Young endurance athletes as users of sports information system: Case Polar Electro Oy

University of Lapland

Faculty of Art and Design

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Jessica Lammela

University of Lapland, Faculty of Art and Design
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Abstract:

The topic of this Master's thesis is Polar Flow sports information system, and young athletes as users of it. As a specific target group is the generation Z. The aim of the thesis is to find solutions to the following questions: Is the Polar Flow service in its current state interesting to the young users and what are the elements which make the service interesting to the young users? Answers for these questions were studied with usability testing, where the participants went through Polar Flow service simultaneously answering to questions. The UI views of the usability testing are presented in the research, followed by the development suggestions, which are based on the findings of the usability test. Findings show that Polar Flow service is interesting to the young competitive athletes. Elements, which make the service interesting are the following: the consistent design and accurate data about training, sleep and recovery.

Keywords: User centric design, user studies, wellness technologies

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Tässä pro gradu -tutkielmassa aiheena on Polar Flow urheilutietojärjestelmä, ja nuoret urheilijat sen käyttäjinä. Nuorista tarkempana kohderyhmänä sukupolvi Z. Tutkimuksessa haetaan vastauksia kysymyksiin: onko Polar Flow palvelu tämän hetkisessä tilassa mielenkiintoinen nuorille käyttäjille ja mitkä elementit tekevät palvelusta mielenkiintoisen nuorille käyttäjille. Vastauksia näihin kysymyksiin on etsitty käytettävyystutkimuksella, jossa osallistujat kävivät läpi Polar Flow palvelua vastaten samalla kysymyksiin. Tutkimuksessa esitellään käytettävyystutkimuksen UI-näkymät, sekä kehitysehdotukset, jotka perustuvat käytettävyystutkimuksen löydöksiin. Tärkeimmät löydökset tutkimuksessa kertovat Polar Flow palvelun olevan mielenkiintoinen tavoitteellisesti treenaaville nuorille urheilijoille. Elementit, jotka tekevät palvelusta mielenkiintoisen, ovat johdonmukainen design palvelussa sekä tarkka data harjoittelusta, unesta ja palautumisesta.

Avainsanat: Käyttäjälähtöinen suunnittelu, käyttäjätutkimukset, hyvinvointiteknologia

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1 Introduction

1.1 Background

Currently, people are living in a technology-centric world, where they are connected through different devices and services available at all times. Mobile phones with different applications in one's pocket enable the availability for communications and allow the access to information anytime, anywhere. People carry an iPad and laptop in a bag, wear headphones on ears. And this not enough, there is a line of business with different wearable technology products are being developed. Technology is ever-changing and evolving, Millennials have seen the change of internet and mobile phones, but Generation Z was born to it (Table 1.). They have not known a time without freely available networks, and they were given some sort of smartphone at an early age to keep them entertained. These are part of the characteristics of the generation world should be prepared for. Because of their life long experience with technology, applications, and services their demands towards it are totally unique. As is their behaviour with it, and towards accepting it. This thesis aims to study whether Polar Electro Oy's technology and usability respond to Generation Z's needs. Polar Electro Oy is a Finnish company and globally known for manufacturing sports training computers (Polar Suomi, 2019).

Whereas wearable technology is a rather large field of devices and gadgets (Berglund, Duvall & Dunne, 2016), this research concentrates on wearable sports technology and more specifically sport watches web and mobile service where data from the device is gathered. Different sorts of activity trackers and sports watches are the most popular form of wearable technology (Berglund et al., 2016). In addition, I have personal experience of using the Polar Flow website and app, which helps me understand the phenomenon and the answers from the interviews.

Background and interest towards sports watches came to me from my three months summer UX trainee position in Polar Electro Oy in summer 2019. During that summer I familiarized myself with how things are done in the UX design team working as one team member. During the summer I started to look at the Polar Flow web and mobile service from an angle of a UX designer which raised a though whether the graphical content in the Flow service was up-to-date. This thesis is not about evaluating Polar Flow service content solutions, but clarifying existing graphical content if refreshing seen needed from results of interviews. Further plans considering graphical styles are decided based on the results of the usability test.

The thesis will present interviews of Generation Z representatives, who were selected to be the target group in the research. Generation Z, Google generation, digital natives - there are many names to define almost the same group of people who were born in the same time frame. There is not an exact, agreed definition of the years when Generation Z should have been be born. In this research, the

definition that is used is the Grail Research Analysis 2011 of Generation Z. According to Grail Research, Generation Z is commonly defined to be born in the mid-1990s and 2010. Each generation has more in common than only the birth year. They have been born to a world where they have to face the same challenges. For Generation Z those challenges are terrorism and environmental concerns. For the generation before Generation Z, the Millennials were born into the world market by increasing inter-regional and inter-community conflicts (Grail Research 2011).

1.2 Polar Electro Oy as a Company

The Finnish company Polar Electro Oy, founded in 1977, was the first to sell wireless heart rate monitors for athletes and still dominates this market (Fitzgerald 2005). Ronkainen and Czinkota also have acknowledged Polar in book International Marketing (2011), and state that Polar Electro Oy was born from a need. There were no light portable devices to measure an athlete's heart rate during a training session on a field. From the basis of this need professor Säynäjäkangas from the faculty of technology at Oulu University started development work on technology that would make such measurements possible. Work was done partly with colleagues at the Oulu University, and eventually, a company called Polar Electro was Founded in Oulu in 1977.

Polar has come a long journey from the founding day, being today an international company operating in more than 80 countries and products being sold in over 35 000 stores worldwide. Over forty years Polar has been a pioneer in wearable technology aiding athletes and coaches reaching the very best they can. Polar is known to be the developer of the first portable heart rate sensor and has ever since offered further versatile training solutions of pro athletes, coaches and lifestyle athletes. Polar has maintained its place as a reliable training partner because of the quality, accuracy and excellent usability of the products (Polar, 2019)

Polar Electro's Key success factors are listed to be the following: User-centric approach, focus on solving the customer problem/need, functional and attractive design, engineering everything to perform in tough sports environment, and an expanding ecosystem of value-added connectivity (Polar Company Presentation Materials).

1.3 Purpose of the research and research questions

The purpose of this research is to study whether the Polar Flow sports information system is presenting data collected by the Polar devices in an interesting way to young athletes, more specifically, to the young competitive endurance athletes, the representatives of generation Z. An interesting way to present data depends on, from the users point of view, if the data is presented and visualized

in an understandable way. The information system needs to be clear and easy to learn, as these are the key elements of user experience.

Q: Is the Polar Flow service in its current state interesting to young users?

Q: What are the elements which make the service interesting to young users?

Nowadays people are so used to use different websites and applications which is at the same time advantage and disadvantages. Generation Z has been born into a digital world, they are proficient with and dependent on technology, making it a critical part of how they interact, play and learn. In 2010, 31% of US children, ages 6-12, wanted an iPad over any other electronic device for Christmas (Grail Research 2011). Companies need to acknowledge this change of behaviour to be able to respond for a fresh group of users.

This research aims to understand the user's needs and desires towards Polar's Flow service, which collects user's training, sleeping and activity data. The main interest of the research is the young athletes, representatives of Generation Z. Users in general are a diverse group of people with different motivations to use sport technology. There are young and old, some of them are pro athletes, some are fit-enthusiastic and others want to improve their health. Different individuals have different motivations for sports wearables. Some individuals seek motivation for weight loss, and other individual has training background of ten years goal-oriented training and is aiming to world championship in their sport. No

company can decide who are buying their products. Marketing, of course, has a big role to play here how and to who they are marketing the product. Still, there might be someone who is not so sport-oriented, but buys a product because of the look of it. This research concentrates on young athletes since Polar is manufacturing sports watches and is providing tools to analyze training. The research question formed up from Polar Electro's interest towards younger users and how Polar Flow service both mobile and web could serve younger users. Is current service fluent for young users, would they want something more or different from the service? Is the current visual content up to date in the world of digitalizing? In this thesis, I am going to research that through interviews of younger users, focusing on a specific group of younger users who are 16-23 years of sports-oriented people from Generation Z.

2 Literature review and previous research

Each generation has unique expectations, experiences, generational history, lifestyles, values, and demographics that influence their buying behaviours. (Williams & Page 2011).

Classifying and delimiting generations is more art than science. There is no formal arbitration board that defines when one generation begins and another end (Reid Cramer, 2014). Even though generation after millennials is quite a new subject, there is a competition on who gets to name it. Generation Z seems to be the most popular name for this generation born after Millennials. In this thesis, when I'm referring to the generation born after Millennials, I will use name Generation Z or Gen Z.

The definition of generation Z can be quite wide, but a common factor among all definitions is that the people have been born into digital age. Generation Z is also referred to be digital natives, which means they have grown up more or less in the digitalizing world (Francis & Hoefel, 2019). In order to understand what kind of graphical content should web sites present to younger users, the main thing is to understand young users. In this case generation Z which is the newest defined generation after Millennials who were the first step to the digital world. Only by understanding millennials, one cannot understand Generation Z. Millennials are quite fluent with new technology, but generation Z is born with it. Not only the

birth year is an accurate definition for Generation Z but also cultural changes they have lived through. Examples of these are the 9-11 strike, new technology, and social media.

2.1 Mobile Wellness Applications

Since the publication of the first mobile app in the app store in 2007, the world has experienced a fast-growing market for wellness, health, and medical apps. In 2017 there were 325 000 of these types of apps available. The huge number is no wonder, as in 2016 globally invested $5.4BN into digital healthcare start-ups (Research2guidance, 2017).

Nevertheless, although it is seen that wearable computing is largely still taking baby steps as consumer's products, it has already emerged to mass markets in some forms, one of these areas being wearable wellness devices. Research "Charting Design Preferences on Wellness Wearables" has researched the requirements for wearable health devices from industrial design aspects which have been an under-explored area. The research was conducted as an online survey, which had 10 questions. The result for current wearable wellness devices usage was that from the 123 test participants 26% owned at least one wearable health device. Out of them, 46% used it every day. There was one clear main reason why participants, 53%, had stopped using the device, this being that the users felt that they did not get relevant feedback from it. What participants wanted from wearable devices, according to the results, was them to be

lightweight, comfortable, durable and that they would look good (Rantakari, Inget, Colley & Häkkilä. 2016).

There is a good market for health and wellness wearables because overweight and obesity are a global epidemic. There are more than one billion overweight adults worldwide, and of these over 200 million men and nearly 300 million women were obese (EASO, 2019). Nowadays people tend to have so hectic life that they have difficulties fitting exercise into their everyday life. Technology might be the answer to this problem, as people have their mobile phone with them all the time. For these people who really do not do any sports, the phone could be the answer to encourage opportunistic physical activities. A mobile phone could provide relevant information at the right time and place. The research "Design Requirements for Technologies that Encourage Physical Activity" concentrated on finding encouraging features to encourage physical activity. First guideline is to "Give user proper credit for activities". For an individual who is not usually active in doing exercise, giving the credit gives the motivation to proceed, to continue doing the sports. The second guideline is to "Provide personal awareness of activity level". If the person is given some goal to achieve, showing the progress to the individual gives motivation to pursue it. The third guideline is to "Support social influence". The human being is a social and competitive creature, and the best influence is deemed to be the social pressure. In the research, it was found out that participants were eager to meet their goal because if they did not their friends would know about it. The fourth guideline is "Consider the practical constraints of users' lifestyles". At the time the research

was conducted, mobile phones and pedometers were big, and they were not exactly unnoticeable (Consolvo, Everitt, Smith & Landay, 2006)

The expanding and growing market of Health and Wellness Apps is going to have a standard (CEN/TC 251 Health Informatics), which will help to establish a common framework across Europe for the evaluation of these apps, and giving users and health professionals confidence that the app is fit for the purpose. With the growing market, a concern about the quality and reliability of apps have risen. Many Health and Wellness applications are being published without a clear way for users to assess which ones are reliable and provide evidence to support the claimed benefits (CEN/TC 251 Health Informatics).

2.2 Generation Z, who are they

The generation born after Millennials, the post-Millennials is a rather new concept, and several researchers have their own definition of them. One thing researchers argue is how to call this generation. At the moment there are almost as many names for this generation as there are researchers. Psychology professor Jean Twenge has named this generation the iGen, and according to her they are born in 1995 and later. In her definition the *i* in the name stands for the internet, it was commercialized in 1995 (Twenge 2017, 5). iModerate Research Technologies also has a name for post-Millennials, calling them the Prularist generation.

iModerate refers to Magid Generational Strategies ™ in their report of Prulars, they have been born in turn of the century and today. Their conclusion about Prulars was that they are full of hope but realistic about their future (iModerate 2015).

Bruce Tulgan, the founder of RainmakerThinking, Inc., has made research "Meet Generation Z: The second generation within the giant "Millennial" cohort, about GenZers as they call it, in 2013. Here, generation Z was studied as a workforce. It also examines, what are the common factors for this large group of diverse people. In this definition GenZers are born in the 90s and raised in the 2000s during the most profound changes in at least a century. He argues against many demographers who argue that people born between 1978 and 2000 belong in the same generation, one gigantic "Millennial Generation". Tulgan acknowledges their argument about technology revolution on a macro level and the helicopter parenting revolution on a micro level, which are claimed as the two most important formative influences of anyone born in the Western world during these years. But in his opinion, this time frame is simply too broad to define only one generation because the 1990s and the 2000s are two distinct eras. Their research has revealed five key informative trends shaping Generation Z. First of them is social media, as Gen Z has not known a world where one could not be in conversation with anyone anywhere at any time. The second finding is the appreciation of human connections, highly engaged parenting, teaching and counselling, which have made Zers less likely to resist authority relationships as Gen Yers did. The third thing are the skill gaps, as this generation more than any other will suffer from the growing gap between the highly skilled and the unskilled. It is not all

about the technical skill gap but also the nontechnical. Fourth trend is strongly associated with the growth of the internet. Generation Z is far more connected to the world in general, and Zers have a global mindset and local reality. Fifth finding is the infinite diversity. Tulgan argues that the emerging Generation Z reflects a whole new way of thinking about difference (Tulgan & RainmakerThinking 2013).

In a study "Understanding the Generation Z: the future workforce", A. P. Singh and Jianguanglung Dangmei have defined characteristics for GenZ. They have been raised in the 2000s with web, internet, smartphones, laptops, freely available networks, and digital media. They are digital-centric and technology is their identity. Generation Z is also referred to as Generation I, Gen Tech, Digital natives, Gen Wii, etc. They are born and raised in the digital world, and the condition which distinguishes them from the other generations is that their existence is more connected to electronics and the digital world. Generation Z is the most ethnically diverse and technologically sophisticated generation. It has an informal, individual and straightforward way of communicating, and social networking is a vital part of their lives (Singh & Dangmei 2016).

Not only the birth year tell the difference between generations. There is some profound characteristics (Table 1.) which divide the generations from each other. Comparing the Millennials which are seen more me-centric and generation Z which is seen more we-centric. To understand this newest generation, it is crucial to understand their world view (Mohr & Mohr, 2017).

Perspective	Gen X—Busters	Gen Y—Millennials	Gen Z—Digital Natives
Birth Years	1965-1980	1981-1994	1995-2010
Life Paradigm	Relate to me	Life is a cafeteria	Make a difference
View of Authority	Ignore them	Choose them	Work with them
View of Relationships	Central, caring	24/7	Collaboration, resolution
Value System	Media	Shop Around	Open-minded
View of Career	Irritant	Place to serve	Place to solve problems
View of Technology	Enjoy it	Employ it	Live it
View of Future	Hopeless	Optimistic	Solve it!

Table 1. Comparison of Recent Generations

The most distinctive difference between generation Z and other generations is that generation Z is used to the technology, they are almost born with it. The representatives of generation Z are expecting objects to interact with them. In American households 38%, of toddlers has regular use of tablet. Tablet with interaction has replaced the stuffed animals toddlers use to have. If for these toddlers would be given a regular card game, concentration card game, they would not know how to play it. And how could they, the regular game is not interacting in any way with the one who is playing it. Concentration game on a tablet or in iPad is totally different, even though it is functioning with the same logic, but lacking the most important feature for generation Z, the interaction (Koulopoulos & Keldsen, 2014).

According to Koulopoulos and Keldsen (2014), there is no point waiting the next generation after generation Z, the technology is here and it is not going anywhere, neither will the generation Z. Because unlike the generations before Z, their behaviour and attitudes are not limited to certain birth year, instead it is a conscious choice. Therefore, the attitudes and values can be separated in two, before Gen Z and Transition to Gen Z (Table 2.). Because having the mindset of Gen Z is optional and there is no need to be born in some time frame, anyone can adapt to this mindset, or adapt part of it.

	Before Gen Z	**Transition to Gen Z**
Internet access	A privilege	A human right
Influence	Purchased	Earned
IP/Patents	Value creators	Barriers
Failure	Avoided	Embraced
Gaming	Non-value-add play	Foundation for engagement
Uncertainty	Prepared for	Predicted
Retirement	A destination	A journey
Connectivity	A luxury	A necessity

Table 2. Attitudes Before and After Gen Z

2.3 Generation Z attitude towards sports

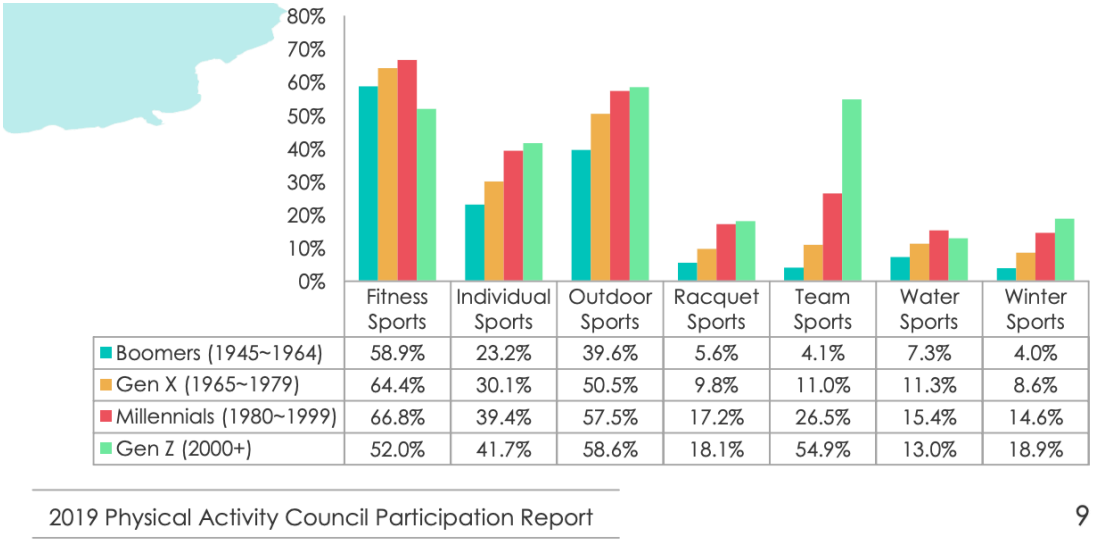
Dave Mace, the Founder and Health Coach of Maximum Potential Calisthenics, explains that with the advent of Instagram and YouTube, technology is actually inspiring Gen Z to be more active than Millennials. Logging your progress and keeping track of your vital statistics has never been easier, with Fitness Watches,

Mobile Apps and Digital Scales. Gen Z is playing sports more than ever before, and during the recent years one of the biggest changes he has seen as a personal trainer is an increase in participation from teenagers through to early 20s (Dave Mace 2018).

There is not only one main thing why Gen Z is so interested in sports, but actually, they are currently the most active generation (Inspiresport, 2018). There are different factors for increasing the popularity of sports among Gen Z. One factor is the technology for example in a form of games. Pokemon Go was quite popular when it came (Althoff, White & Horvitz, 2016; Cartlidge, 2017; Colley, Thebault-Spieker, Lin, Degraen, Fischman, Häkkilä, Kuehl, Nisi, Nunes, Wenig, Hecht & Schöning, 2017) and was proven that those who played the game had a boost of physical activity (Arjoranta & Salo, 2017). Additionally, people are now becoming more influenced by the people they admire. If these admired persons happen to be some sort of sporting heroes or influencers interested in sports, fitness and physical activity, then, in turn, they will become more active. The second factor is an influence coming from education, as children are being taught that exercise is important. Schools are encouraging physical activity whenever possible so that young people understand the benefits of it. The third factor is big sporting events. In these events children, have seen and are seeing athletes from their own country, city or town who have been successful in sports. All of the sporting events will impact on young people and encourages them to try new sports. Fourth factor is new sports. Whether it is new sports or recently popular sports, the new options that are available when it comes to sport are certainly encouraging

Generation Z. Running is the activity people participate in most followed by fitness classes and then gym sessions (inspiresport 2018).

Generation Z has the highest activity percentage, 70%, but also the lowest inactive percentage 18%, compared to all other generations. Generation Z dominates in team sports, and over half of this generation participated in a team sport during 2018 in the United States. Still, when digging deeper, a disappointing trend appeared. Gen Z team sport participation declined over the last six years, losing 0.2% on average annually. Luckily still, they have not given up on sports but their focus has turned to fitness sports which gained 5.2% since 2013 (Physical Activity Council 2019).



	Fitness Sports	Individual Sports	Outdoor Sports	Racquet Sports	Team Sports	Water Sports	Winter Sports
Boomers (1945~1964)	58.9%	23.2%	39.6%	5.6%	4.1%	7.3%	4.0%
Gen X (1965~1979)	64.4%	30.1%	50.5%	9.8%	11.0%	11.3%	8.6%
Millennials (1980~1999)	66.8%	39.4%	57.5%	17.2%	26.5%	15.4%	14.6%
Gen Z (2000+)	52.0%	41.7%	58.6%	18.1%	54.9%	13.0%	18.9%

Table 3. Activity Category Segmented by Generations (Physical Activity Council 2019)

2.4 Young and the use of technology in general

Generation Z is the first generation to face the change in teaching. More and more was demanded from the teachers so that Generation Z could not be accused of not concentrating in class. Nine out of ten Finnish young uses the internet daily. Young adults use the internet on various tasks, on information retrieval, shopping and managing different matters (Kaarakainen, Kivinen & Tervahartiala, 2013). Teaching has to transform for this generation, so they do not prove Marc Prensky right in his argument. He argues that it is the fault of digital immigrants, as he calls the teachers, that digital natives, as he calls Generation Z, does not pay attention, as their education is not worth of paying attention (Prensky, 2001).

The change of everyday life, and the change in technology are changing the reading environment of the young. Reading the traditional literature and printed material is decreasing, and the communal reading of interactive web text is increasing rapidly. In a changing media environment, the reading should be understood more extensive than only a skill of an individual that can be mechanically practiced. Unlike printed text, in the web environment, there is multimodal material consisting of text, pictures, videos, sounds, and social interaction. In order to "read" fluently web environment material, one should manage text comprehension, receiving visual information and have the ability to function in the social community. In the most recent PISA-research, the literacy of web environment material is assimilated to the reading of hypertext, which means an ability to read

texts which includes navigation tools. It is not odd that young understand fluently the hitches of the web environment. 97% of the young who participated in the University of Turku ReadIT-research announced that they use information technology (computers, tablet computers, smartphones or corresponding devices) daily, two-thirds of young at least two hours per day, and third more than three hours. The most popular actions were surfing on the internet, listening to the music, using video services such as YouTube, and social media, like Facebook and other community applications. There were no differences in internet usage between boys and girls. The difference was in gaming and the use of social media. The boys played more online games, and one third of boys played the online game daily, whereas the only tenth of girls plays online games. Girls were more active in using social media. In addition to entertainment, young are using computers also for actions that can be labelled as improvements for studies and the development of useful skills for working life. Most young are producing weekly texts on the computer, one fifth is programming at least once a week, and four out of five are using weekly either email or are retrieving information from the internet (Kaarakainen et al., 2013).

Often when media is telling about young and their use of technology, it has a negative tone. Problem-orientation is a continuum for a two-pronged paradigm where on the other hand young are perceived as a hope of nation but also as a thread of order. Mostly the discussed risks in the media are based on a subjective perception of a not hoped and dangerous outcome rather than on a certain consequence based on calculations. It has been stated that media should restrain itself, because the use of digital technologies is a beneficial for humans, in the

forms of economical benefits (an increase of fortune and education), cultural benefits (participation and identity), social benefits (networks), and personal benefits (self-actualization) (Kaarakainen & Kaarakainen, 2018).

There are three different genres of participation culture, *hanging out, messing around and geeking out* -genres. Hanging out -young are using actively web environments and digital content sharing, liking and commenting them, but they barely participate in producing them. According to its name, it highlights hanging out with friends. Messing around -users' actions are based on editing content or producing it, but also social participation. Geeking out- users are absorbed in their own target of interest and are actively producing content in their own community (Kaarakainen et al., 2013; Kaarakainen & Kaarakainen, 2018).

Finland's school system has embraced well the change of the world, the digitalization and change in technology. Finland's school system has added Multimodal and media to its syllabus, as a bigger theme concerning the whole teaching, not limited to one specific subject. In the syllabus multiliteracies are defined followingly, it means interpreting, producing and valuing different texts, which will help students to understand diverse cultural forms of communication and building their own identity. Multiliteracies is based on extensive perception of the text. Verbal, pictorial, auditory, numeric and kinesthetic symbol systems and combinations of them are texts in this context. Students need multiliteracies in order to interpret the world around them and perceive its cultural diversity (Perusopetuksen opetussuunnitelman perusteet, 2014).

2.5 Technology acceptance and phases of it

Technologies are constantly evolving, driven by research and development, as well as by consumer and corporate demand for new products and applications. Companies attempt to understand the nature of the technological opportunities and maintain the growing market shares (Adomavicius, Bocksted, Gupta & Kauffman, 2004).

To understand how people confront the technology, it is important to take a look at the Technology acceptance model (TAM). Fred Davis developed it with two major objectives in mind. The first objective was that the model should improve understanding of the user acceptance process, providing new theoretical insights into the successful design and implementation of the information system. The second objectives was that TAM should provide the theoretical basis for a practical "user acceptance testing" methodology that would enable system designers and implementors to evaluate proposed new systems before their implementation (Davis, 1985).

The technology Acceptance Model, proposed in 1985 proposed and used today, is shown in Figure 1, with arrows representing causal relationships. According to the model, the potential user's overall attitude towards the system is hypothesized to be a major determinant of whether or not he uses it (Davis, 1985).

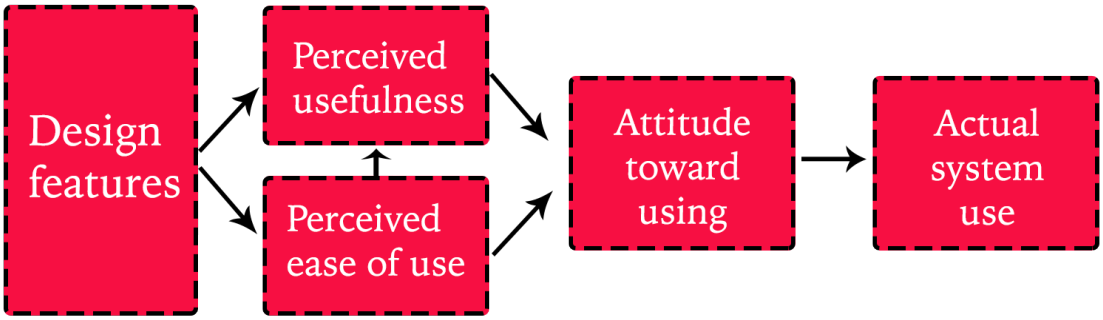


Figure 1. Technology acceptance model (retell Davis 1985)

After Davis revealed Technology Acceptance Model, it has been expanded afterwards many times. Among others, Venkatesh et al. (2003) published a unified theory of technology acceptance and use, which is known by UTAUT model. It is a combination of eight different models of technology acceptance and theoretical models of the use of technology (Venkatesh et al., 2003)

While studying Davis's Technology acceptance model one cannot help but think whether usability testing has inherited some features from it. Today's usability testing includes similar factors as TAM, such as perceived usefulness and perceived ease of use. Similarity between usability testing and TAM have been researched, which has led to TAM Model for Usability factors, which is one of the extended TAM models, Figure 2. Burney et al. (2017) aimed to identify the connection between the real performance and the superficial view of the users.

Through the study, Burney et al. tried to identify the connection coefficient between core elements of usability, which are efficiency, memorability, effectiveness and learnability and factors of Technology Acceptance Model which are

Perceived usefulness and Perceived ease of use. Albeit all connection coefficients are not huge, the importance of their relationship should be additionally explored. From the investigation and results, it has unmistakably appeared that the perceived ease of use is in accordance with the core elements of usability "Memorability" and "Learnability"(Burney, et al. 2017).

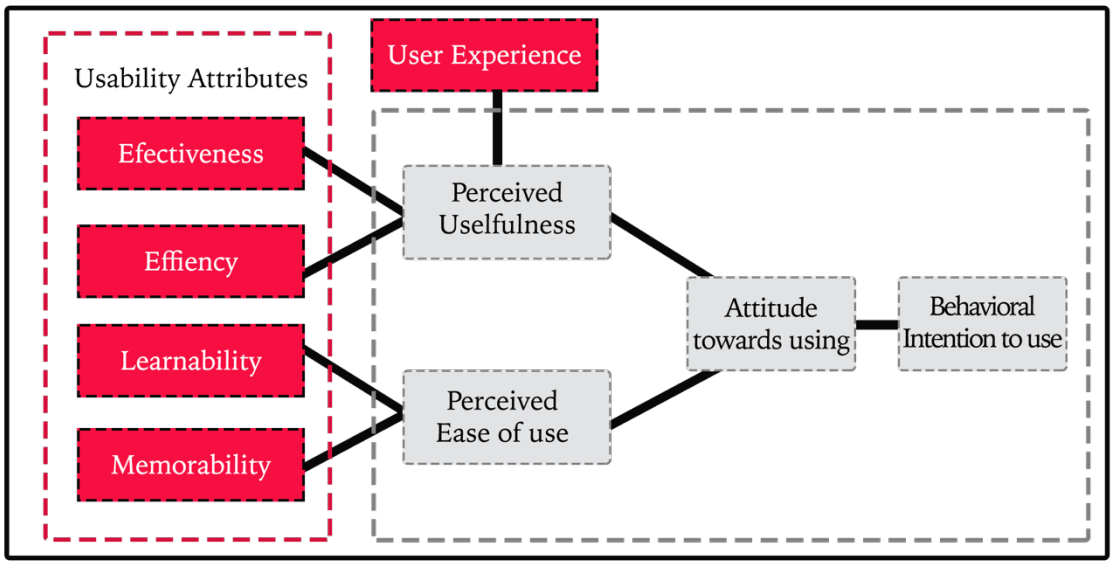


Figure 2. TAM Model for usability factors.

3 User-centered design

Way too often usability and user experience design concepts are confused with each other, they even collide, usability is part of user experience design. Usability and user experience (UX) are not the same thing: the usability of a product is a crucial part that shapes its UX, and hence it falls under the umbrella of UX. While many might think that usability is solely about the 'ease of use' of a product, it is more than that (Soegaard, 2018).

Jared Spool, researcher and an expert on usability, software, design and research puts into a nutshell difference between usability and user experience. Usability answers the question, "Can the user accomplish their goal?" User experience answers the question, "Did the user have as delightful an experience as possible?" (Spool, 2007).

3.1 Usability

Usability is a concept that has existed quite a long time, but still even nowadays it is not clear how it is defined or is it understood. Difficulty to define usability lies for it being an intangible thing. No instrument can provide an absolute measurement of the usability of a product. Usability is an emergent property that depends the interactions among users, products and environments (Lewis, 2006).

The concept of usability has existed since 1984 when Eason Model was created by Kenneth Eason. In the Eason Model there are three aspect in usability **task**, **user** and **system**. For **task** there is two sub attributes which are frequency and openness. For **user** there is three sub-attributes which are knowledge, motivation and discretion, and for **system** there is also three sub-attributes, ease of learning and ease of use and task match. Eason model is a causal type model because it has input that is an independent variable and outcome or result that is a dependent variable. Causal model predicts causality. Before ISO standards there where two other models, the Shackel model and the Nielson model. The Shackel model differs from Eason model in a way that it has four attributes: **effectiveness**, **learnability**, **flexibility** and **attitude**. In the Nielsen model there are five attributes: **learnability**, **efficiency**, **memorability**, **errors** and **satisfaction**. To understand the values the ISO standard, is based on, one needs to have a glance to the models before it (Aziz & Kamaludin, 2014; Madan & Dubey, 2012).

The first ISO standard in the 1998 (ISO 9241-11) there were three attributes, introduced in the following. The first attribute was **effectiveness,** which is familiar as a concept from the Shackel model but with a different definition. Shackel defined the effectiveness as the system's performance being better than some required level. The ISO 9241-11 defined the effectiveness to be the performance measure of a system for completing a specific task or goal in successfully within a certain time. Second attribute in ISO 9241-11 was **efficiency**, which is also a familiar concept, as Nielsen model had it, although not with the same definition. In Nielsen model efficiency is defined to be the directly related to the productivity. In ISO 9241-11, efficiency is defined as the successful completion of a task, and it relates

to the accuracy and completeness of the specified goal. The third attribute is **satisfaction** which is mentioned in Nielsen model. Still, in the ISO 9241-11 model the definition for it is not the same as in Nielsen model. In Nielsen model, satisfaction is defined to be by the pleasant feeling the user gets while using the system or afterwards. In the ISO 9241-11, satisfaction is defined to be the acceptability of a system by users, in a specific context of use. The newest standard is ISO 9126 (2001), which contains five attributes. These attributes are **understandability**, **learnability**, **operability**, **attractiveness** and **usability compliance**. Understandability stands for the capability of the software product to enable the user to understand whether the software is suitable, and how it can be used for particular tasks and use conditions. Learnability is simply the capability of the software product to allow the user to learn its functions. Operability is the capability allowing the user to operate and control the software. Attractiveness is the capability of the software to be attractive to the user. Usability compliance is the capability of the product to adhere standards, conventions, style guides, or regulations related to usability (Aziz & Kamaludin, 2014; Madan & Dubey, 2012). The ISO 9126 is all about the capabilities of the software product, and what the user thinks about it. The standard there is no anymore mentions the system and what it is actually doing.

Usability is not only about the Human-Computer Interaction (HCI), but there is much more behind it. Some of the benefits of having usable user interfaces are improved human productivity and performance, safety and commercial viability. Attitudes might be influenced by abstract factors, such as the look and feel of the product, or what kind of individual touch can the user can give to it. Several

different standards or models for quantifying and assessing usability have been proposed among the Human-Computer Interaction and the Software Engineering communities. Examples of the latter include the ISO/IEC 9126 (2001) standard, which identifies usability as one of the six different software quality attributes; and the ISO 9241-11 (1998) standard which defines usability in terms of efficiency, effectiveness and user satisfaction (Seffah, Donyaee, Kline and Padda, 2006).

In addition to standards, usability means that the people who use the product can quickly and easily accomplish their tasks. This definition rests on four points. First, usability means focusing on users. In order to develop a usable product, one has to know, understand and work with people who represent the actual or the potential users. No-one can substitute the real user. Second, people have a motivation to use the product, and to be productive. There are terms what people consider while using the product, and it needs to be easy to learn and use. To develop usable products, one must understand users' performance goals. Third, users are busy people trying to accomplish tasks. People usually connect usability with productivity, because one gets paid for the time spent by sitting at a computer. Users are concerned with productivity and accomplishing their own goals at home as well as at work. Last but not least, users decide when a product is easy to use, not the designers or developers. People are all so busy that they are constantly balancing the time and effort, and consider if something is worth of the benefit they will gain from it (Dumas & Redish, 1999)

Soegaarden (2018) is pointing out the same crucial points for usability as Dumas and Redish, and also adding a few more angles. Website and applications are tricky, because if the user is not satisfied with them, they will seek an alternative for it, and it is known that there are alternatives for websites and applications. Simply put, if a product is not usable, its UX will be bad, and users will seek an alternative replacement. It has been studied that there are three main reasons why users leaves websites. 46% of the users leave the website because of lack of effective messaging, for instance they cannot tell that the company does. 44%of the users leave due to lack of contact information, and 37% due to the poor design or navigation. These are the potential harmful consequences what bad usability can bring to website (Soegaarden, 2018). Therefore, usability is the outcome of user-centered design process. That is the process which examines how and why a user will adopt a product and seeks to evaluate the use of it. User centric design is an iterative process, which seeks to improve the following iteration with continuous evaluation cycles (Soegaarden, 2018).

It is not that usability has not been there since the very first product was ever made, it has just been researched more over the years and been characterized in more detail during this process. Every human being loves a good design, and that the product or service is working like a dream, and over the generations, people have become more and more impatient. Having everything at hand all the time has changed the society. People can literally live in a way that they do not need to come out of their house if they do not wish to do so. Food is being delivered to the door from the restaurants and nowadays also from the stores. People have become more effective in everything, which is one of the

characteristics of usability. Effectiveness is not only about the completing the task by oneself, but much of it comes from the support provided to users. It is interesting to consider, if the change started from the people who have become more effective and are seeking the efficiency, or is it the way that world has changed and usability is only answering to the demand. From the viewpoint of usability, effectiveness and efficiency are quite different. Efficiency is all about the speed. For instance, why would users want to have a slow browser if they could instead have a faster browser.

Also engagement, plays big role, and relates to the condition of users finding the product pleasant to use (Soegaard, 2018). It is not only about the product looking good, but also about looking right. Proper layouts, readable typography and easy navigation all come together, and provide the user fluent interaction and make the product use engaging. Good usability is about listening to the majority of population, and determining which things they appreciate and which annoy them. This related also to the error tolerance, the forth factor of usability. The users do not like errors, but if an error still occurs, it is important to know how to dealt after the error (Soegaard, 2018). User needs an undo function to correct something that happened by accident (Soegaard, 2018). As it is hard to predict everything the user will do, there should also always be a link to help or product support. To avoid people contacting the product support, products and services should be easy to learn.

3.2 User experience design

User experience (UX) design is in an important role in this research, as it is a tool to evaluate Polar Flow service. More specifically this research adapts user experience design methods on evaluating service from the viewpoints of digital natives, Generation Z.

User experience is an intangible quality, and because of it, it is hard to find a solid and extensively approved definition for it (Law, Roto, Hazzenzahl, Vermeeren & Kort, 2009). Marc Hassenzahl and Noam Tractinsky have defined user experience design as follows. UX is about technology that fulfils more than just instrumental needs in a way that acknowledges its use as a subjective, situated, complex and dynamic encounter. UX is a consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc.). Obviously, this creates innumerable design and experience opportunities (Hassenzahl & Tractinsky, 2006)

Mads Soegaarden offers a more approachable definition for user experience design. He claims that there are seven factors describing it. The first factor is *usefulness*, makes a good question if products is not useful to someone, why would

anyone want to bring it to the market? Or if the products end up on market, who will buy them? The market is full of purposeful and useful products. The second factor is *usability*, users need to achieve their end goal with a product effectively and efficiently. It is not likely for the product to succeed if it is not usable. The third factor is that the product needs to be *findable*, which refers to the idea that the product needs to be easy to find and recognize, and in the instance of digital and information products, the content within them must be easy to find, too. Reason for this is quite simple. If users cannot find the content on the website, they are going to stop using it. The forth factor is *credibility*, which relates to the ability of the user to trust in the product that is provided, not only that it does its job, but does it in a reasonable time and that the information is accurate. The fifth factor is *desirability*, which is conveyed in design through branding, image, identity, aesthetics, and emotional design. The more desirably the product is, the more likely it is that the user who has it will brag about it and create desire in other users. The sixth factor is *accessibility*. It is said that accessibility gets often lost in the mix when creating user experiences. Companies may see designing for accessibility as a waste of money, even though it is often found out that the products that have been designed accessibility in mind are easier for everyone to use. The seventh factor is *value*. Simply put, the product must to deliver value to the business which creates it as well as to the user who buys or uses it (Soegaard, 2018).

3.3 User interface design

Whenever users interact with a computer system, they are doing it via a user interface (UI). Graphical user interfaces (GUIs) are the most common UIs, but there are also vast amounts of multimodal UIs, using for instance speech recognition or gestures as input. There is not a one UI solution for all computer based systems, but they typically all differ from each other. Also the devices also differ from each other, setting different requirements for the UI. Digital watches have a UI same way as do PC's, but their screen size and input keys are very different. Designer should not focus too much on details such icons or colours, because the real concern lies on the on the usability of the user interface (Stone, Jarrett, Woodroffe & Minocha, 2005).

It can be argued that the user interface development consists of two parts: designing the UI components and interaction flow, and implementing the functionality with software (Hix, Hartson & Wiley, 1993). The reason of this is that for most users, the UI represents the system itself. The UI can be seen, it can be heard, and it can be touched. The piles of the software code are invisible for the user, hidden behind screens, keyboards, and the mouse. The goals of the UI design are simple: to make the working with a computer easy, productive, and enjoyable. Nowadays the usability of the UI gets more attention, and people's voice and frustration with complicated procedures and incomprehensive screens has been heard. "That is just the way it is" is no longer tolerable answer to a usability

problem. There are examples of good UI designs, and with that people have noticed that there is proof that good design is possible (Galitz, 2007). Good user interface design encourages an easy, natural, and engaging interaction between a user and a system, and it allows users to carry out their required tasks. With a good user interface, the user can forget that he or she is using a computer and simply just go on with what she or she wanted. Just as the knowledge of the transmission mechanism of a car is of a little concern to most motorists, knowledge of the internal workings of a computer system should be of little consequence to its users (Stone et al., 2005).

4 Research approach and methods

Qualitative research approach was chosen to use in this research because of the research problem, which sought for rich data about the user experience and UI design. It was clear that to gain answers to research questions, interviews were needed. Qualitative research is a approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. Data is typically collected from participant's, the data analysis conducted inductively building from particulars to general themes, and the researcher makes interpretations of the meaning of the data. Typically, the final written report has a flexible structure (Creswell & Creswell, 2018).

After choosing the research approach, researcher needs to decide a type of the study within these three choices. Research designs are types of inquiries with qualitative, quantitative and mixed methods approaches that provide specific direction for procedures in a research design. There are various types and procedures on specific qualitative inquiry approaches, such as narrative research. Narrative research approach has its bases in humanities, where a researcher studies the lives of individuals and asks one or more individuals to provide stories about their lives. In phenomenological research, which is a design of inquiry coming from philosophy and psychology, the researcher describes the lived experiences of individuals about a phenomenon as described by participants. Yet another approach is the grounded theory, in which the researcher derives a general,

abstract theory of a process, action or interaction grounded in the views of the participants. Ethnography is a research approach coming from anthropology and sociology. In ethnographic research, the researcher studies the shared patterns of behaviours, language, and actions of an intact cultural group in a natural setting over a prolonged period of time (Creswell & Creswell, 2018).

For this research, a case study was the best suited research strategy. Case studies are a research approach found in many fields, especially in evaluations, in which the researcher develops an in-depth analysis of a case (Creswell & Creswell, 2018). A typical for case study is to choose for target of research some singular case, situation, event or group of cases, as the target of the research. It is common to choose a case study as the research approach if the research is associated with some company. When researching a case study, the purpose is to add understanding about a certain phenomenon without pursuing too generalized information (Saaranen-Kauppinen & Puusniekka 2006).

The case what is under examination in this research is the usability of Polar Flow service from the perspective of younger users. Especially, it is interesting to know if younger users differ from Polar's average users, and if yes, how they do. The case study aims to find out if the Polar Flow service provides an interesting tools to analyse exercises, and if the content of the Flow service is attractive for young users, particularly to representatives of generation Z.

4.1 Philosophical choices

There are no right or wrong philosophical concepts and traditions, and the main thing is that the researcher familiarizes him/herself with the ordinary philosophical concepts, positions and traditions. It will assist the researcher on specifying the direction for the research, and it will also assist in overall research and strategy so that the research will achieve what it was supposed to achieve. Reasoning and statements, which constitute the research phenomenon might affect achieving information about it. During research, researcher needs to make decisions about the empirical data that is collected, how to analyse it and how to present conclusions. Exploration of the basic philosophical concepts will help the researcher in decision making (Eriksson & Kovalainen 2008).

In social studies the key concepts of the philosophy are ontology, epistemology, methodology, methods and paradigms. Ontology answers to question "What is there in the world?". Ontology consists ideas about existence and relationship between people, society and the world in general. Reality can be understood either as subjective or objective. This means that the reality is understood to be based upon perceptions, and experiences that may be different for each person, and may change over time and context. Individual's reality is a result of social and cognitive process. Besides, reality can also be seen as objectivism, where the social world is seen existing as independent, beyond humans and their actions. Alongside or instead of subjectivism term, constructionism is often used to

describe the social nature of reality. This research is based on subjectivism vision of reality, where people can change their aspects and perceptions of reality through social interaction (Eriksson & Kovalainen 2008).

In order to understand, it is important to realize its connection to ontology. When ontology answers and focuses on the question "What is there in the world?", epistemology is concerned with the questions "What is knowledge? and "What are the sources and limits of knowledge?" Both ontology and epistemology have an objectivist and subjectivist view. Objective view in epistemology is that there may exist a world that is external and theory neutral. According to the subjective approach, there is no access to external world beyond our observations, and interpretations are possible. This research uses epistemology's subjective vision, where it is not possible to reach this sort of external world without perceptions and interpretation (Eriksson & Kovalainen 2008,).

When combining the ontology's and epistemology's visions and methodology, methods that are suitable for the research, the result is a frame for the research. In philosophy of science, the paradigm constructionism relies on social ontology and relativism epistemology. Constructionism accepts a realistic ontology which refers to the material world. In principle, it would not be possible to research social studies if at the same time would not be agreed that the concept of reality is socially built and being constructed all the time. After ontology and epistemology analyses, the researcher can choose a suitable combination of philosophy of science paradigms, the most functional combination of them (Širen & Pekkarinen 2017).

4.2 Research schedule

Figure 3 describes the timetable for the research from the autumn 2019 to the winter 2020.

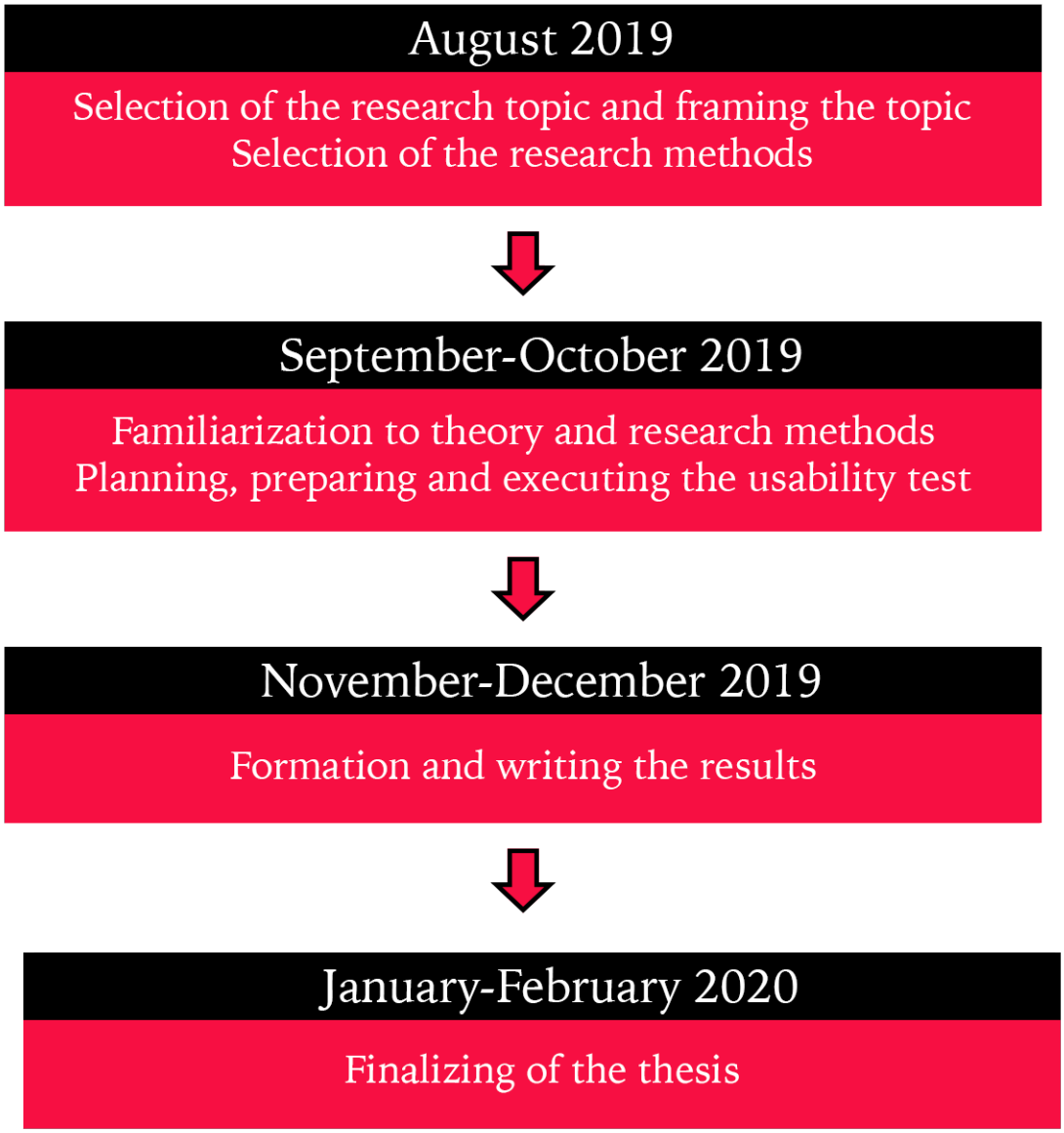


Figure 3. Progress of the research process

The research process started in august 2019 during the trainee internship, by choosing, forming, developing and framing the research subject. The time of the autumn turning to the winter was filled with researching more about the theory, research methods and forming a theoretical framework, while simultaneously planning, preparing and executing usability test. Before the actual usability tests, there were two pilot usability tests to try out the questions and the pace of the usability test. After both pilot usability tests, corrections were made to the questionnaire. After the pilot usability tests, the rest of the interviews were executed. Some little corrections to the questionnaire were made in the test day after the first participant. Next week after the usability tests, the answers were transcribed and analysing started. After analysing the results, it was possible to compare the results to the theory and make conclusions

4.2.1 Qualitative research

Qualitative research gives researchers a lot of options on how they want to execute the research they are doing. Qualitative research is an umbrella concept for a whole lot different ways and methods to perform a research. Because qualitative research is not just one whole and unified approach, but it draws on more than one philosophical and disciplinary root, it relies on several methods of data collection and analysis (Erikkson & Kovalainen 2008).

Quantitative research uses measurable data whereas qualitative research is primarily exploratory research, and it goes deeper to humans social and cultural background. Because of this difference, it is often mistaken that one can only do either qualitative or quantitative research, but they often overlap. It is much easier to compare them than define them. Erikkson and Kovalainen (2008) have defined some of the major differences between qualitative and quantitative research. Quantitative research cannot deal with the social and cultural construction of its own "variables". This refers to one of the major interests of many qualitative research approaches, that is, understanding reality as socially constructed: produced and interpreted through social and cultural meanings. Qualitative research approaches, therefore, are concerned with interpretation and understanding, whereas quantitative approaches deal with explanation, testing of hypothesis, and statistical analysis.

According to Hamza & Antwi (2015) qualitative research is the right choice if little is known about a topic or phenomenon and when one wants to discover or learn more about it. It also centralizes on a local perspective and sometimes to comes up with or generates new hypothesis and theories. Qualitative researchers often view human behaviour as being fluid, dynamic, and changing over time and place. They usually are not interested in generalizing beyond the particular people who are studied.

For this research, the qualitative research approach was selected because of the nature of the research. This research wants to understand the research phenomenon, experiences of web and mobile services supporting the user in analysing

trainings, comprehensively. Aim of this research is not to find right answers or truth, but understand and describe the phenomenon profoundly. To solve athletes subjective vision and experiences on the topic, it is natural to use such a method which allows them a way to express themselves and tell their experiences freely. Because of this, theme interviews and the case study was selected to be the research methods in this research.

4.2.2 Theme interview

Semi-structured theme interview is, for its formality, in between a structured interview, where is rigorous set of questions whence interviewer cannot divert, and an open interview, which is quite loose situation. The most known open interview is probably a job interview. (Hirsjärvi & Hurme, 2001) In this research, it was decided to use a semi-structured theme interview as a research method, because interviews are very suitable for consumer research. Interviews are one of the main methods of data collection in qualitative research (Ritchie & Lewis, 138).

A semi-structured interview employs a beforehand made questionnaire and the questions are the same for all interviewees, but there are no ready-made alternatives for answers. A theme interview is an applied version of a semi-structured interview, which is one of the most used form of interviews. This form of interview gives space for interaction between the interviewer and the interviewee. Methodologically, a semi-structured theme interview brings up interpretations,

meanings that the people have given to the things. How meanings are born in interaction are highlighted (Tuomi & Sarajärvi, 2006).

More loosely said, theme interviews are conversations where the interviewers know what they want to find out about, have a set of questions, and a good idea what topics will be covered. Theme interviews vary a lot. In one end, the questions are quite simple and the order of the questions is easy to follow, in the other end, the questions can be very open, and the conversation can take many directions before all the areas are covered. The amount of structure will depend on the research questions being asked. The more complex the questions are the less they need structured formats (Miles & Gilbert, 2005).

5 Usability testing

5.1 Test preparations and procedure

Usability testing was chosen to be a method used in this research because of the nature of the research and the research question. Preparing the usability test was an iterative process. I made two pilot usability tests for my co-workers who were part of Generation Z. After both test sessions, I made corrections to the questionnaire.

Usability testing has existed roughly since the 1980s, one of the first mentions about it is from 1981. Alphonse Chapanis and his students applied it to product design. Usability testing did not just pop out from somewhere, but it has originated from experimental methods of psychology, particularly from cognitive and applied psychology and human factors engineering, and is strongly tied to the concept of iterative design (Lewis, 2006).

Carol M. Barnum argues that usability is originated from the 1990s, and it was a formal process employing the methods of experimental design. As such, it was expensive, time-consuming, and rigorous. The laboratory premises, where such tests were conducted, were managed by usability experts who typically had education and training as cognitive scientists, experimental psychologists, or human factor engineers. Because tests were viewed as research experiments, they typically required 30 to 50 "test subjects" (2011).

Usability has come a long way since Barnum's definition of it. Nowadays usability testing is a common way to evaluate the research product's or service's usability before launching them. Usefulness is a combination of utility and usability, which both need to be carefully considered. Usability makes functions easy and pleasant to use, whereas a utility is about providing functions that users really need (Soegaard, 2018)

In this research, the usability testing was conducted with interviews and observations on user tasks with Polar Electro's Flow web and mobile service. The findings of this research might be exploited in further development.

The purpose of the interview was to examine Polar Flow service's information content. Especially, it targeted to find out, if the service was serving its purpose among younger users, Gen Z. It was not relevant for this research whether the interviewee was familiar with the Polar Flow service or not, and in both cases, the usability test began from the same spot. If the participant was not familiar with Polar Flow service they got a brief introduction of what the service was for: Shortly in the application has the measurements from Polar device, information about the activity, sleeping, and training. The participant was asked to imagine that they have used Polar's watch for some time and they have recorded their training for this application.

Graphics, information, and usability were the base for the interview questionnaire, these themes derived from TAM (Technology Acceptance Model) (Burney

et al., 2017). Graphics derived from design features, information derived from perceived usefulness and usability from actual system use.

The usability test started from Polar's Flow mobile application. At first participants got to interpret the weekly summary view (figure 4). It shows all the training during the week and more information about the training sessions and their effects. As the second view, the participants got to see the activity view (figure 5), which shows information about daily activity and sleep. For both of these views, the same questionnaire was used, evaluating the informativeness, the graphics, and usability.

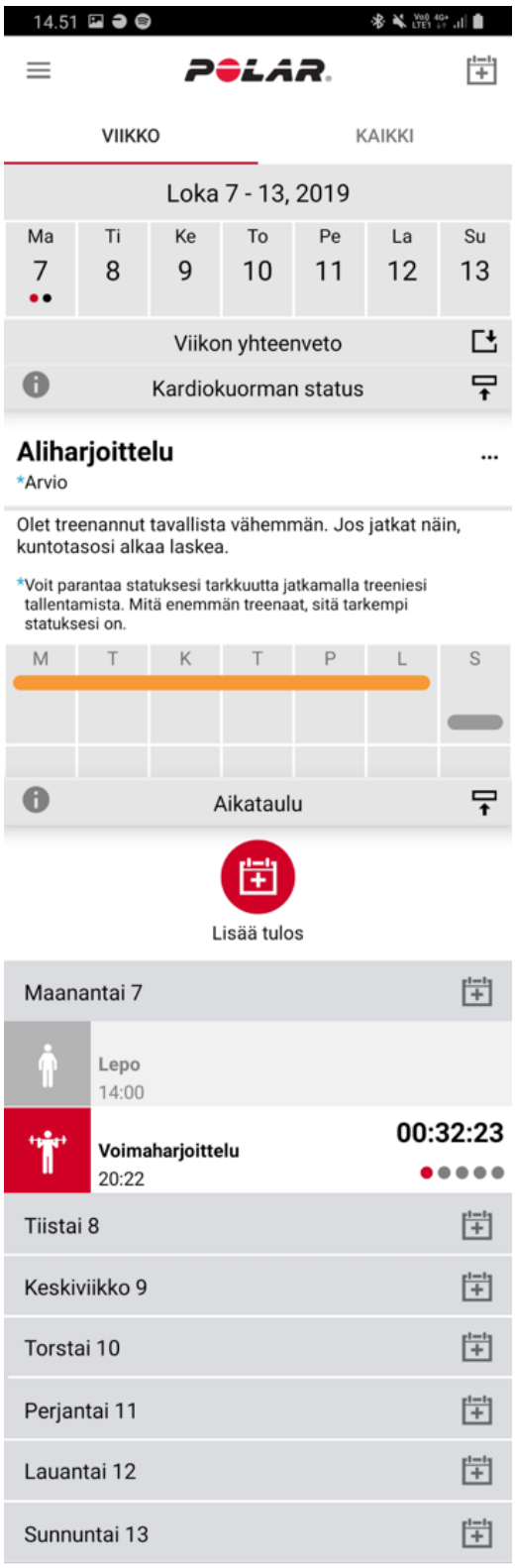


Figure 4. Weekly summary

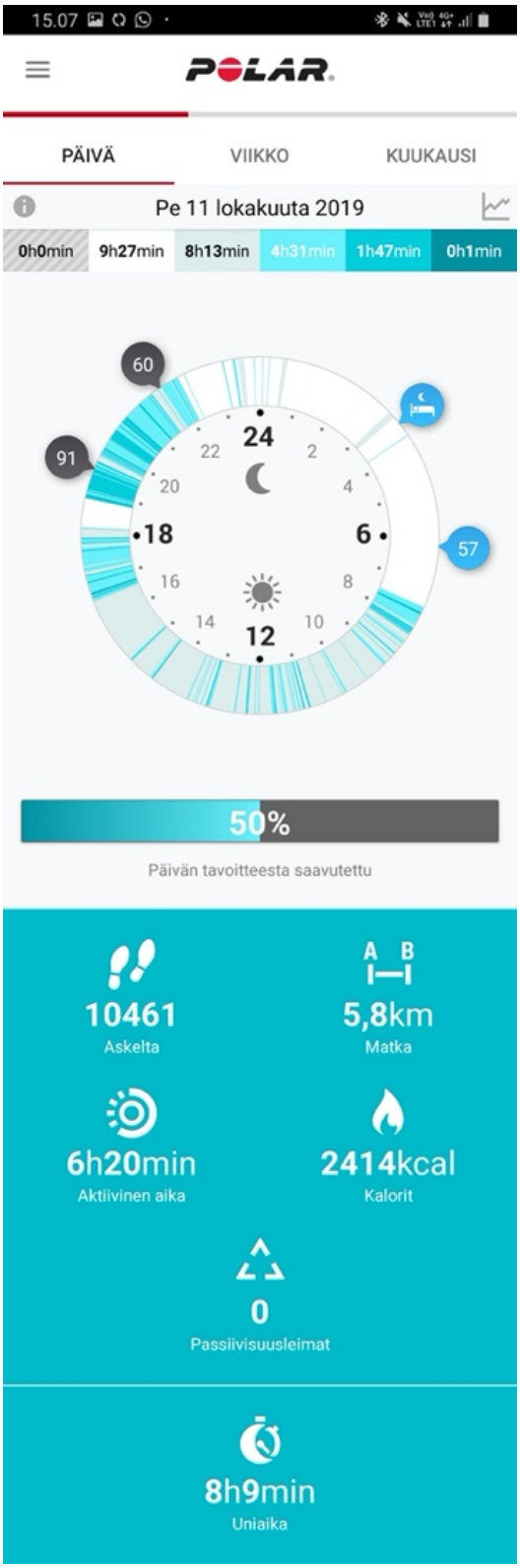


Figure 5. Activity view

After going through the questionnaire in mobile app UI, the view was switched to the web service. Still, the same questionnaire remained, and only the views changed. The first UI view that participants saw in the Polar Flow web was the Diary view (Figure 6). This gathers together the whole month's exercises, tests, and own notes.

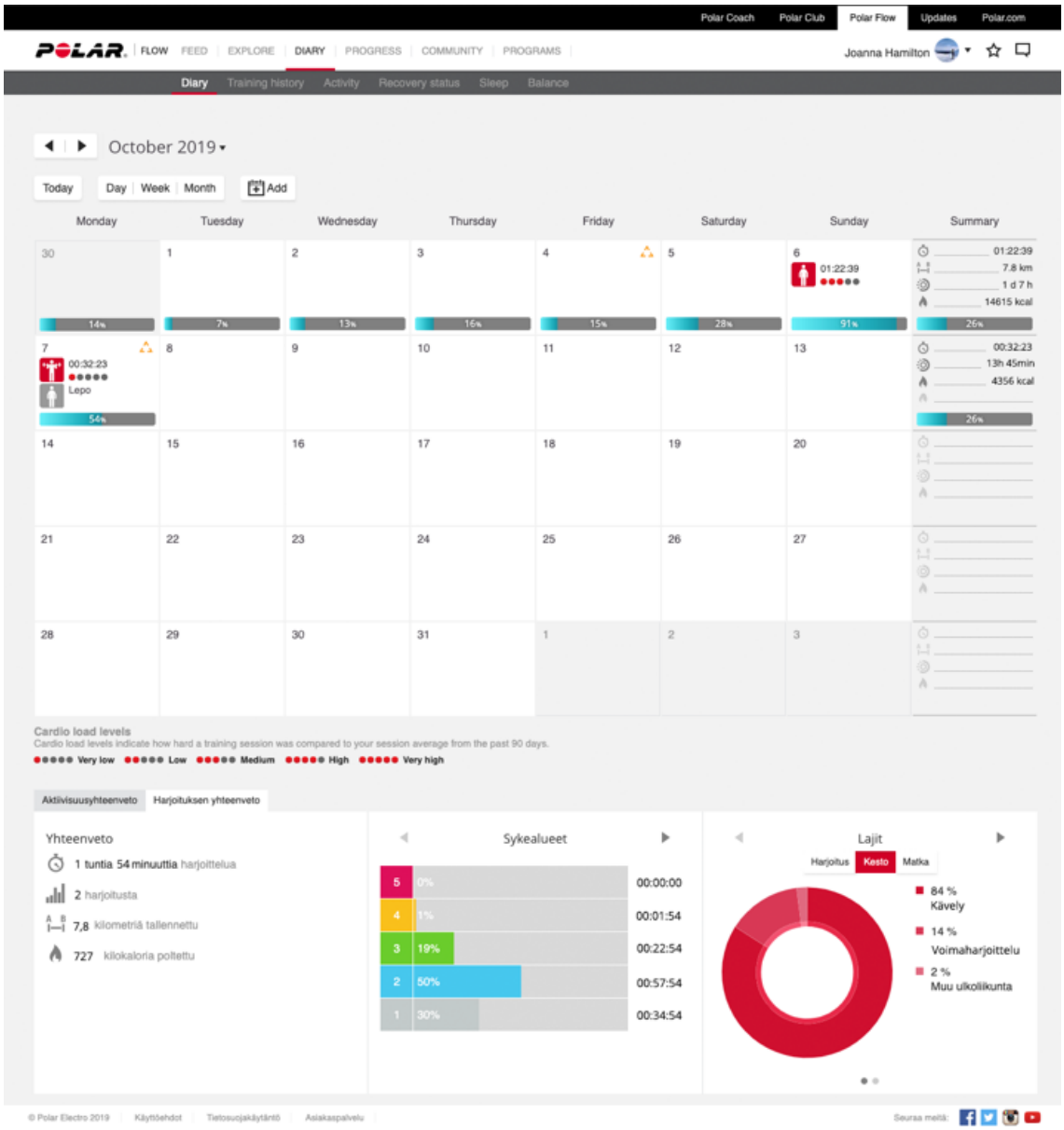


Figure 6. Diary in Flow web

Some of the questions were formed so that they targeted the information about the exercises, and whether the interviewees were satisfied with the analysis of the exercises, and how things were presented in the UI view.

Participants were asked to interpret three different exercises. They were asked how the training had gone, and how they interpreted the training, and what were the UI elements they used to interpret the training. The interviewees were also asked to name the most interesting thing in every view. For the training views, training specific questions were added. The three different exercises and views the participants got to answer questions about were the following: strength training, swimming and jogging. In the strength training (figure 7), there was only the heartrate graph to analyse. Swimming (figure 8) was chosen because on Polar Flow service, the UI view differs from the strength training and jogging (figure 8). To avoid the bias, these three sports were not presented in the same order for every participant.

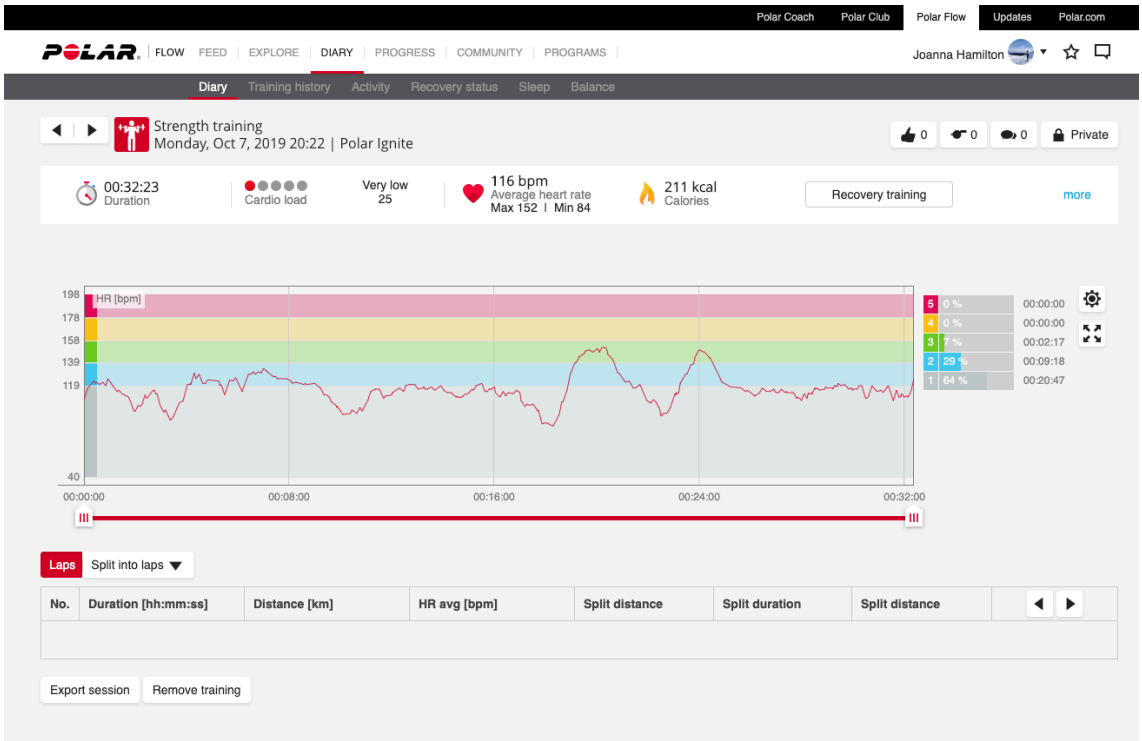


Figure 7. The strength training in Flow service

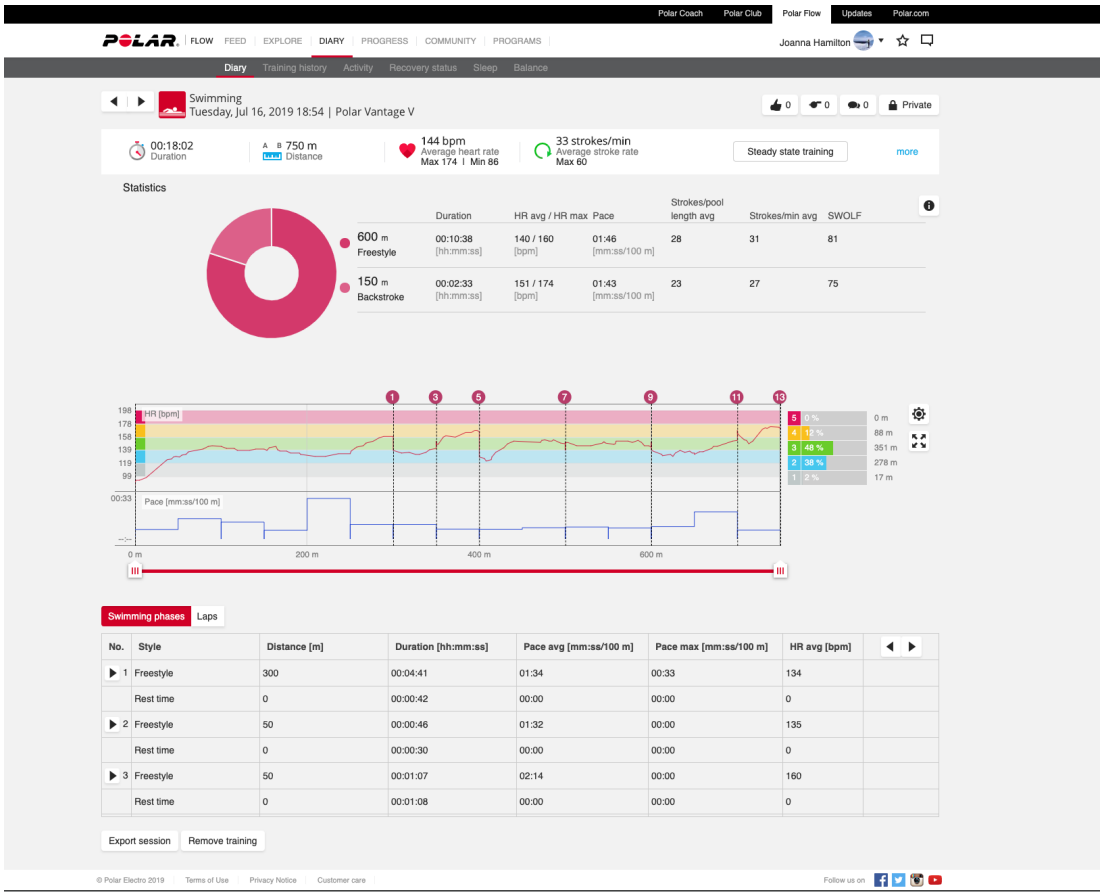


Figure 8. The swimming training in Flow service

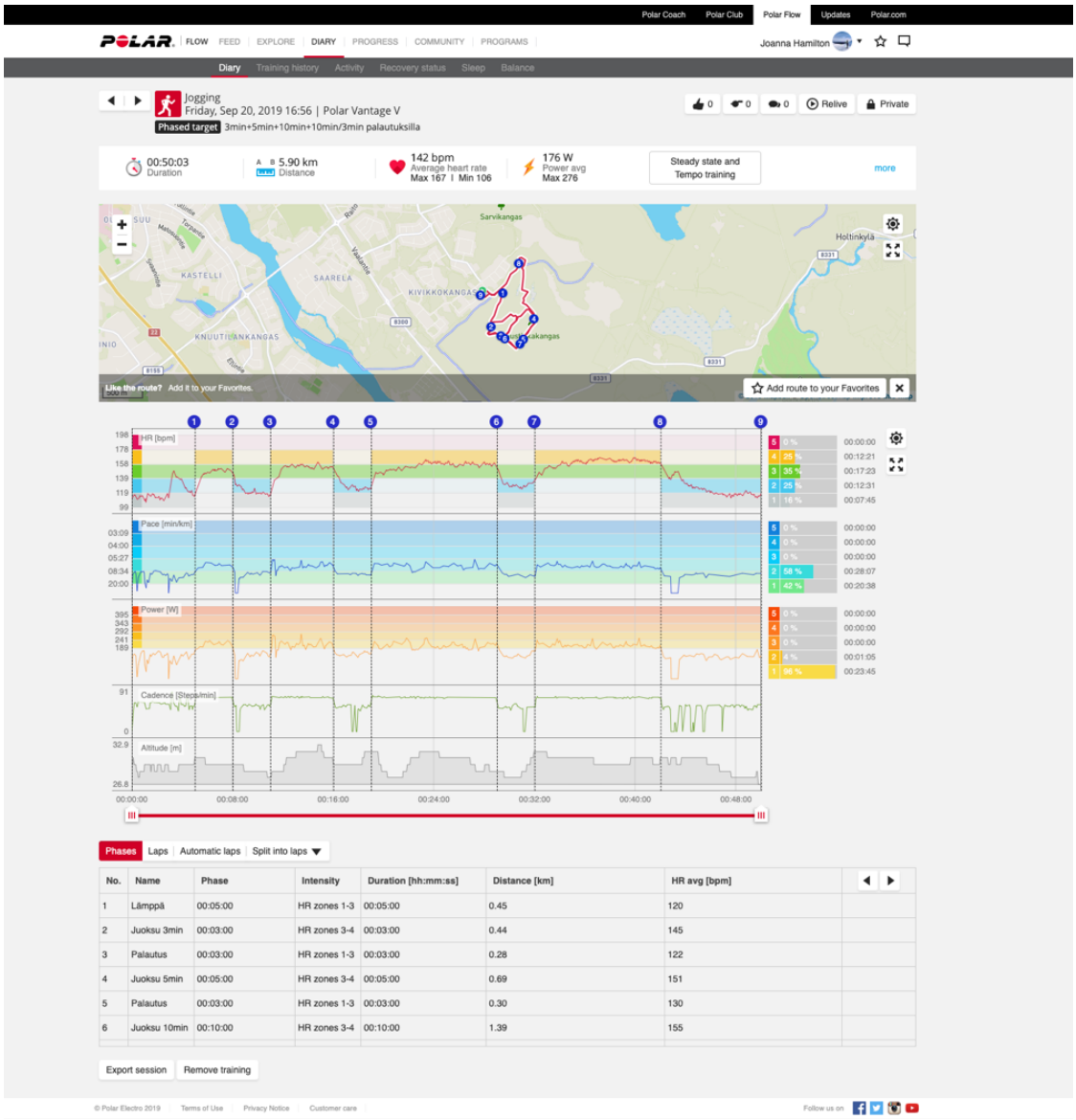


Figure 9. The jogging training in Flow service

There was a so-called bonus question after the last training analysis question and view. The participants were asked whether they would want to see some 3D elements, animations, video on their training analysis view. And whether interviewees would want to share their training results on social media.

After going through all three pieces of training and asking the training questionnaire was time to move to Training report (Figure 10). If the participants did not

have their own Polar Flow account there was a test account they could see all the views. The interview was planned based on three different pieces of training, some strength training, some swimming exercise, and jog or running exercise. Because these views differ a lot from each other. The same questionnaire as for Dairy and mobile views was presented also for the Training report view.

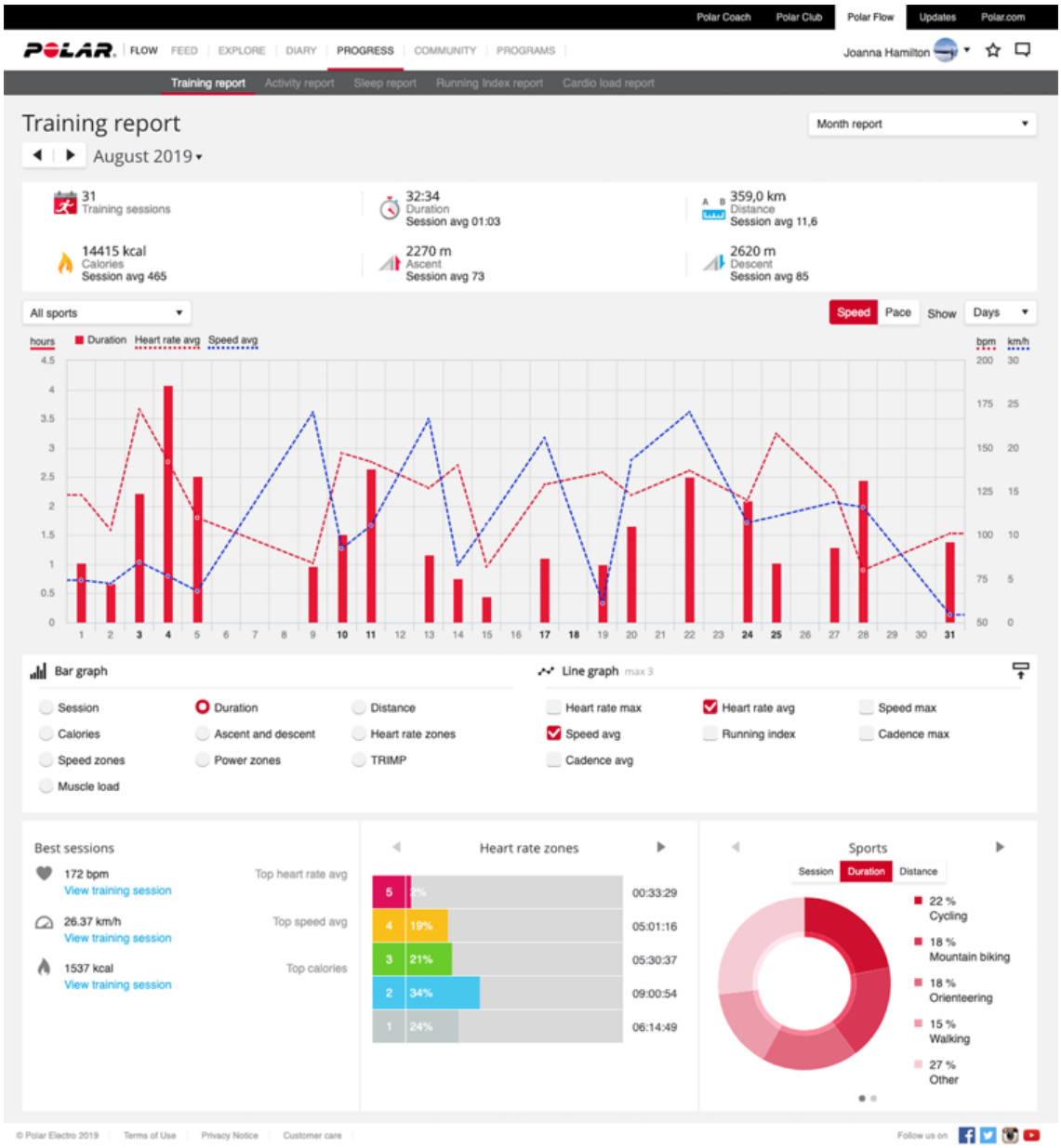


Figure 10. Training report in Flow service

After the Training report questions were the last subject for the question, the orthostatic test (figure 11). It monitors the balance between training and recovery. The test is based on the training-induced changes in the function of the autonomic nervous system (Polar, 2019).

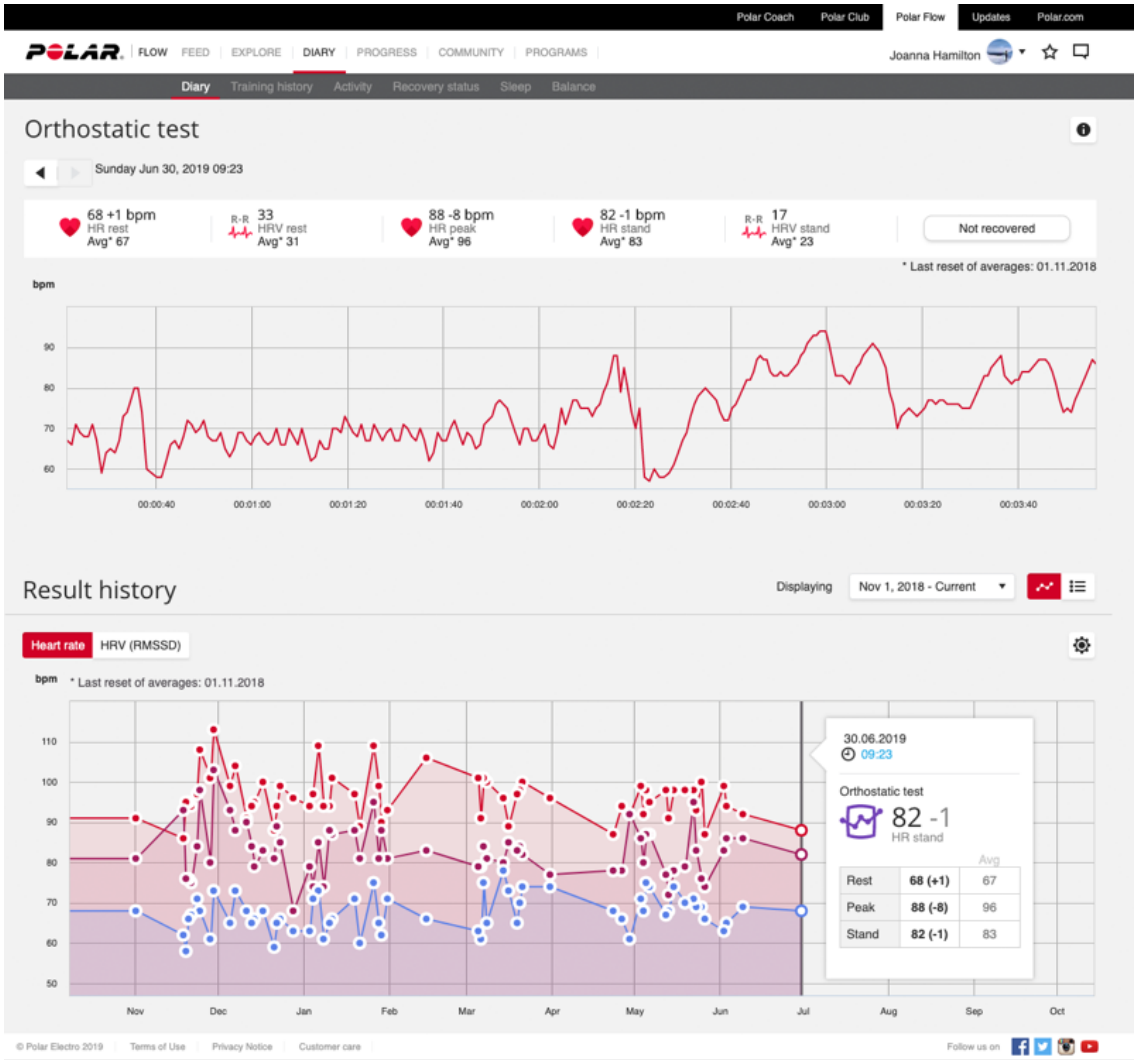


Figure 11. Orthostatic test in Flow service

The usability test was videotaped, and I made notes during the usability test. Participants' actions was observed and recorded, and I answered on possible

questions about the questionnaire and views neutrally during the usability test. The results of the usability test were reported so that the participants stayed anonymous.

5.2 Creating and collecting material

The research literature was exploited from libraries, e-books, and different databases. The research material itself was collected from the usability test and interview of Polar Electro's mobile and web Flow service for athletes to monitor their progress, training, recovery, and sleep.

The criteria on choosing the participants for usability tests was that participants should be athletic, and have some team sport or sports background. Still, there was no minimum requirement on how much participants should train or how competitive oriented the training should be. The requirement for the participation was that the person fitted to the target group of Generation Z from sixteen-year-old to twenty-three years old. There were no limitations if participants had used Polar Flow service before, because the aim of the usability test was to evaluate Flow application and web service graphical content. The test was not focused on how well the participant was managing in using the service already, but to research how easy or hard using the service was.

There were six participants who participated to the test and the interviews in it. The participants were Finnish men and women, ages 18-22-year-old. Participants were from different sports club, had different backgrounds in sports. In table 4 is more information from each of the participants. Almost every participant was a competitor in the national team in their sports. Few of the participants were not familiar with Polar Flow service or did not have an account in Polar Flow, and they got to examine **test account** in the usability test.

Interviewee's gender and age	Sport background	Targets in sports	Actively competing	Device(s)	Duration	Code
Woman 22 years	Trial runner in local team	Own records, get points in Kalevalan competition	Yes	M430	34 min	U1
Woman 22 years	High jumper in local team	Lot of injuries, no specific goals at the moment	No	Years ago Polar Loop 2, A370 and now Ignite	40 min	U2
Man 18 years	Orienteering in local team	Has trained goal oriented for 2-3 years	Yes	Suunto	43 min	U3
Woman 18 years	Biathlon in local team	National team in biathlon	Yes	Suunto	49 min	U4
Man 19 years	OHS skier, main sport skiing secondary sport biathlon	National team in skiing	Yes	First was RCX3, M400, M430, V800 and now Vantage V	67 min	U5
Woman 18 years	Swimmer in Oulun Lohet, national team	National team in swimming	Yes	Vantage V	38 min	U6

Table 4. Background information of the interviewees

5.3 Analysing material

Briefly after the interviews, I started transcribing the material. After transcribing, I read the material several times. I coded the answers in different colours so I could separate who of the interviewees had answered what, still maintaining the anonymity of the participants.

The purpose of the analysis is to clarify and compress the material, still preserving the information material is telling. There are two different ways to analyse material, either quantitative or qualitative method (Hirsjärvi & Hurme 2001, 180). In this research analysing the material was made qualitative since it was suitable for the research question and the research method. The material is partly familiar to the researcher even before the real analysis. Still, researcher should read the material as a whole and should read the material many times through. The analysis of the material also depends on how familiar the researcher is with the material. (Hirsjärvi & Hurme 2001).

The term *method* originally meant the way to reach the goal. The material of this research was collected with semi-structured interviews in a user test, so the analysing method is thematizing. The purpose of thematizing the interview material is to clarify the theme of the study (Steinar & Brinkmann, 2008).

For qualitative research, it is typical to do an inductive inference. Thematic analysis is suitable for qualitative research, and popular method for qualitative data analysis. Thematic analyses go beyond counting explicit words or phrases and focus on identifying and describing both implicit and explicit ideas within the data, those are called themes. After thematizing comes coding, codes are developed to represent the identified themes and applied or linked to raw data as summary markers for later analysis (Guest, MacQueen & Namey, 2011)

Thematic analysis as a process is widely spread. Still, there is relatively little written about it to actually help people learn the technique, and in some rare cases the persons seem to have an intuitive grasp of the process (Boyatziz, 1998). The researcher needs to analyse the material in a way to find patterns in material, which will form a theme. Themes can be identified in many ways. They can be identified at the manifest level, which is directly observable in the material, or in latent level, underlying the phenomenon (Boyatziz, 1998).

Thematic analysis is a method for systematically identifying, organizing and offering insight into patterns of meaning, themes, across a data set. It gives the researcher a way to make sense of collective or shared meanings and experiences. Method is not about identifying unique and idiosyncratic meanings and experiences found only within a single data item. This method is a way to identify what is common in material and making sense of those commonalities. That itself is not meaningful or important, but the patterns need to be important in relation to the research question. Data set can give numerous patterns, but the purpose of

the analysis is to identify those that are relevant for answering a particular research question (Cooper 2012).

8 Discussion

The purpose of this research was to get acquainted with the generation Z and study their interest towards a sports information system. In order to find that out, it was crucial to study their characteristics, way of thinking, and the use of the technology. In the main role of the research was conducting an interview for the target group, the young competitive endurance athletes. The target group was defined by from Polar Electro's assignment, as they wanted to know whether their service, Polar Flow, was interesting for young endurance athletes.

8.1 Answering to the research questions

There were two research questions for this master's thesis. They focused on understanding the user's needs and desires towards Polar's Flow service. The users were limited to a certain group, the generation Z. The first research question was the following:

Q: Is the Polar Flow service in its current state interesting to young users?

From the interview results could be concluded that the representatives of generation Z found Polar Flow service interesting. The service itself was consistent and pleasant, with all the information about training, activity and sleep. These young athletes that were in the interviews looked at the data extremely keenly. The

young seemed engineer like, as they were very analytical. They appreciated the accurate information the service provided for them.

The interview revealed generation Z to be perfect examples of users who follows Soegaards "The 5 Characteristics of Usable Products" (2018). The first two characteristics are **effectiveness** and **efficiency**, even though they might have become a bit blurred, are quite different from the usability perspective. Effectiveness concentrates on whether users can complete their goals with high degree of accuracy (Soegaard, 2018). Effectiveness in the interviews was best emerged while the heartbeat graphs were presented to the interviewees. The interviewees were satisfied about the looks of the graphs, and they got the information what they wanted quickly.

As Soegaard (2018), has listed the Efficiency to be on second on the list, and I agree with him based on the interviews. The interviewees were really keen on the effectiveness. They really did not want their time to be wasted on something which was not important to them. The desire for effectiveness was seen also indirectly. They did not name that something was not effective, but hoped that they could see information that mattered to them with only one glance.

Q: What are the elements which make the service interesting to young users?

Young athletes really appreciated the consistent design in the service. No matter what kind of training was under examination, they recognized the summary box on top of every data. Accurate data was the key element for the young endurance

athletes. They were national level competitive athletes, and they needed accurate data to support their training. The participants of the usability test were practically pro athletes, which means that they were nearly professionals on interpreting their body and its functions. This means that the data concerning anything that could have an effect on their wellbeing and training was the most important knowledge for them. Accurate data for them did not concern only the heartrate measurements in the training, but also the information about their sleep and recovery.

There were quite many interesting elements that came up in the interviews. Some of them were something the interviewees answered, and something was clearly interesting and important form the unsaid. Interviewees thought that Flow service was really simple and clear, and easy to operate. Nor was the service at all blunt or boring, but it was really nice looking as they put it.

It may be speculated that the results of this research might have differed somewhat if there would have been a different group of young athletes in the interviews, for instance a diverse group of athletes from different athletics. Endurance athletes were however chosen because Polar Electro is a company of which products are mainly targeted for endurance athletes.

Based on the research results I made some development suggestions to Polar's Flow service. A bigger issue was found during the research, namely that Flow service has amazing functionalities, but they are so hidden that users cannot find them. If the users cannot find them these functionalities do not exist to them.

8.2 Reflection on the research

In this chapter I will reflect on the research and present personal thoughts about it. The Generation Z was quite unfamiliar to me, and I needed to do really deep research about it. It was not an easy task because the generation Z is rather new concept and yet has not a specific definition. Before the interviews I studied the generation Z so I could create a foundation for the comprehension of who they are and what could be expected from them.

After the literature study I wanted to conduct an interview where I could compare the knowledge about them gained from reading, and if they lived up to this definition. What I had learned was that impatience could be expected from the generation Z. In the interviews I did not notice as strikingly as expected based on the reading. I suspect that the choice of sports may have something to do with this. I also think that a mindset of an athlete might be the key which makes the difference in characteristics compared to the generation Z description in general. An athlete knows that things just do not happen without serious work, and to be the best, you need to work hard to gain it.

The generation Z was described to be rather different from the earlier generations because of the technology centric world where they had been born to. They were described to expect that everything is ready before they even think about it, or that there was always an application to handle some task they needed to take care of. Based on the interviews, I believe that at least when it comes to the sports,

the generation Z relates it somewhat differently than described in the literature. It might be that the influencing characteristics came from the goal-oriented training, because they knew that they needed to pay attention to the little details. The seconds are the things which matter on elite sports.

Prior to the user study, I had some anticipation what the results could be related to. I thought that the interviewees could pay more attention to the lack of animations and videos in the service. That anticipation was proven rather quickly wrong. The real thing where young did pay attention was the raw data about their training and things that supported it.

The purpose of the research was to study Polar Flow's content, and whether the content was presented in an interesting way to young endurance athletes. To research this, I familiarized myself with Polar Flow service so I could make the interview questionnaire about the service. Through the interview, which was semi-structured theme interview, I wanted to find out what young think about the service and is there some things that could be improved. The focus was on three different factors: the information, graphics, and usability.

Because I am an industrial designer doing UX (user experience) design, I needed to get acquainted also with user experience design principles. The research adapted user experience methods on evaluating the design from the viewpoints of digital natives. I built the interview along the Technology Acceptance model for usability factors. I had never before arranged a usability test, so I needed to familiarise myself with the method. I was really happy how well the usability

test went, and also about the results of it. Still, during the writing process, I kept having these ideas how I could have asked something differently, or that I forgot to ask something.

All in all, working on this research taught me much new. I got to familiarise myself with user-centered design from the perspective of research. I personally think that my education in industrial design has given me the foundation to understand a user with any platform, no matter if is it a physical product, service or application.

There are two factors that needed to be considered to evaluate the research, validity and reliability. The validity of the research means the ability of research methods to measure what was purposed to measure. Ways to assess the reliability of the research are many, one of them is the repeatability of the research (Hirsjärvi, 2007).

This research is followed a general scientific policy, well-known research methods and honesty. The references used in the research have been scientifically reliable, such as books and research articles. The internet references have been published by universities and well-known sources. The participants of the interview were voluntarily involved to the research. They got small Polar related gift after the interview. Every form and the interview materials has been handled with anonymity.

8.3 Future work

The research has been interesting and productive. During the process some further research topics arose, and I see that this topic is not nearly studied to the completion. Here, the platform for the research would stay the same, the Polar Flow service, but the research would be conducted from different angles.

If the research on this subject was continued, it would be interesting to scale it to an international study. It would be interesting to perform the same interview as I conducted in Europe, Asia and United States to the representatives of generation Z and compare the results. It would be curious to see if there were some profound differences between the characteristics of young endurance athletes regardless of the culture and the country.

Other direction that the further research could take would be to expand the target group. It would be beneficial to gather more representatives of generation Z from different sports. It would be interesting to know is the results of this research associate more with the chosen sports or age. It would be interesting to study if the study if the interview results from other than endurance athletes would differ somehow.

9 Conclusion

This research concentrates on wearable sports technology, and more specifically on sport watches and the web and mobile service where the data from the device is gathered in. The research focused on the Polar Flow sports information system presenting the data collected by the Polar devices, and young endurance athletes. The purpose of this research was to study how well Polar Flow service serves the young users, focusing on generation Z. Especially, the thesis aimed to study if the content was relevant, interesting and up-to-date from their perspective. The goal of this thesis was to define the needs and wishes of the target groups. In order to find out these matters, I also needed to get to know the target group, the generation Z. User experience methods were used in the evaluation.

The research was successfully restricted to a clear target group, which was used in the a user study. The six participants of the user study got to interpret two of Polar Flow mobile application UI views and six web UI views. The results revealed that Polar Flow is in its current state interesting to the young endurance athletes. Based on the user study, UI design proposals for improving the user experience were made. Elements, which make the service interesting are the following: the consistent design and accurate data about training, sleep and recovery.

The young participants in the user study could be referred as pro athletes because almost all of them competed on the national level. It can be speculated that the

satisfaction with the service associates also with the sports background, and not only with the age. This would be an interesting direction for future work.

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Attachment

The email for the sports clubs

Sähköposti urheiluseuroille

Hei,

Olen Jessica Lammela Polarilta, etsimme 16-23 vuotiaita urheilijanuoria käytettävyystestiin Polarille, jossa tutkimme Polarin mobiili- ja websovellusta.

Tutkimus tehdään pro gradu loppututkielmaani varten, joka tutkii diginatiivien näkemyksiä urheiluteknologiasta.

Haastattelu tehdään Oulun keskustassa Scandic hotellin tiloissa ja se kestää noin tunnin. Osallistujat muistetaan vaivannäöstä. Haastatteluun voi osallistua 10.-11.10. (to ja pe) kello 08:00-20:00 aikavälille, voit ilmoittautua suoraan osoitteessa www.vello.fi/polarelectro. Tutkimus suoritetaan Scandic Oulu City hotellissa osoitteessa Saaristonkatu 4 (Finnkinon vieressä).

Olisiko mahdollista, että jakaisit tätä seuranne jäsenille?

Rakkaudesta urheiluun,
terveisin Jessica Lammela
0400523795
jessica.lammela@polar.com

Vastausviesti

Moikka!

Aivan mahtavaa, että pääset osallistumaan haastatteluuni!

Haastatteluun voit varautua rennolla mielellä. Haastattelussa emme arvioi sinua, emmekä sinun toimintatapojasi vaan sovellustamme. Olemme siis enemmän kuin kiitollisia, jos annat palautetta ja esität mielipiteitäsi sydämesi kyllyydestä. Kaikki ajatuksesi ovat meille kullanarvoisia.

Mikäli kuitenkin käy niin harmillisesti, että jostain syystä estyt tulemasta jo varaamaasi aikaan, soitathan minulle puhelinnumeroon 0400 523 795.

Rakkaudesta urheiluun,
Jessica Lammela

Presentation of the interview

Haastattelun esittely

Hei mahtava, että pääsit tulemaan! Ensimmäisenä kirjoitetaan NDA eli salassapito sopimus.

Minä olen Jessica Lammela ja vedän tämän haastattelun. Olen ensimmäistä kertaa vetämässä tällaista käytettävyystestiä, eikä asioiden tarvitse mennä niin kuin Störmössä. Testi saa edetä täysin omalla painollaan rennosti eikä siitä tarvitse murehtia. Tässä tilanteessa ei ole tarkoitus arvioida sinun tekemisiäsi, vaan havainnoida Polar Flow sivun käytettävyyttä.

Haluaisin myös videoida koko tilanteen. Onhan tämä sinulle ok? Kamera tallentaa sinun tekemisiäsi ja tallenteita käytetään vain ja ainoastaan haastattelun purkamiseen muistin tukemiseksi.

Haastattelun aikana pyydän sinua käyttämään Polarin web- ja mobiilipalvelua ja esitän niihin liittyen sinulle kysymyksiä. Toivomme, että vastaat esittämiini kysymyksiin täysin rehellisesti ja kainostelematta. On todella tärkeää, että ajattelet ääneen ja kerrot suoraan reaktiosi ja ajatuksesi, nyt on tilaisuus antaa palautetta täysin suoraan.

Tarkoituksena ei ole testata miten hyvin sinä suoriudut tehtävistä, vaan tutkia kuinka helppoa tai vaikeaa käyttäminen on. Eli en arvioi sinua, enkä mielipiteitäsi vaan meidän palveluamme. Eikä tarvitse huolehtia, että loukkaisit kenenkään tunteita, sillä en ole suunnitellut miten asiat ovat palvelussamme tällä hetkellä. Tästä syystä olen kiinnostuneita palveluidemme käytettävyyden kehittämisestä.

Onko sinulla jotain kysyttävää? Oletko valmis aloittamaan?

Get to known chart

Kerro hieman itsestäsi:

Onko Polarin laitteet sinulle tuttuja? (Onko sinulla joku laite käytössä?)

Onko sinulla kokemusta kelloista ja/tai urheilu- ja hyvinvointisovelluksista?

Minkälainen urheilutausta sinulla on? Oletko jonkun seuran jäsen?

Oletko minkä ikäinen?

Kuvaile tyypillistä viikkoasi, minkälaisia harjoituksia se sisältää?

Urheiletko jonkun ohjeen mukaan? Onko sinulle treeniohjelma?

The questionnaire

Haastattelu

Alustus mobiili: Onko Polarin sovellus sinulle tuttu? Jos on 1. jos ei 2.

1. Olet käyttänyt Polarin kelloa jo jonkin aikaa ja tallettanut treenejäsi ja dataa Flow palveluun. Nyt edessäsi on siis… mikä näkymä?
2. Ei haittaa ollenkaan, vaikka Polarin sovellus ei ole sinulle tuttu, tutustaan siihen nyt yhdessä. Sovelluksessa lyhykäisyydessään on kellolla mitattuja tietoja aktiivisuudesta, unesta ja treenauksesta. Kuvittele, että olet käyttänyt Polarin kelloa jo jonkin aikaa ja tallettanut treenejäsi ja dataa Flow palveluun. Miltä tämä näkymä näyttää?

Alustus web: Vaihdetaan nyt puhelimesta tietokoneelle, näet myös web versiossa samanlaisia tietoja kuin puhelimessa. Kirjaudutaan Polar Flow nettipalveluun henkilökohtaisilla tai laina tunnuksilla.

Kysymyspatteristo

Alleviivatut kysymykset esitettiin silloin kun näkymänä oli jokin harjoitusnäkymä

- Miltä sivu näyttää ensi silmäyksellä?
- Onko sivu selkeä?
- Onko sisältöä sopivasti?
- <u>Miten harjoitus on näkymän perusteella sujunut?</u>
    - <u>Miten se on edennyt?</u>
- Onko näkemäsi tiedot mielenkiintoisia?
- <u>Minkä elementtien kautta tulkitset treeniä?</u>
    - <u>Esimerkiksi sykealueiden kautta?</u>
- Jos tämä sivu pitäisi pisteyttää mitkä pisteet antaisit?
    - 1… ei yhtään hyvä
    - 7… todella hyvä
    - Miksi?
- <u>Mikä on mielenkiintoisinta treenitiedoissa?</u>
- Onko jotain asioita mitä tällä sivulla ei ole, mutta haluaisit että näkyisi?
- Mitä olet mieltä sivun yleisilmeestä?

Viimeisen treeni näkymän jälkeen webissä kysyttiin seuraavat kysymykset:

- Haluaisitko jakaa treenituloksen someen?
    - Facebook, Instagram?
- Jos kuvitellaan, että haluaisit. Haluaisitko nähdä videon? Riittäisikö pelkkä kuva? Haluaisitko itse päättää mitä tietoja jaat?