk kaffe, mineralvann og litt attåt før vi starten introduksjonen. Introduksjonen ga et lite innblikk i hvem vi var, masteroppgaven vår og hva deltakerne skulle gjøre de kommende tre timene. Deltakerne skrev under på et infoskriv hvor det ble klargjort hva som kom til å skje med personopplysninger, deres svar, lydopptak med mer etter prosjektet er ferdig. Det ble også informert om hvor toalettet og kaffemaskinen var. Introduksjonen ble ferdig kl. 12.19.

Fokusgruppe

Leder: Odd Fredrik Mørch Rogstad
Varighet: 90 minutter (planlagt: 60 minutter)

Rett etter introduksjonen ble fokusgruppen satt i gang. En kort introduksjon om hva en fokusgruppe er ble gitt, og deltakerne ble forklart hvordan den ville foregå, samt hva som var målet med fokusgruppen.

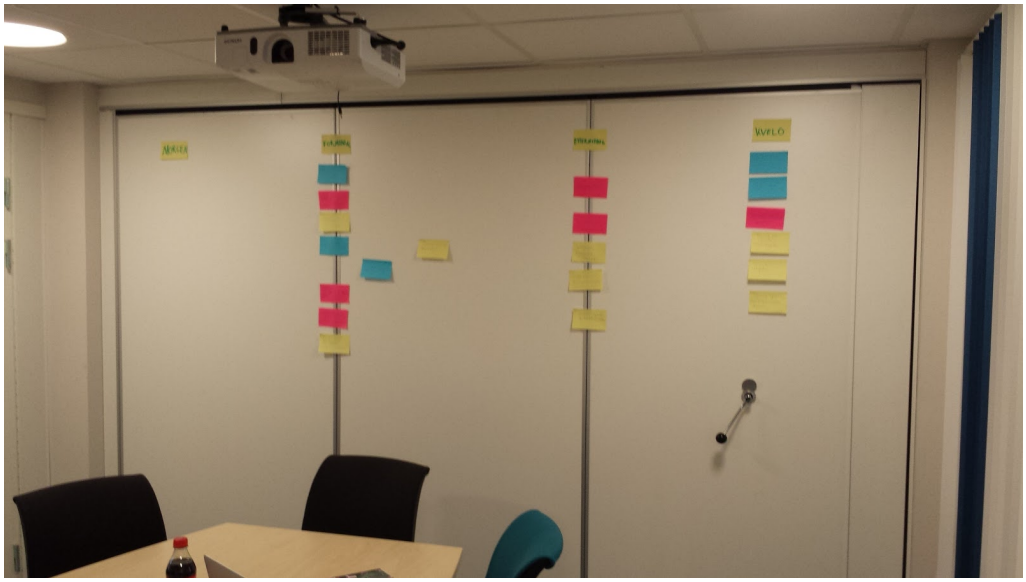
Etter introduksjonen fikk alle deltakerne mulighet til å presentere seg selv. Deltakerne fokuserte på hvor de kom fra, hva de hadde drevet med opp i gjennom livet, og de la vekt på hvordan de trente og holdt på med på fritiden. Etter presentasjonen ble det avholdt diskusjon rundt fire temaer, selve fokusgruppen, som er representert i tabellen under.

Tema	**Undertema**	**Hva**	**Funn**
Din aktive hverdag	Aktiviteter	Deltakerne ble bedt om å lage Post-it lapper som beskrev en aktivitet de bedrev. Deltakerne hadde forskjellige farger på sine Post-it lapper. De fikk beskjed om å skrive ned én aktivitet per Post-it lapp. Deltakerne ble så bedt om å presentere aktivitetene, samt å plassere aktivitetene på en tidslinje som var delt inn i morgen, formiddag, ettermiddag og kveld. Post-it lappen ble vidrer brukt gjennom hele workshoppen, for å diskutere forskjellige temaer.	● Deltakerne viste seg å være meget aktive, og det ble presentert hele 20 aktiviteter. ● Flesteparten av aktivitetene ble gjort på formiddagen. ● Aktiviteter som ble presentert: ○ Kondisjon ■ Løpetur / joggetur ■ Gåtur ■ Skigåing ■ Sykkeltur ■ Orienteringløp ○ Styrke ■ Treningsstudio, apparater ■ Yoga øvelser ■ Balanse ○ Hjemmearbeid ■ Snømåking ■ Hagearbeid ● 7/20 aktiviteter omhandlet en eller annen form for “tur” ● 13/20 aktiviteter var utendørs aktiviteter ○ “liker seg bedre utendørs” ○ “blir glad av å gå tur” ● 12/20 aktiviteter var kondisjon aktiviteter ● 1/20 var hjemmearbeid (snø/hage) ● 7/20 aktiviteter var styrke ● 1/20 aktiviteter var delvis balansetrening ● 1/20 aktiviteter var hjemmearbeid (snømåking/hagearbeid) ● 3/3 deltagere trente på treningsstudio ● ⅓ av deltagere presenterte hjemmearbeid som aktivitet

	Planlegging	Det ble spurt om deltakerne planla aktivitetene	● Alle gå, løpe, ski og sykkelturer var ikke spesielt planlagt, men ble utført etter lyst ● Alle bedrev en form for organisert fysisk aktivitet; orienterings konkurranser og ukentlige, planlagte turer med venner. ● De fleste planlagte aktiviteten var forbundet med at de var planlagte, typisk an en tredjepart.
	Logging	Det ble spurt om deltakerne logget aktivitetene	● Kun ⅓ logget delvis sine aktiviteter. Loggingen ble gjort gjennom bruk av en avansert GPS pulsklokke. Grunnen var ikke annet enn at det var gøy å se på, og ble ikke brukt i en større sammenheng.
	Sosialt	Det ble spurt om deltakerne var sosiale i en trenings sammenheng	● 3/3 deltakere var sosiale i forbindelse med en eller flere aktiviteter
	Verktøy	Det ble spurt om det ble brukt noe form for verktøy/utstyr for å utføre aktiviteten, annet enn det som er nødvendig (f.eks sykkel til sykkeltur)	● ⅔ brukte avanserte GPS pulsklokke.
Motivasjon		Det ble spurt om deltakernes motivasjon for å holde seg fysisk aktiv.	● Få et bedre liv. ● Velvære. ● Miljøpåvirket, altså hvor man kommer fra, og hvem man er samme med ● ⅔ mente det var viktig å kunne se fremgang/utslag ● ⅓ mente det viktigste var å vedlikehold av eksisterende nivå
Utfordringer	Største utfordring	Det ble spurt om deltakernes utfordringer for å holde seg fysisk aktiv.	● Det å holde seg skadefri. ● Is på veien, altså at det er glatt og man letter kan falle.
	Fremtiden	Det ble spurt om	● ⅓ mente treningen ville være

		hvordan deltakerne så på sitt eget aktivitetsopplegg 5-10 år frem i tid	anderledes, med mer fokus på balanse og tøyninger ● En mente det var viktig å tøye grensene for å ikke bli for passiv ● En mente at sko valg ville være viktig
Trening og IKT	IKT og Trening	Det ble spurt om deltakernes forhold til IKT i bruk før, under og etter trening.	● Bruker internett for søk etter informasjon tilknyttet trening. ● Bruker internett for søk etter ulike turmuligheter når man er på ukjente steder. ● Ellers lite tilknyttet trening.
	IKT generelt	Det ble spurt om videre forhold til IKT	● 3/3 har e-post. ● 3/3 har smarttelefon. ● ⅓ er medlem på Facebook. ● ⅔ leser Twitter, men er ikke medlem. ● ⅓ har WIMP abbonement. ● Alle var enige om at det var vanskelig å holde seg oppdatert på IKT fronten ● En mener det ikke finnes noe opplæringstilbud i bruk av teknologi, for de litt viderekommende.

Bildet under viser hvordan deltakerne presenterte aktiviteter på en tidslinje.



Bildet under viser en digital representasjon av Post-it lappene.

Morgen	Formiddag	Ettermiddag	Kveld
	Løpetur i skogen, ca 1 time	Sykkeltur	Treningsstudio, Styrke
	På vinteren. På ski, ca 2-timer, nesten hver dag	Orienteringsløp, 2-3 dager i uka	Kveldstur med samboer 4-5 g. per uke, ca. 1 time
	Snømåking/hagearbeid, ca 3 timer	Joggetur, hjemmefra - moholt	Tur med venner, 1 g. pr. uke, 2 timers
	Treningsstudio, 2 g pr. ike (Lerkendal)	Joggetur i Estanstadsmarka (intervalltrening skjeldent)	Trening på Impuls (treningssenter), Mest styrke
	Trimrom i kjeller 2g pr. uke (intervaller på tredemølle)	Orienteringsløp, bedriftsidrett	Trening hjemme, styrke
	Sommer, 1 tur i Estenstadmarka eller Bymarka pr. uke.		Trening hjemme, enkelte yoga øvelser, balanse
	Skitur i Bymarka		
	Gå til "byen", tur retur, Moholt - Sentrum		
	Trening hjemme, toyninger		

Bildet under viser en oversikt over aktivitetene, sortert på hvordan type aktivitet.

Kondisjon	Styrke	Hjemmearbeid
Løpetur/joggetur	**Studio / aparater**	**Diverse**
Løpetur i skogen, ca 1 time	Treningsstudio, Styrke	Snømåking/hagearbeid, ca 3 timer
Joggetur, hjemmefra - moholt	Treningsstudio, 2 g pr. ike (Lerkendal)	
Joggetur i Estanstadsmarka (intervalltrening skjeldent)	Trimrom i kjeller 2g pr. uke (intervaller på tredemølle)	
Gåtur	Trening på Impuls (treningssenter), Mest styrke	
Sommer, 1 tur i Estenstadmarka eller Bymarka pr. uke.	**Enkle øvelser**	
Kveldstur med samboer 4-5 g. per uke, ca. 1 time	Trening hjemme, styrke	
Tur med venner, 1 g. pr. uke, 2 timers	**Balanse**	
Gå til "byen", tur retur, Moholt - Sentrum	Trening hjemme, enkelte yoga øvelser, balanse	
Skigåing	**Tøyning**	
På vinteren. På ski, ca 2-timer, nesten hver dag	Trening hjemme, toyninger	
Skitur i Bymarka		
Sykkeltur		
Sykkeltur		
Orienteringsløp		
Orienteringsløp, 2-3 dager i uka		
Orienteringsløp, bedriftsidrett		

Det var planlagt å bruke omtrent 15 minutter på hvert tema, altså 60 minutter totalt. Det ble valgt å ikke stoppe diskusjon av temaer, før ingen av deltakerne hadde noe mer å si, dette førte til at hver tema brukt lengre tid enn forventet. Det var spesielt det første temaet som tok lang tid, delvis på grunn av opplegget rundt Post-it lappene. Fokusgruppen ble avsluttet 13.50.

Presentasjon av konsepter

Leder: Nitharshaan Thevarajah
Varighet: 20 minutter (planlagt: 20 minutter)

Etter at deltakerne hadde tatt en liten pause, ble det holdt en presentasjon av diverse konsepter som er vanlig i dagens populære treningsapplikasjoner. Deltakerne ble oppfordret til å stille spørsmål underveis og komme med innspill og kommentarer slik at det ble en dialog mellom foredragsholderen og deltakerne.

Konseptene *planlegging, sporing, logging, tilbakemelding,* og *det sosiale aspektet* ble presentert.

Deltakerne syntes det var interessant å høre om ulike treningsapplikasjoner og noterte ned navnet på noen av applikasjonene. En av deltakerne sa at vedkommende hadde tenkt til å søke opp noen av applikasjonene på nettet og lese mer om dem. De andre mente at det var en utfordring å installere applikasjonen på smartelefonen, og sa at de mest sannsynlig ikke kommer til å bruke applikasjonene. Presentasjonen ble ferdig 14.20

Produktboks

Leder: Truls Hamborg

Varighet: 30 minutter (planlagt: 60 minutter)

Etter presentasjonen av konsepter fra populære treningsapplikasjoner ble det avholdt en kjapp introduksjon til produktboks. På grunn av tidsmangel ble ikke hele produktboksmetoden fullført, men deltakerne diskuterte og delte sine meninger rundt et par konsepter. Deltakerne mente at applikasjoner for balanseøvelser er et forsømt område.

En av deltakerne foreslo at man kunne ha et brett med en rulle under som man kunne balansere på. Via en IKT-anretning kunne man få vite hvor godt man lå an og hvor lenge man hadde holdt på. Det ble også nevnt at en av de største utfordringene med balanse er at man må klare å hente seg inn dersom man begynner å miste balansen. Produktboksen ble ferdig klokken 14.52.

Avslutning/evaluering

Leder: Truls Hamborg
Varighet: 6 minutter (planlagt: 10 minutter)

Deltakerne fikk mulighet til å komme med tilbakemeldinger til oss. Noen av de var:

- Ikke noe ubehagelig
- Produktboks var litt vanskelig å forstå
- Jeg synes det har vært interessant
- Det var givende

Vi fikk veldig mye ut av deltakerne og har lært veldig mye. Deltakerne fikk med seg et gavekort på kinobilletter. Opplegget ble avsluttet 14.58.

Metode

Hva gikk bra?	Hvorfor?	Forbedringer
Få deltakerne til å gå gjennom sin aktive hverdag.	Å lage en tidslinje med Post-it lapper gjorde øvelsen mer interessant og interaktiv. Post-it lappene konkretiserte alle aktivitetene, og det var enkelt å bringe frem senere i workshopen.	Øvelsen burde bli gitt mer tid, da ikke alle aktivitetene kunne bli presentert fullt ut.
Holde praten i gang.	Deltakerne var flinke til å ytre sine meninger og komme med kommentarer til påstander lagt frem av oss.	

Alle deltakerne fikk sagt sin mening	Moderatorene var flinke til å bytte på å spørre forskjellige deltakere. Deltakerne var utadvente personer, og var ikke redde for å ta ordet.	
Deltakerne var opplagte og ivrige	Vi hadde en pause mellom innslag som tok lang tid samt forfriskninger tilgjengelig under hele workshopen.	

Hva gikk dårlig?	Hvorfor?	Forbedringer
Fokusgruppen tok 50% lengre tid en planlagt	Deltakerne hadde mye å fortelle. Moderator stoppet i liten grad fortellingene til deltakerne.	Moderator kunne vært strengere på ordstyringen. Deltakerne kunne fått tidsbegrensninger.
Det var vanskelig å få i gang debatt og refleksjon i fokusgruppen	Deltakerne var enig i mye, og det var lite uenighet.	Flere spørsmål og utsagn som legger opp til diskusjon.
Liten mengde deltagere, samt mye enighet	Vi hadde kun tre deltagere, hvor to var gift. Deltakerne er mye enig, som over, og det ble lite diskusjon.	Rekruttere flere og mer diverserte deltakere.
Fikk lite tid til å gjennomføre produktboks.	Brukte for lang tid på fokusgruppen	Holde tidsskjemaet eller utvide tidsskjemaet.
Fikk ikke notert tidspunkter i alle notater.	Delvis glemt bort.	Viktig med samme format på notater når forskjellige personer noterer.
Få deltakerne til å forstå konseptet produktboks.	Deltakerne ga inntrykk for at øvelsen hørtes for vanskelig ut. “Uff, jeg er ikke kreativ nok for slikt”	Mer tid til introduksjonen av produktboksen.

Rekruttere deltakere	Det er vanskelig å rekruttere deltakere til et stort opplegg.	Prøve å rekruttere personer fra samme omgivelse/krets
Opplegget startet 10 minutter for sent	En av deltakerne kom for sent.	Legge inn 15 minutter buffer på starten.

Forskningsspørsmål		**Besvart?**
RQ-1	What is the situation today when it comes to physical activity/exercise and seniors.	**Besvart** av deltakerne som deltok i workshoppen. Begrensent utvalg gjør at det ikke er mulig å generalisere svarene, men at fokusgruppen gir et godt inntrykk til tre aktive seniorer sin hverdag
RQ-2	What are the key factors that motivate active seniors to exercise?	**Besvart** av deltakerne som deltok i workshopen. Begrenset utvalg gjør at det ikke er mulig å generalisere svarene. Deltakerne ytrer forskjellige motivasjoner, blant annet om velvære og at et generelt bedre liv er det viktigste. Det meldes også om motivasjon som baserer seg på fremgang i fysisk form.
RQ-3	What are the characteristics of ICT tools used by seniors in relation to physical activity reported in the literature?	**Ikke besvart**. Ikke relevant for workshopen.
RQ-4	What kind of ICT tool do active seniors use in conjunction with physical activity? What are the differences between these tools and those reported in the literature?	**Besvart** av deltakerne. 2 av deltakerne brukte GPS-klokke og pulsklokke, mens 1 deltaker ikke bruke IKT verktøy til trening.
RQ-5	What kind of functionalities do the seniors want in an exercise concept?	**Delvis besvart**. Det kom frem at balansering på et brett kunne vært en øvelse som styrket balansen. Hvilken type enhet eller hvilke funksjonaliteter enheten skulle inneholde ble ikke besvart.

Hovedfunn

- Deltakerne mente at det var en utfordring å holde seg skadefri.
- Deltakerne bruker IKT på nybegynner-nivå, men sliter med å utnytte det enhetene er i stand til.
- Deltakerne mente at applikasjoner for balanseøvelser var et bortglemt område.
    - Responderte positivt når de ble spurt om en app som viste hvordan man gjorde balanse øvelser, til og med personen som var erfaren på området. Den erfarne kunne tenkt seg forslag til nye øvelser.
- Motivasjon til å holde seg fysisk aktiv: velvære og et bedre liv.
- Deltakerne hadde ingen treningsplan som de fulgte, men det var heller en rutine de hadde.
    - En av deltakerne hadde en plan som ble fulgt på et treningsstudio, men kunne tenkt seg å bytte øvelser.
- Miljøet og det sosiale aspektet er viktige deler av den aktive hverdagen.
- Noen av deltakerne loggfører delvis aktivitetene sine, men bruker det ikke bevisst til noe mer enn å kun loggføre.
- Noen av deltakerne mener at loggføring tar tid og gjør derfor ikke dette.

Notater

Følgende notater er en gjengivelse av selve workshopen. Notatene er laget ved hjelp av notater tatt under selve workshopen, samt nøyere gjennomgang av lydopptak i etterkant. Tidspunktene angir hvor man er i lydklippet. Mesteparten av notatene er ikke direkte sitater, men ment som en gjengivelse. Direkte sitater er tydelig markert med anførselstegn. Tekst i ***tykk skrift*** *er enten tidsangivelse, beskrivelse, eller direkte spørsmål fra moderatorer.*

11:00 - 18:00 - Introduksjon av Truls
18:00 - 20:00 - Introduksjon til fokusgruppe
20:00 - 23:30 - Introduksjon av deltakerne
Person 3 - Vokst opp i Trondheim, bodd 44 år i Bergen. Flyttet tilbake til Trondheim i 2013. Bosted: Moholt Aktiv. Det er 3 lavblokker på 4. etasjer hvor det var lagt opp til en sporty livsstil. Treningsrom, skismørebod og god plass til sykler. 67 år og pensjonist.
Person 2 - Født i Trondheim, flyttet tilbake til Trondheim etter en del år. 72 år. Siv.ing. kjemi fra NTH (45 år siden). Løper orientering siden ganske ung. Trener en del med det, utenlandstur også videre.
Person 1 - Ektefelle til 2. Orientering. Født i Bergen, bodd 16 år i Oslo, bodd 35 år i Trondheim. Vært borti litt forskjellig. BI, lærer, maskinist, osv..
24:00 - 25:00 - Tema 1 - Din aktive hverdag. Intro.
25:00 - 30:00 - Skriving av post-it lapper
30:00 - Gjennomgang av lapper
Person 3 - Dagene er veldig forskjellige. Mest aktiv mellom 10 og 13. Før 10 er det pensjonist tilværelse. Avisen tar lengre tid nå enn før.
32:00
Person 3 - Treningsstudio 2 ganger i uken. "*Det primære er å herde eller styrke muskulaturen*". Treningsprogram som dekker hele kroppen, som jeg har holdt på med i ett år. "*Nå er det på tide å få ett til, eller ett nytt e*t". Tar omtrent en time. Som regel tar det en time. Mellom klokken 11 og 13.
33:30
Person 2 - Formiddagen, etter frokost og avis. Løper en tur i marka. Det er lystbetont. Ikke målrettet. Må stå opp får å kjenne hva jeg orker. Hadde treningsdagbok før, men ikke nå.
Person 3 - Logger heller ikke. Men styrketrening er målbar ved at det gir seg utslag på apparatet. Husker, "*har det på harddisken*", hvor man er.
Person 2 - Sliter med å huske hvilken vekt man er på.
Person 3 - Siden han bare har ett program så er det ikke noe problem, men hvis han hadde hatt flere måtte han nok hatt en form for logging.
Person 2 - GPS klokke. Laster inn i Garmin Connect. "*Det som er fint med den klokka er å se hvor langt og hvor lenge har jeg holdt på*". Gjør dette nesten alltid. Ikke alltid jeg hukser å ta på klokken. Gjør dette evt. rett etter trening. "Det er lissom litt morsomt da".
37:15

Person 1 - Vinteren. Ski hvis det er snø, omtrent 5 ganger i uken. I år har det ikke vært sånn, fordi det har vært dårlig vær. Løper eller går tur i steden, "*Hyggelig å gå tur i skog og mark*". Men er også innom treningsstudio, men liker heller å komme seg ut. Melder seg på til Birken, men ikke i år.
Skitur, går i 1-2 timer, rolig, sammen med person 2. 120-130 i puls. Ikke intervall på ski. Planlegger ikke, tar det som det kommer. Planlegger om morgenen, "*vær og føre som bestemmer*".

40:00

Person 1 - Hjemme, prøver å gjøre balanse og styrkeøvelser. Legger først og fremst, litt push ups, og yoga, har gått på yogakurs. Bruker relativt mye tid på balansetrening, nesten hver dag. Før han legger seg, på badet, med lukkede øyne. Ser at balansen blir dårligere når man blir eldre. Ser det på Birken, hvor man detter. Folk glemmer balanse. Har hatt vippebrett. Mye balanse som man trenger ved langrenn. Bruker pulsklokke ved skigåing, ser mye på puls, ikke så mye distanse.

42:30

Person 2 - "*Jeg bruker ikke puls, får det ikke til å funke, plutselig viser det 200, og jeg har maks 170*"

43:30 - Avslutter å gå gjennom lapper ved å klistre opp alt på veggen, samtidig som deltakere forteller om hver lapp.

Person 3 - Trimrom i kjeller, 2 ganger i uken, intervall. Formiddagen, det er da jeg er sprekest. 2 timers tur med venner, kveld, gange, overalt, hele Trondheim kommune. Planlegges hver tirsdag klokken 19 med venner. Veldig sosialt. Formen er veldig forskjellig blant vennene. 2 kveldsturer i uke med samboer. 1 gang i uken med tur i marka, formiddag.
Person 2 - Skitur. Sykler en tur, når jeg ikke har fått gjort noe annet. Går på treningsstudio sent på kvelden. Hagearbeid noen timer i blant, blant annet 5 timer i går. Snømåking, føles rolig, men man blir sliten, formiddagen. Orienteringsløp, 2 til 3 ganger i uken i sommerhalvåret. Arrangerte løp. Konkurranse aspekt, men ser på det som trening.

48:00

Person 1 - Treningsstudio, kveld. Trening styrke og balanse hjemme, mest om kvelden. Går til byen, føler at jeg har gjort noe fornuftig. Joggetur hjemme fra, par ganger i uken, formiddag. Joggetur i Estenstadmarka eller bymarka. Intervall trening, sjeldent. Orienteringsløp, samme som person 2. Bedriftsorientering hver tirsdag. 34 bedriftsløp i året, er med på 12-13-15 i året. Er mye bortreist.

51:45

Hvordan finner man ut av orientringsløp?

Person 2 - på nettet. Har en liste på nettet. Info på arrangørens nettsted.

53:40 - Tema 2 - Motivasjon, hvorfor trener dere?

Person 3 - "*Det er jo for å få et bedre liv da, rett og slett*". "*Trene for å unngå å falle, er et moment. Velvære*".
Person 2 - "*Samme, er vant til å drive med en eller annen bevegelse, og hvis jeg ikke gjør det får jeg dårlig samvittighet, for jeg trenger det og jeg vet det er bra." "Får bedre overskudd". "Føler seg mer vell hvis man har vært fysisk aktiv".*

55:40

Person 1 - Hvor aktiv man blir kommer ann på hvilket miljø man komme i , hvilken ektefelle man havner med. Person 1 og 2 kom inn i gruppe når man 15-16 år gammel, og har løpt siden… Vi er ganske aktive, men har ikke alltid oppfattet seg som aktiv alltid.
Person 2 - Venner driver også med orientering.
Person 1 - Hvordan foreldre er, virker inn på en. Faren var turner.
Oppdaterer seg via litteraturen hvordan man kan holde seg aktiv.
Person 3 - Foreldre har mye å si.
59:15
Person 2 - "*Det er ikke noe offer å drive med det, men mer en nødvendighet, for det har blitt en livsstil, offeret blir når man ikke kan*". "*Hvis man ikke har anledning, så er det uff, så forferdelig*". "*Det var en bortkastet dag, fikk ikke rørt meg i dag*". "*En dag uten trening er en dag uten mening*".
Person 3 - Har ikke vært aktiv hele livet, men føler at når man passerer 60 så er det viktig å gjøre noe. Kan forfalle ganske raskt. Føler det er en investering.
Er det gøy å holde deg fysisk aktiv?
Person 3 - "*Ja, ellers hadde jeg ikke gjort det såpass mye som jeg gjør*". Har en veldig aktiv samboer, som hjelper på.
1:02:00
Person 1 - "*Det vi setter pris på er å komme ut i skog og mark*". Kan ikke fordra storbyferie. "*Man konkurrerer like mye med seg selv*".
1:04:22
Person 3 - "*Ser på klokka ved visse punkter, så har en trang til å måle fremgang*". Det er motiverende når det gir seg utslag på vektene. Tilfredsstillende når det går lettere.
Person 2 - Det viktigste er å vedlikeholde.
Person 1 - "*Fighting spirit*", tror dette er viktig for å ikke falle så langt ned.
Person 3 - Mer snakk om vedlikehold
1:07:15
Person 2 - Mye statistikk fra klokken, men bruker ikke statistikken. Skal prøve å bruke det igjen.
Person 1 - Det tar for mye tid på å logge.
Person 2 - Blir litt rart å bruke like lang tid på loggføre og holde statistikk som selve treningsøkten.
1:08:30 - Tema 3 - Utfordringer. Hva er dere utfordringer knyttet til trening.
1:09:10
Person 3 - "*Holde seg skadefri*". På treningsstudio kan man ta for hardt i, og da kjenner man det. Viktig å være god og varm når man begynner på harde øvelser. Ikke hatt personlig trener eller opplæring, men har fått et program, og blitt vist hvordan øvelsene utføres, men det er bare en éngangs sak. Har hatt det samme treningsprogrammet over lengre tid, som blir brukt to ganger i uken, men tror jeg kanskje skulle hatt forskjellig program de to gangene. Har begynt å bli litt lei av det. Kunne tenkt seg å kanskje brukt andre apparater, som bidrar til det samme. Er opptatt av å holde seg skadefri, og har forståelse for at man skal være varm før man begynner, men har ikke fått noe veiledning av treningsstudio på hvordan holde seg skadefri, bare hvordan øvelsen skal gjøres.

1:12:56

Har du den informasjonen du trenger for å utføre den treningen du ønsker å gjøre?

Person 1 - Har drevet med meditering og yoga. Har en del bøker. Føler det er ganske mange som kunne hatt nytte av det.

Hvis man er senior og ønsker å begynne med balanse øvelser i dag, hvordan går man frem da?

Person 2 - "*Man kan jo gå på nettet*"

Person 1 - Det finnes balansebrett/vippebrett.

Person 3 - Har en balansepute, som samboer bruker. "*Det var en vekker dette her*"

Person 1 - Tror mange kjøper balansepute, men man vet ikke hvordan det skal brukes, og det er vanskelig å få noe målbart ut av det. Man bare står der, også detter man ned, og det er ikke så målbart. Man burde ha en eller annen klokke foran seg, så man kan se om man klarer å stå lengre. Man kunne fått feedback.

Person 3 - Skal prøve å bruke den puten.

1:17:00

Jo eldre man blir jo større risiko har man for fall. Er det noe dere tenker på, eller tenker på når dere planlegger de fysiske aktivitetene deres?

Person 3 - "*Nei*"

Person 1 - Mener at man burde falle litt mer. Når man var yngre gikk man på tryne hele tiden under orienteringsløp, så blir man litt mer forsiktig når man kommer i femtiårene, men man burde falle litt mer. Faller man for lite, så blir man for pysete. Samboer har hatt litt stygge fall på ski, og har blitt litt forsiktigere. Man burde tøye grensene litt mer, og man må ikke bli for passiv.

1:18:20

Hvordan ser treningen ut om ti år eller mer, ser treningen ut anderledes ut da tror dere?

Person 3 - "*Jeg håper ikke det*"

Person 1 - Jeg vil si mer balanse og mer tøyninger, og kanskje mindre kondisjon, mer gåing. Før i tiden kunne man gå opp i bro osv., men man stivner til.

Person 2 - "*Man blir stivere og stivere*"

1:21:30

Kommer inn på skader, og spør om dette er en utfordring.

Person 1 - Viktig å skifte sko

Person 3 - Kjøpte dempende sko på "löplabbet".

Person 2 - Interessant med demping. Fokuserer ikke på å holde seg skadefri, men "*når det kommer så kommer det som julekvelden*". Det kan jo være uhell i forbindelse med fall, som man ikke tenker på. Er forsiktig med sko og underlag, helst ikke løp på asfalt. To venner som hadde brukket håndleddet de siste ukene.

Person 1 - Kommer inn på at man burde utfordre seg litt mer.

1:27:00 - Tema 4 - Teknologi og IKT.

Vi tror at teknologi kan spille en stor rolle å få folk fysisk aktive og holde de i fysisk aktivitet. Hva brukere dere av teknologi i en trenings kontekst.

Person 3 - "*Bruker ingen ting*"

Person 2 - Bruker GPS klokker. Mest for gøy.

Person 1 - "*Ja, det er mest for gøy, men det kan være litt lærerikt*". Utfordringen er å holde seg datateknisk oppdatert. Har "Polar personal trainer" på datamaskinen, som sønn har lagt inn på PCen. Men datamaskinen får ikke programmet til å fungere, så fjernet det. Her har vi problemer når man kommer opp på vår alder, vi kan bruke datamaskinen, men straks det skjer noe, så stopper det opp. Feilsøking og få ting som ikke fungerer til å fungere er et problem. Men liker ikke å bruke tid på å analysere data i etterkant av trening.

1:30:40

Er det bortkastet tid å legge inn data?

Person 1 - "*Nei, det er ikke det, det er interessant å bruke litt tid på det, men da vil jeg brukt mindre tid på andre ting som jeg har lyst til*".

Person 2 - Samboer, Person 1, er interessert i å lære nye ting, men ikke så interessert i å lære å bruke data.

Leter dere etter treningsrelaterte ting på nettet?

Person 3 - "*Nei, har ikke gjort det*".

Person 1 - "*Jeg gjør det ganske mye, er interessert i hvordan topp treningsutøvere trener, og hvordan jeg kan finne impulser til å finne bedre øvelser, som jeg bruker relativt mye tid på*".

Hvordan går du frem da?

Person 1 - Det finnes jo på Hegnar Sprek, og DN (Dagens Næringsliv), også inne på Healt Information (red.adm.: en nettside) for å finne forskning om trening. Bruker internettet til å holde seg oppdatert på idrett og forskning.

1:33:30

Prøver dere å finne stier og turmuligheter gjennom nettet?

Person 3 - Venner er såpass godt kjent i Trondheim, så det er ikke noe problem.

Person 2 - Det har vi gjort vist vi har vært ute å reist, nå nettopp i Spania. Og fant diverse turmuligheter rundt Grenada, der vi var, og det var veldig fint.

Person 1 - Lå ute 20-30 turforslag. Det samme med Bergen. Men har ikke sette noe i Trondheim.

Person 2 - Men det er fordi vi ikke ser etter det, fordi vi tror vi vet om det meste.

Person 1 - Nevner at det går ann å gå på biblioteket for å finne turmuligheter.

Har dere smarttelefoner?

Person 2 - Ja, men bruker den ikke så mye

Person 1 - Vi er ikke flinke nok til å laste ned apper og slike ting.

Person 3 - Har noen nyhetsapper

Person 2 - Har bankapp, men vet ikke hvordan den brukes.

Person 1 - "*Vi er oppmerksomme på at hvis vi ikke følger med på det området, så blir vi akterutseilt, og kanskje isolert om noen år*"

Person 2 - Men vi bruker nettbank

Gjør dere noe aktivt for å holde dere oppdatert på ny teknologi?

Person 3 - Nei, men får hjelp av barna. Men sitter ikke for seg selv å prøver og feiler.

Person 2 - Enig, det tar for mye tid det.

1:38:15

Person 1 - Var innom biblioteket for å finne bok om hvordan man bruker datamaskinen. Har noe litteratur hjemme, men begynner å bli utdatert. Har et problem med å skifte

operativsystemer, man blir vant med noe, men så kommer det ett nytt system, også må man begynne på nytt, og det er ikke vi mentalt instilt på. Et eksempel er på nettadresser, før kunne jeg lagre nettadresser, og jeg viste hvor man fant de igjen, men nå vet jeg ikke hvordan man gjør det enkelt.
Person 2 - "*Google hadde ny logo i morges*"
Person 3 - "*Googler en del innen sport og idrett, og historie*". Spesiell forkjærlighet for de olympiske leker. Interesse for musikk, og abonnerer på WIMP. Bruker YouTube en del.
1:41:20
Noe spesielt dere bruker internett til?
Person 2 - Bruker det mye til å søke, men liker å bruke leksikon også. Kommer ikke alltid opp det man faktisk leter etter, man må velge mellom mange forskjellige kilder. Bruker nettbrett til å sjekke mail og nyheter, spesielt når man er ute og reiser. Men liker best å lese avisen i papirform.
1:44:20
Bruker dere sosiale medier?
Person 3 - Facebook, mest mottager. Har omtrent 100 venner og familie. Ikke alt som er like interessant. Mest titting.
Person 1 - Bruker ikke Facebook. Har vært inne på Twitter, men bruker det ikke så mye. "Det er ikke min gate, hvis jeg skulle brukt tid der, så måtte jeg brukt mindre på noe annet, det er en prioritering".
Person 2 - Leser på Twitter for å lese hva sønnen vår driver med. Men jeg er ikke på Twitter. Vil ikke blande meg inn i det der.
Person 1 - Har bruker på LinkedIn. Men brukere det ikke. Kan ikke bruke tid på det der.
Person 2 - Føler det er for de mer aktive, og de som er i jobb, og de som jobber med samme ting.
1:48:30 - Avslutter Fokusgruppe. Spør om kommentarer.
Person 1 - Føler man ikke har bruk for all funksjonaliteten som finnes på en smarttelefon, selv om sønnen prøver å lære meg opp. Bruker den til nyheter, ringe og mail. Har et ønske om opplæring.
1:51:30 - Pause
2:04:30 - Presentasjon av populære treningsapplikasjoner, samt kommentarer rundt dette.
2:05:30 - Planlegging
2:11:00
Person 1 - Interessant å få anbefalinger på turruter.
2:11:30 - Sporing
2:16:30
Person 3 - En venn bruker mobilen mye og det er interessant å høre hvor langt man har gått osv..
2:17:30 - Logging
Personene noterer ned hva applikasjonene heter. De mener det er morsomt å se hvor man faktisk har gått på er kart.
Tilbakemelding

2:24:40 - Sosiale aspeketer
Andre applikasjoner
2:29:30
Person 1 - Interessert i trenings armbånd, og lurer på om vi har greie på det. Kjenner noen som sliter med å få det til å fungere, men ønsker å kjøpe noe når det kommer noe som fungerer.
2:31:30
Spør om noen av de presenterte applikasjonene kunne vært interessant å faktisk tatt i bruk.
Person 2 - Kunne vært morsomt å prøve.
Person 3 - "En tallfrik som meg, så kunne det vært noe".
2:32:10
Hadde det gjort hverdagen letter å bruke noe av disse?
Person 2 - Det jeg loggfører i etterkant tar 5 minutter.
Person 1 - Når kvaliteten blir god nok skal jeg kjøpe trenings armbånd. Sønnen har brukt trenings armbånd, men har hatt problem med det.
Person 3 - Når det kommer til å trene på treningsstudio, så har jeg alt i hodet om hva jeg skal gjøre. Trenger å komme over en terskel for å komme inn i det, så hadde det sikker vært "jævlig gøy". Må over en barriere.
2:35:00 - Tiden begynner å renne ut, diskuterer hva vi skal gjøre.
2:36:40 - Forklarer hva vi hadde tenkt til å gjøre. Product box.
2:38:40 - Prøver å starte en diskusjon rundt et use case. *Man ønsker å trene balanse, for å holde seg skadefri, men man vet ikke hvilke øvelser eller hvordan man utfører øvelsene. Skal innebære bruk av teknologi, uten andre begrensninger*. Forklarer at vi ønsker å høre om funksjoner og begrensninger et slik produkt skal ha.
2:40:10
Person 2 - Lurer på om det kanskje skal motivere?
Person 3 - Ser at det kan være viktig med balanse og styrketrening, og vil ta det med seg videre fra i dag.
Person 1 - Balanse er kanskje den vanskeligste treningsformen, den er ikke så lett målbar. Kan ikke se for seg at man kan profitere på balanse applikasjoner. Kommer inn på treplanke og balansepute. Måle avvik på f.eks en balanseplanke. Forklarer videre om hvordan man kan gjøre øvelser på en balanseplanke. Kommer videre inn på at det er viktig med reduksjon av forfall, men også at psyken er viktig å huske på når man blir eldre. Protesterer mot brodder.
Workshopen avsluttes.

Appendix D

Concent Form for Interview

Forespørsel om deltakelse i forskningsprosjekt

om trening, IKT og eldre

Bakgrunn og formål

Formålet med studiet er å utvikle et konsept gjennom en brukersentrert utviklingsprosess. En brukersentrert utviklingsprosess vil si at man tar med brukernes meninger og synspunkter i en tidlig fase i utviklingen av et produkt. Konseptet er en del av en masteroppgave om fallrisiko og forebygging av fall. Masteroppgaven skrives for NTNU i samarbeid med SINTEF.

Hva innebærer deltakelse i studien

Studien vil bestå av intervjuer med eksperter innenfor temaene eldre, IKT og trening.
Basert på funn og resultater fra litteratursøk og workshop med potensielle brukere har det blitt laget noen konsepter som skal vurderes av deltakeren.
Studien vil hovedsaklig bli drevet av erfaringer og synspunkter fra deltakerne. Data bil bli registrert som notater og lydopptak.

Hva skjer med informasjonen om deg?

Alle personopplysninger vil bli behandlet konfidensielt. Det vil bli innhentet navn, e-post og telefonnummer til deltakerne. De som har tilgang til personopplysningene er prosjektgruppen, bestående av studenter og veileder fra instituttet.
Deltakeren vil kunne gjenkjennes i masteroppgaven, navn og stilling, samt område eksperten har ekspertise i vil bli publisert sammen med dens svar.

Frivillig deltakelse

Det er frivillig å delta i studien, og deltakeren kan når som helst trekke sitt samtykke uten å oppgi grunn. Dersom deltakeren trekker seg, vil alle opplysninger om og svar fra deltakeren bli anonymisert, og personopplysninger slettet.

Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS.

Samtykke til deltakelse i studien

Jeg har mottatt informasjon om studien, og samtykker til å delta

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(Signatur, dato)

Appendix E

Notes from interview with Ebba Bredland

Notater fra intervju med Ebba Bredland

Følgende notater er en gjengivelse av selve intervjuet med Ebba Bredland. Notatene er laget ved hjelp notater tatt under selve intervjuet, samt nøyere gjennomgang av lydopptak i etterkant. Tidspunkene angir hvor man er i lydklippet. Det meste av notatene er ikke direkte sitater, men ment som en gjengivelse. Direkte sitater er tydelig markert med anførselstegn. Tekst i ***fet skrift*** *er enten tidsangivelse, beskrivelse, eller direkte spørsmål fra moderatorer.*

13:00 - 17:45 - Ebba presenterer seg selv og hennes synspunkter rundt fall. Odd presenterer oppgaven og hva vi holder på med. Snakker løst rundt fall og Ebba sine erfaringer rundt fall.
17:45
Ebba - Mener at man må ufarliggjøre fall. "Du må holde deg på beina, eller er det ikke så farlig?"
19:00 - 19:40 - Nitharshaan presenterer hva vi holder på med og hvor langt vi har kommet med oppgaven og hva vi skal gjøre videre i dag.
19:40 - 20:50 - Truls har en introduksjon av konseptene.
20:50 - 24:00 - Presentasjon av konsept 1: Balansebånd
Går ut på at man har armbånd rundt armer og ben som kommuniserer med en applikasjon. Viser balanseøvelser som brukeren skal gjennomføre. Video av øvelsen først slik at brukeren vet hva den skal gjøre. Starter øvelsen, får opp tid hvor lenge det er før neste øvelse og visuelt hvor bra man gjør det. Når man er ferdig får man opp tilbakemelding på hvor bra man gjorde øvelsen.
Ser du noen fordeler ved konseptet?
24:00
Ebba - Konseptet er ikke forferdelig. Jeg mener at de eldre over 75 vil trolig trenge hjelp til å bruke en smarttelefon og applikasjonen. Det kan være en dobbel gevinst at de eldre må bruke en smarttelefon, slik at de også blir introdusert til smarttelefonenes verden.
28:22
Ebba - "⅔ av 80-åringer har ingen hjemmetjenester", mener at det er viktig å få med seg denne gruppen også.
Ser du noen ulemper ved konseptet?
30:20
Ebba - De eldre må nok ha ting stort og klart. Store knapper. Uheldig valg av farger med tanke på rød-grønn fargeblinde. De vil ha problemer med å skille knappene fra hverandre. Konseptet bør ta høyde for dette.
32:08
Ebba - Jeg tror slike balanseøvelser er viktigere enn styrketrening.
Kan konseptet motivere og engasjere eldre til fysisk aktivitet?
Ebba - Ja, jeg tror det kan motivere og engasjere.
Andre funksjoner som savnes i konseptet?

33:00

Ebba - “Blir litt alene når du holder på”. Damer er ikke så glad i å være alene. Mener at konseptet er best egnet til de som liker å trene alene.

Hvor mye man beveger på armer eller ben, er det et mål på hvor “bra” man utfører øvelsen?

35:00

Ebba - Man ikke vil stå helt stille når man skal balansere, men man vil bevege litt på seg for å utfordre seg. For å trene funksjonell balanse vil man bevege på seg. Mener at man blir utfordret når man beveger på seg og det skjer andre ting utenifra.

36:00 - 36:55 - Presentasjon av konsept 2: Balansebrett

Bruker et balansebrett som er koblet til en tablet. Fungerer mer som et spill.

Ser du noen fordeler eller ulemper ved konseptet?

37:00

Ebba - Synes dette er et artig konsept i utgangspunktet. Mener at dette konseptet utfordrer balansen ved å legge inn uforutsigbarhet. Kunne brukt bevegelser fram og tilbake til å f. eks bremse eller akselerere. Menn vil kanskje foretrekke dette framfor damer.

38:24

Ebba - “Her knytter dere litt generasjonene sammen!”

Kan konseptet motivere og engasjere eldre til fysisk aktivitet?

39:50

Ebba - “Ja!” Konseptet får eldre til å tenke på noe annet enn trening.

Kan de bruke konseptet over en lenger periode?

40:40

Ebba - “Ja”, men mener at det hadde vært greit hvis man fikk byttet ut spillene slik at det er flere alternativer. Eller andre baner eller gater å kjøre i.

Andre funksjoner som hadde styrket konseptet?

41:15

Ebba - Mener at man bør utnytte alle funksjonene et balansebrett har. Bevege fram, tilbake, fra side til side og rundt. Mener at det er bra konseptet fokuserer mer på balansetrening enn styrketrening.

42:50

Ebba - Hva slags type spill det er, er jo litt av kunsten. Foreslår et spill hvor man f.eks går “Inca Trail”. Det kunne vært artig. Rett opp på den ene siden, og rett ned på den andre siden.

45:05 - 48:20 - Presentasjon av konsept 3: Otago digitalisert.

Konsept basert på Otago, som er et balanse- og styrketreningsprogram. Programmet har veldig god effekt. I utgangspunktet bør man ha en instruktør, men vi tenker å la mobilen være instruktøren. Ved hjelp av video og tekstlig beskrivelse kan brukeren finne ut av hvordan man skal gjøre øvelsene.

48:25

Ebba - “Synes ikke dere det høres kjedelig ut?” Dette konseptet passer for de som liker rutine eller skal utføre øvelsene i en begrenset periode f. eks. 4 uker.

50:00

Ebba - For noen vil dette fungere, men da trenger de en heiagjeng, for eksempel en personlig trener eller fysioterapaut. Det vil kanskje også være for mange øvelser på en gang. Mener at den eldre generasjonen ikke er vant til et "program", men at de heller er ganske fysisk aktive i hverdagen.

Så du tror at den instruktøren som er en del av dette programmet er en viktig del?

Ebba - Ja

51:50

Merker du om det er noen som kommer til deg og har lyst til å trene spesifikt styrke eller balanse?

Ebba - Nei, men hvis eldre begynner å bekymre seg for å dø ,så sier vi at det er ganske mye du kan gjøre selv. Da må vi finne ut av hva som er viktig for den personen å gjøre selv. For noen kan man spørre rett ut, men for de aller fleste anbefaler jeg å gå på tur. Komme seg utenfor ytterdøra si. Her kan man også møte andre mennesker. Er det glatt, gå i trappa i borrettslaget.

Ebba - Når jeg starta min karriere traff jeg Einar Gerhardsen. Han kom med pekefingeren og sa: "Hør her, den viktigste oppgaven din, det er når du jobber med gammalt folk er få til gode rutiner i hverdagen". Han laget et program i løpet av dagen som var fysisk aktivt.

54:15

Kanskje noen ønsker et mer fastsatt tilbud?

Ebba - Ja, det er viktig å ha et slikt tilbud, men jeg ville ha valgt med omhu hvem jeg tilbøy det. Må kartlegge hvem som kan tenke seg det. Er nok ikke så mange som jeg har vært borti som kunne tenke seg det. Kan fungere for flere over en kortere tidsperiode.

56:00 - 58:00 - Presentasjon av konsept 4: Treningsprogramgenerator

Handler om å lage en individualisert treningsplan. Man får generert en individuell plan ut ifra egne forutsetninger.

59:00

Ebba - "Når man er 85+, livet er ikke evig da altså. Må prioritere artige ting."

Mener at flere forskningsprogrammer har en del drop-outs. Det viser seg at de eldre ikke foretrekker slike program. De vil heller danse på eldresenteret. Mener at tiden er kostbar og at eldre vil prioritere tiden sin.

Ebba - Synes det er bra at brukerne kan variere treningen sin ved å endre på innstillingene.

Ser du noen andre fordeler eller ulemper?

1:01:30

Ebba - Det som jeg er opptatt av er å flette inn gode fysiske aktiviteter i hverdagen. Da liker jeg bedre å ha aktiviteter. Gåing er bra. Da vil jo jeg at folk skal gå litt fortere og saktere, utfordre seg selv litt. Ujenvt underlag for eksempel.

Ebba - Mener at dette konseptet er litt gammeldags og ikke veldig nytenkende.

Foretrekker at det ikke er så faste programmer, men heller at det varierer. Man må bygge på det eldre faktisk gjør av fysisk aktivitet i dag, og så pushe de litt i de områdene vi ser det mangler aktivitet. Vil gjerne ha feedback på ulike hverdagslige aktiviteter, som for eksempel snømåking og vedhogging, med mulighet for oppsummering over ukas aktiviterer mot slutten av uka.

Ebba - “Sitte for mye er farligere enn å trene for lite. Det viser forskningen.”

Hvordan kan man få de som ikke er aktive til å trene?

1:08:04

Ebba - For å få de som ikke er fysisk aktive til å trene, må man først få dem til å gå. Endre deres holdning til trening. Gjerne også unngå bruk av ordet trening. Mener det kan motivere eldre å vise dem hvor aktive de faktisk er i hverdagen. Altså å vise de ulike aktivitetene de utfører, for eksempel trappegåing og snømåking. Mange er også glade i å være ute i marka, men savner benker i marka. Vært i “breshen” for å få ut benker i marka. Flere eldre går også fra busskur til busskur. Det er passe avstand. Det må vi registrere. Gjerne med pulsmåling.

1:16:30

Kan konseptet motivere og engasjere eldre til fysisk aktivitet?

Ebba - Mener at konseptet kan motivere og engasjere noen, men ikke alle.

Vil eldre kunne bruke dette konseptet over lenger tid?

Ebba - Det tror jeg. Min greie når man jobber med eldre er at man trenger mye forskjellig.

1:17:00

Ebba - Gjerne unngå ordet trening. Vil kalle applikasjonen noe annet, for eksempel aktivitetskalender.

Noen andre funksjoner du ser for seg kunne vært aktuelt i en slik applikasjon?

1:18:45

Ebba -Dungad! Da får man med mannfolket. Mange er ganske samfunnsengasjerte og ønsker å yte noe for samfunnet. Bruke seg selv for å gjøre noe for andre.

1:22:15 - 1:22:50 - Oppsummering av konseptene

Hvilket konsept ville du foretrukket som du mener eldre vil bruke?

Ebba - Mener to av konseptene peker seg ut. Balansebrettet og treningsplangeneratoren. Balansebrettet var spennende og har et stort potensial. Tror balansen og kontrollen er viktige ting å jobbe med. Treningsplangeneratoren, gjerne kalt for aktivitetskalender, hørtes også spennende ut, men måtte videreutvikles slik at den ble tilpasset hverdagslige aktiviteter. Dette er noe hun savner i dag.

Ebba - Må jeg velge en av de fire konseptene, tror jeg at jeg velger aktivitetskalenderen.

1:25:50

Ebba - En ting til jeg bare må si før vi avslutter. Jeg jobber for å få eldre til å se hvor artig dette kan være. Skal ikke være en plikt, skal være gøy. Skal være et helseperspektiv og ikke det "dette må dere gjøre ellers dør dere".

1:27:50

Ebba - "Depresjon er noe som mange eldre sliter med." Viktig å få dem ut av det!

Appendix F
Notes from interview with Jorunn Helbostad

Notater fra intervju med Jorunn Helbostad

Følgende notater er en gjengivelse av selve intervjuet med Jorunn Helbostad. Notatene er laget ved hjelp notater tatt under selve intervjuet, samt nøyere gjennomgang av lydopptak i etterkant. Tidspunkene angir hvor man er i lydklippet. Det meste av notatene er ikke direkte sitater, men ment som en gjengivelse. Direkte sitater er tydelig markert med anførselstegn. Tekst i ***fet skrift*** *er enten tidsangivelse, beskrivelse, eller direkte spørsmål fra moderatorer.*

1:00 - 1:50 - Introduksjon og presentasjon av konseptene av Truls.
1:50 - 3:35 - Presentasjon av konsept 1: Balansebånd
Går ut på at man har armbånd rundt armer og ben som kommuniserer med en applikasjon. Viser balanseøvelser som brukeren skal gjennomføre. Video av øvelsen først slik at brukeren vet hva den skal gjøre. Starter øvelsen, får opp tid hvor lenge det er før neste øvelse og visuelt hvor bra man gjør det. Når man er ferdig får man opp tilbakemelding på hvor bra man gjorde øvelsen.
4:00
Jorunn - "Ganske kritisk punkt hva du måler for i forhold til hva du ønsker å oppnå". Mener det er viktig å ta stilling til hva båndene måler, og hvor båndene er festet. Ideen er veldig bra, med det er en del å tenke på, med tanke på hva man har tenkt til å påvirke. Mener det å ha båndet på den frie foten ikke sier så mye om balansen.
4:55
Jorunn - "Balanseøvelsene er ganske krevende å vite hva du skal måle". mener at balanse går mer på hvordan man kontrollerer kroppen.
Si man hadde de riktige målene hvor man gi tilbakemelding på hvor bra man gjør det og hvor god balansen. Legger man det til grunn, har du noen kommentarer på konseptet?
Jorunn - Det å flytte fokuse fra helsevesenet til personen selv er viktig og riktig og veldig tidsriktig. I tråd med det som regjering og myndigheter jobber med nå - strategi "Aktiv eldre". Og det å styrke folk til å ta ansvar for seg selv og sin egen helse. Det synes jeg er bra.
6:22
Jorunn: Det å bruke smarttelefon er en utfordring per i dag, men det skjer jo veldig mye i løpet av kort tid. Tror det er en god idé.
Tror du konseptet kan få både de som gjør balanse øvelser og de som ikke gjør det til å utføre balanseøvelser riktig?
7:20
Jorunn - "Det å opprettholde den aktiviteten over tid er en utfordring". Mener det å endre en atferd er en utfordring.
8:50
Jorunn - Mener at bare det å gi tilbakemelding og vise statistikk på øvelsene som er gjort er en motivasjonsfaktor. En utfordring for de eldre er å utføre balanseøvelser på en korrekt måte.

Andre funksjoner som savnes slik at det kan engasjere og motivere eldre til å trene mer?

10:25

Jorunn - Progresjon på øvelser. Øke vanskelighetsgrad. Bør være individuelt tilpasset, kanskje starte med en test for å finne ut av hvor man selv ligger an. Kan være en bedre motivasjon å sammenligne med deg selv over tid. Må gjerne bruke referanse til andre for å si noe om hvordan du ligger an, men sammenligne med deg selv over tid for å se progresjon. Ha noe sosialt i selve applikasjonen.

Noen ulemper ved applikasjonen?

12:10

Jorunn - "Skjermen kan være liten for eldre". Nedsatt syn hos noen kan være et problem. Kan være litt utfordrende å balansere og se på en skjerm samtidig. Må evt. bestemme hvor du skal legge telefonene, eller ha noe auditiv tilbakemelding.

13:45 - 13:40 - Presentasjon av konsept 2: Balansebrett

Bruker et balansebrett som er koblet til en tablet. Fungerer mer som et spill.

Noen fordeler eller ulemper ved konseptet?

14:55

Jorunn - Greit å fokusere på fysisk aktivitet og ikke fall. Må tenke på at det kan være ganske krevende for folk som er ganske ustø. Kan være en ulempe at man får trent færre ting enn det man bør gjøre, siden man beveger seg i en retning og får kun trent på ett aspekt ved balanse, nemlig det å holde balansen i den situasjonen. Balansebrett kan skape en farlig situasjon i seg selv.

15.38

Jorunn - "Mindre overføringsverdi til hverdagen".

Hvordan er eldres holdning generelt til exergames? Er jo litt uvanlig at eldre skal kjøpe spillkonsoll.

Jorunn - Brukes på noen boenheter i dag i Trondheim kommune. Dog med støtte fra personalet. Wii er konsollen som brukes. Brukes mer for underholdning enn trening.

17:50

Jorunn - Mener at exergames kan motivere folk til å holde på. Vet at i starten kan slike spill øke motivasjonen. Må finne ut av hva man kan gjøre for å motivere over lenger tid, må finne ut av hva man må endre på og hvor ofte.

Andre funksjoner som kan motivere folk til å holde på lenger?

20:10

Jorunn - Selve oppgaven folk gjør bør oppleves meningsfylt. Oppgaver folk liker å gjøre, gjerne tankekrevende kan motivere folk.

21:30

Jorunn - "For å trene balansen er det viktig å kunne gjøre flere ting på en gang". De personene jeg har gjort tester med likte dårlig å gjøre flere ting samtidig. De sa også at de ville vite målet med øvelsen man gjorde, gjerne en introduksjon til hvorfor man gjør øvelsen.

22:30 - 25:50 - Konsept 3: Otago digitalisert

Konsept basert på Otago, som er et balanse- og styrketreningsprogram. Programmet har veldig god effekt. I utgangspunktet bør man ha en instruktør, men vi tenker å la mobilen være

instruktøren. Ved hjelp av video og tekstlig beskrivelse kan brukeren finne ut av hvordan man skal gjøre øvelsene.

Hva tenker du rundt konseptet?

25:58

Jorunn - Veldig god ide, relativt enkel applikasjon og som faktisk er gjennomførbar. Øvelser som er laget for at man kan gjøre dem selv uten instruktør. Utfordringen vil være å gjøre øvelsene riktig. Kan ha en eller annen distansekontakt som erstatter den tilstedeværende instruktøren. Kan ha video eller telefonsamtale for å vite om man utfører øvelsene riktig. For de som er relativt friske går det fint å ikke ha noe kontaktperson, men for de som er litt mer skrøpelig, som Otago programmet er laget for, kunne dette vært lurt.

27:35

Jorunn - Mener dette er et opplegg som er relativt greit å gjennomføre, men har kjedelige øvelser.

Kan dette konseptet motivere de eldre?

27:45

Jorunn - Tror det, men gitt at man får tilbakemelding. Og hvis man får vite om en terskel man må nå for å bedre funksjonen sin, så kan dette være motiverende. Gjerne få vite om at man f.eks må utføre øvelsene 2 ganger i uka.

Reminders kan både være bra og dårlig, for mange reminders kan virke mot sin hensikt og virke forstyrrende.

29:25

Jorunn - En måte å få tilbakemelding på er f.eks at man starter på et bygg og bygger opp bygget etterhvert som man utfører øvelsene slik at man bidrar til å for eksempel bygge et hus, eller en hage eller lignende. Enkle øvelser kan bygge mindre enn vanskelig øvelser eller lignende. Det kan hende vi synes ting er kjedelig, men som ikke er kjedelig for de eldre og det kan hende vi trenger mer variasjon oftere enn det de eldre gjør.

Er dette et konsept som kan få de eldre til å holde på over lenger tid?

30:45

Jorunn - “Ja det tror jeg kanskje.”

Men øvelsene må være litt utfordrende.

Synes det er en enkel og god idé. Hadde vært artig å testet ut, siden det per i dag ikke trengs noe mer forskning for å gjennomføre idéen.

31:50 - 35:30 - Konsept 4: Treningsplanlegger

Brukeren forteller applikasjonen hva man vil utføre av trening, litt om seg selv, hvilket nivå man er på, hvilke fasiliteter man har tilgang til og lignende, så genererer applikasjonen en treningsplan.

35:30

Jorunn - Mener det er en god ide å få forslag til aktiviteter, og passer bra for de som er relativt oppegående. Vil klare å få med flere menn enn kvinner. “Mye av tiltakene på aktivitet på eldre fenger mer damer enn menn”. Det å velge aktiviteter og det å være målrettet er mer viktigere for menn. Sosialt er viktig hos damer, spesielt med tanke på motivasjon.

Andre fordeler eller ulemper ved en slik applikasjon?

36:25

Jorunn - Ikke direkte ulempe, men kan være en utfordring for alle å få til å bruke smarttelefon. Applikasjonen må være veldig intuitivt og ikke så mye valg. Fint at applikasjonen tilbyr brukeren å fylle inn mye informasjon men på en annen side kan det være en utfordring å fylle inn så mye. Blir også et veldig stort "decision tree" bak det her, sånn programmerisk sett. Stort arbeid å utvikle alt som ligger bakenfor.

37:22

Jorunn - Hadde kanskje vært bedre om noe informasjon var fast, mens man hadde noen frie tøyler til å endre på andre type informasjon. Men synes det er en veldig god ide og bra at det er mulig å individualisere, som også er en bra motivasjonsfaktor.

Tror du de eldre kan bruke applikasjonen over en lenger periode?

38:06

Jorunn - Trenger tilbakemelding som er viktig.

38:34

Jorunn - Kan være greit å legge inn automatiske meldinger som f.eks spør etter 3 uker: “Nå har du holdt på i 3 uker, ønsker du å endre?” slik at brukeren har mulighet til å endre på treningsplanen sin. Å selv være med på å lage planen kan også være en motiverende faktor. Tilbakemeldinger hadde vært en bra funksjon som også kan øke motivasjonen.

Andre funksjoner som savnes?

39:26

Jorunn - Det sosiale kan være bra å ha slik at man får kontakt med andre som gjør det samme. Noen vil foretrekke et mer konkurranse aspekt, mens andre vil like mer det sosiale aspektet. Noen vil sammenligne med seg selv, mens andre vil sammenligne med andre. Det er en tendens til at menn liker mer konkurranse enn damer, mens det sosiale aspektet er viktigere for damer. Menn ønsker å trene mer individuelt, mens damer mer i grupper.

41:35 - 41:45 - Oppsummering av konseptene

Hvilket konsept mener du er best tilpasset de eldre og hvorfor?

42:00

Jorunn - De forskjellige konseptene gjør forskjellige ting, og de passer for forskjellig type grupper av eldre.

Jorunn forteller litt om hvert konsept. Hva som er bra med de forskjellige.

42:20

Jorunn - Balansebåndet. Styrken er at man kan få informasjon om hvordan øvelsen skal utføres som er viktig for å få god kvalitet for gjennomføringen av øvelsene. Tilbakemelding fører til større motivasjon.

42:50

Jorunn - Balansebrettet. Øvelsen var kanskje litt enkel, men selve konseptet med exergames kan være relevant som en fin treningssituasjon. Ville kanskje ikke ha brukt et brett til å balansere, ville heller brukt en matte eller et kamera. Vil gå bort fra brettet siden det er kun mulig å gjøre en bevegelse. Enkel teknologi. Man kan gå fort lei av det, siden man ikke har så mange muligheter.

44:00

Jorunn - Otago digitalisert. Kanskje den som er enklest å videreutvikle. Øvelsene vet vi virker og det kunne vært en bedre måte å levere øvelser på enn per i dag. Treningsprogram som

hadde vært artig å få testet ut. Det å ha en app som hadde motivert dem til å utføre Otago øvelsene i tillegg til noe annet hadde vært helt ideelt. En enkel ide som kan være omsatt i praksis som mange ville synes var bra.

45:35

Jorunn - Treningsplan. Litt annet konspet, ikke så mye innhold per i dag. Er mer en måte å tenke planlegging av trening på. Har ikke det spesifikke fokuset på trening, slik som i de andre applikasjonene. Vanskelig å sammenligne denne. Liker muligheten for å individualisere både ut i fra din egen motivasjon og ditt eget ferdighetsnivå som er bra. Ideen er god, og det er mulig å bruke denne sammen med noen av de andre konseptene, f. eks med Otago digitalisert.