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# Mobility aid user experience and the development ideas

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## Mobility aid user experience and the development ideas

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The purpose of this study was to investigate test user experiences and development ideas of the Veloped walker and its role in promoting health and well-being. A recent version of the Veloped walker is a type of mobility aid equipment that is built with mechanical construction only. A representation of an imaginary Veloped with information and communication technology (ICT) and integration of fitness equipment with technological features was an innovation by research students. The idea of the representation of imaginary Veloped got started from the fact that various research participants' denied their need for mobility aid. The motive was to enable a new viewpoint and attitude towards mobility aid device use. The goal of representation of imaginary Veloped is to investigate possible service elements for Veloped.

The scope of this research involves six recorded interviews collecting the insight of test user experience with Veloped walker. Participants' interviews contained three open-ended questions. Voice recorded interviews used the 'thinking aloud' method. Moreover, there were plenty of opportunities for participants to express their experience using the language and expressions familiar to them. Representation of imaginary Veloped service questionnaire involved seventy-five respondents.

Qualitative research method was applied in this thesis along with Action research approach - living theory. Living theory's ideal guide lined the representation of an imaginary Veloped into this thesis process. The data collected and analysis shall reflect user experience theories and the philosophical knowledge of Service Dominant (S-D) Logic. Outright of thesis theoretical framework supports these further actions. Research questions guided the data based content analysis.

Based on findings, this master's thesis describes the Veloped's test users' experiences and developmental ideas for the Veloped walker's suppliers. In order to develop services, these results could add to Veloped's value and aid co-creation of services. Findings are provided that working life partners could consider their further initializations. Additionally, thesis aims to influence the future of the health-promoting culture and give new insight for health care professionals within an innovative idea of integrating fitness technology and ICT in mobility aid.

Keywords, mobility aid, user experience, health promotion and well-being, service design, information and communication technology (ICT)

Niina Joronen & Margaret Kibatha

### Liikkumisen apuvälineen käyttäjäkokemuksia ja kehitysideoita

Vuosi

2014

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Opinnäytetyön tavoitteena oli tutkia Veloped rollaattorin testikäyttäjäkokenuksia ja kehitysideoita sekä sen roolia terveyden ja hyvinvoinnin edistämässä. Nykyinen Veloped rollaattori on rakenteeltaan mekaaninen liikkumisen apuväline. Kuvitteellinen Veloped on Veloped rollaattorin integraatio kuntolaiteteknologian ja informaatio- ja kommunikaatioteknologian (ICT), tietotekniikan kanssa. Kuvitteellisen Velopedin idea sai aiheensa siitä asianhaarasta, että moni tutkimukseen osallistuja torjui apuvälineen tarpeen liikkumisen tukemiseen. Motiivina oli aktivoida uusi näkökulma ja asenne liikunta apuväline käyttöä kohtaan. Kuvitteellisen Velopedin kyselykaavakkeella oli tavoitteena selvittää mahdollisia palvelumuotoja Velopedille.

Opinnäytetyö tutkimus käsitti kuusi Veloped rollaattorin testikäyttäjäkokenus haastattelua. Osallistujien haastattelu sisälsi kolme avointa kysymystä. Äänitetyissä haastatteluissa käytettiin 'ajattele ääneen' menetelmää. Tämä menetelmä mahdollisti osallistujien omien tuttuja sana- ja lausevalintojen käytön. Kuvitteellisen Velopedin kyselykaavake käsitti seitsemänkymmentäviisi vastausta.

Aineistonkeruu opinnäytetyöhön toteutettiin laadullisella tutkimusmenetelmällä. Toimintatutkimuksen menettely tapa - living theory, oli kuvitteellisen Velopedin ohjenuora tähän opinnäytetyö tutkimukseen. Aineistonkeruuta ja analysointia ohjasivat käyttäjäkokemus teorit, palvelumuotoilun filosofia. Kokonaisuudessaan opinnäytetyön teoriakehys ohjasi opinnäytetyön prosessia. Tutkimuskysymykset johdattivat aineiston lähtöistä sisällönanalyysiä.

Tutkimustulosten avulla opinnäytetyö toimittaa Veloped rollaattorin testikäyttäjäkokenuksia ja kehitys sekä parannus ideoita Velopedin toimittajille. Näitä tuloksia voidaan käyttää Velopedin palvelumuotoilun mahdollisessa yhteiskehittämishankkeessa. Lisäksi opinnäytetyöllä on toive vaikuttaa tulevaisuuden terveyden edistämisen kulttuuriin tällä innovatiivisella idealla integroida liikkumisen apuväline kuntolaiteteknologian sekä informaatio- ja kommunikaatioteknologian kanssa.

Avainsanat, liikkumisen apuväline, käyttäjäkokemus, terveyden edistäminen, hyvinvointi, palvelumuotoilu, informaatio - ja kommunikaatioteknologia

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## 1 Introduction

Would you think that rollator walker is just a simple walking frame which offers support for moving? Long-standing theory holds that belief. Habitually, rollators have been regarded as just simple walking frames that only offer support and assist in the movement for those who need it. This is true in principle. However, could a rollator walker be a service; inclusion of mobility support, fitness equipment machine and information and communication technology ICT?

The Veloped walker is a mechanical mobility aid device to support movement. The Veloped walker, as well as other assistive devices, are designed to complement a person's freedom, values, and equality status in their daily life (Klinger & Spaulding 2001.) Notably, mobility assistance devices' use is linked to aging, performance challenges and chronic diseases (Eizmendi & Azkoitia 2007, 21.) The prescription of assistive devices for elderly people and individuals with special conditions is an important measure to maintain or restore the ability at the highest possible level. Consequently, physical activity can help reduce pain, could help prevent further impairment, and promotes safety by preventing falls that often lead to hospital or care home intervention - a moment that is unfortunate. Mobility aid device, in other words helping equipment, enables activity and participation. Classification of Functioning Disability and Health (ICF) describes this context as social, physical and attitudinal environments. Existing research and studies show that the physical activity promotes health and well-being.

According to Eizmendi & Azkoitia (2007), there is a direct relation between aging and disability. A report from Finland's National institute of health and welfare (THL 2011) indicates that the use of assistive devices tends to increase as people age. Demand for helping equipments in the future is supposed to be on the rise due life expectancy which is increasing globally (WHO 2014.)

While people take advantage of mobility aids functionality, usability also needs to have an aim towards a desirable outcome. User experience theory framework claims that user experience is subjective and holistic. It has human, physical and operational aspects. Furthermore, service and service design elements gain proposals from user experiences (Jääskö & Keinonen 2004; Hyysalo 2009.) Describing the users' experiences is an essential part of ensuring integrity of the communication between the users and service providers. Clear and accurate message to service provider supplies development ideas worth investigating further. User experience techniques can be applied to describe empirical use,

but results do not reveal whether a different solution may deliver a more remarkable experience. (Portigal 2013).

One of the conceptual frameworks for service marketing is Service-Dominant (S-D) Logic. Its core idea is a mindset for a unified understanding of the purpose and nature of organizations, markets, and society. According to Lusch & Vargo (2004), the core idea is that the service is exchanged for service and therefore marketing thought, and practice should be grounded in service philosophy, principles, and theories. We refer to that philosophy with an inquiry, could a mobility device be the future's health program service? In our optimistic opinion, the answer is yes. Information and communication technology ICT provides a platform for new innovative traditions to operate in health care systems (Au 2012; Pereira, Duarte, Rebelo & Noriega 2014.) Eizmendi & Azkoitia (2007) have concerns that there is technology which has potential benefits to quality of life, but elderly people are far from taking advantage of it.

This thesis paper on the Veloped mobility aid user's experiences process provides information to the service provider which is essential for product and service improvement. Preliminary findings also reveal the public's attitudes towards mobility aids and that pose a challenge to health care workers; a problem of denial of the need of mobility aid. Denial is facing health care sector workers: how to promote physical health, performance and implications, and well-being?

This thesis was iterative in nature, and data was gathered in a qualitative methodology. For a data collection method concerning users' using experiences and development ideas of Veloped, interview method was chosen to provide authentic outcomes. The purpose of this study and the quality of the data leads to a deductive analysis method. Jääskö & Keinonen (2004); Hyysalo (2009) have created a concept for user experience that manifests in operational, physical and social components. Abductive attitude towards preliminary finding data was practical and led to the invention of the Imaginary Veloped service. A questionnaire about the Imaginary Veloped was integrated into qualitative research with action research's living theory giving the guidelines for research methodology. This questionnaire was presented to the public to fill in on three different standing desk occasions.

The results will be structured in a way that they can serve working life partnerships and health care parties to understand what a service concept consists. Additionally, these parties can value what is the key uniqueness and benefits of the service proposal suggestion. The findings of this thesis could assist in co-creating value for assistive devices' service area in health care sections by introducing a new service idea that patients could perceive in the future as consumers and customers.

The thesis begins with an introduction. Chapter 2 presents societal motivation behind the study, introduction of working life partners and the Veloped walker and background on previous researches on the mobility devices. Chapter 3 presents the theoretical framework for the thesis that is constructed by service elements and health elements and a literature review on the subject of what mobility aid devices could mean for health. Chapter 4 presents research design; the purpose of the thesis and the research questions, methodology used as well as the implementation of the empirical research. Chapter 5 presents the study's findings. Chapter 6 presents a discussion and evaluates the research process.

## 2 Societal background

This study investigates the users' experiences and development of Veloped walker and its role in promoting health and well-being. Helping equipments can support independent living. The initial motivation to understand users' experiences was because falling and dread of falling administrates people to hospitals and service homes. According to Kuntaliitto Finland (2014), supporting equipment is a tool which is promoting or maintaining an individual's performance or implication when health is weakened by illness, disability or aging.

As described by the National Institute for Health and Welfare (THL) Report (Terveys, toimintakyky ja hyvinvointi Suomessa 2011), mobility assistance equipment is used commonly among retired people in Finland. Nearly every third woman and every sixth man who is over 65 years is using moving helping equipment. Among over 75 years olds the figure is every second woman and every third man. The number has not increased since 2000 even though Finland's aging politics is supporting own home living and self-acting. This THL Report also underlines the fact that falling or the dread of falling is administrating people to service housing or hospitals. (Koskinen, Lundqvist and Ristiluoma 2012, 151-154).

Second motivation was the fact that worldwide, the average life expectancy is increasing. In developed countries, this growth in expected life years could lead to greater requests and wider selection of mobility aids. That need could benefit towards improving health and well-being in aging. The following figure shows numerically how life expectancy is forming to rise globally in all continents. (WHO 2014).

	Male			Female			Both sexes								
	<u>Life expectancy at birth (years)<sup>i</sup></u>			<u>Life expectancy at age 60 (years)<sup>i</sup></u>			<u>Life expectancy at birth (years)<sup>i</sup></u>			<u>Life expectancy at age 60 (years)<sup>i</sup></u>			<u>Life expectancy at birth (years)<sup>i</sup></u>		
	199	200	201	199	200	201	199	200	201	199	200	201	199	200	201
	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
Africa	48	49	55	14	15	16	51	51	58	16	16	17	50	50	56
Americas	68	71	73	18	19	21	75	77	79	22	23	24	71	74	76
South-East Asia	58	61	65	15	16	16	60	64	69	16	17	18	59	63	67
Europe	68	68	72	17	18	19	76	77	79	21	22	23	72	73	76
Eastern Mediterranean	60	64	67	16	17	17	63	67	70	17	18	19	61	65	68
Western Pacific	68	70	74	17	18	20	72	75	78	20	21	22	70	72	76
Global	62	64	68	17	17	19	67	68	72	20	20	21	64	66	70

Table 1. WHO's table of global life expectancy.

Table 1. WHO's table of world life expectancy.

## 2.1 mHealth booster project

The Laurea University of Applied Sciences is coordinating the mHealth booster project. The project started on August 1<sup>st</sup> 2013, ending December 31<sup>st</sup> 2014. Project funders are European Social Fund (ESR) and Finnish Centres for Economic Development, Transport and the Environment (ELY Centres).

Aim for the project is

- To promote and increase the growth of businesses located in Uusimaa and to boost the knowledge of the trade.
- To introduce more working places for mhealth industry and allocate these for unemployed ICT professionals.
- Capitalize companies' wellbeing technology developments, enable to familiarize one with products and provide testing in development environment.
- Ensure operational environment for research for personnel and students.
- Produce research studies of ICT products. (Laurea 2014).

The purpose of the project for Laurea Otaniemi with City of Espoo is

- To plan and co-create with the clients, professionals and entrepreneurs active and participative development environments.
- To find out how new mhealth products and services support health and wellbeing of the users.

Participants in the mHealth booster project Otaniemi will be clients; mainly elderly people living in their homes, various companies, Laurea's professionals and students. Operational environments situated in Soukka Service Centre and Tapiola Health Care Centre. (Brochure of Laurea Otaniemi 2013). Turvallinen Koti Company is our thesis working life partner and one of the participants in this project. It is providing an on-line shop on the internet. They sell safety equipments for elderly and people with special needs like mobility assistant device Veloped walker.

## 2.2 Veloped walker

This mobility assistance equipment is designed for comfortable and safe use of different environments and surfaces. Veloped's special attribute is a patent on the front wheel. Figure 1 shows Veloped, roller's technical specifications, and special accessories and supplement function qualities are in the list with list number of directing lines. The optional accessories among other things are LED lights, mini-pump, cable lock, and a walking stick rack. Veloped's warranty is for two years. Delivery is organized by the Post Office.



Figure 1. Veloped walker

Lightweight and sturdy aluminum frame.

Flexible front wheel - claims over up to 13cm.s barriers.

The front wheel has off-road and city positions.

Three-wheel frame always makes a firm grip with the ground.

12 " pneumatic tires help overcome obstacles and soften movement.

Snap hooks with removable rings.

Handlebar height adjustment. Two different models Medium and Large.

Brake levers with the parking brake.

Ergonomic handlebars, which can also serve as a backrest when sitting.

25cm deep seat made off waterproof fabric, which removes when not in use. In that case space is free for walking between handlebars.

Telescopic design, allowing quick assembly of Veloped.

Removable basket prepared off waterproof fabric and entailed zipper pocket.

**Dimensions:** Length 102cm, Width 76cm, Handlebar height Medium 76-94cm (150-188cm user), Handlebar height Large 90-105cm (188-210cm user), Weight 11.8 kg, Seat height 62cm, Seat depth of 25cm (30cm Tour model), Wheel size 31cm (12 inches), Maximum user weight 150kg

**Dimensions when folded:** Length 106cm, Width 42cm, Height 76cm

**Dimensions when folded without wheels:** Length 84cm, Width 42cm, Height 59cm, Weight 6.9 kg.

According to THL (2014), there is an enormous number of the different kind of helping equipment for many various needs. To manage these equipments recycling, borrowing, statistics, and comparison, as well as logistics and coordination, ISO 9999: 2007 International helping material classifications were composed. It appears with an ISO number code, and it is possible to search information from any database what was created with ISO number systems. Classification is hierarchic and holds three levels. Top level contains 11 categories; middle level is holding 130 subcategories that are enclosing 710 subcategories. Veloped roller is in class 12 " Movement helping equipment" and subcategory 12 06, inclosing subcategory rollers 120606. THL is an author for Apudata database in Finland. European EASTIN supporting material data bank was also built with ISO 9999: 2007 classification. Belgium, Italy, Great Britain, France, Germany and Denmark are six European countries that keep up EASTIN. (THL; Apudata.) Polycon is THL national level expert group for supporting equipment (THL; Polycon). Current Veloped is tested to ISO 11199-2-2005 standard.

### 2.3 Previous research synthesis of the mobility devices

Salminen (2009) is one of the many writers who collaborated to perform a systematic review on how mobility devices promote activity and participation in the countries Finland, Denmark and Sweden. This study revealed that existing reports in this area focus mostly on outcome aspects rather than activity and involvement. For an assistive device to be considered effective it has to produce a beneficial result in a typical routine setting or day-to-day circumstances. Mobility devices that are geared to activity and participation should have their outcomes evaluated in relation to real life contexts. International Classification of Functioning, Disability and Health (ICF) describes this setting as a social, physical, and attitudinal environments. In which people live and conduct their lives (Salminen, Brandt, Samuelsson, Töytäri & Malmivaara, 2009).

Salminen et al. (2009) review's aim was to identify and evaluate the effectiveness of mobility device interventions in terms of the activity and participation of people with mobility limitations. In their review, they encountered the conceptual difficulty of mobility in relation

to activity and involvement. Even though within the ICF classification mobility is considered to be under activity and participation, and walking under mobility, in everyday life mobility in itself is rarely the aim. A mobility device is needed to enhance the ability of people to move around their homes, travel to work or school, and be mobile within their community. There is a need for more work to develop a conceptual framework within the ICF and also to develop measures that focus on activity and participation level outcomes.

Salminen et al. (2009) uncovered that most researchers had methodological challenges with respect to the effectiveness of the assistive technology. A systematic quality assessment of the studies clearly demonstrated that despite the effects of mobility devices being obvious, there is still a need for research outcomes. Results could provide the best suitable solutions for people with activity and participation limitations. Additionally, it is necessary to assess the effect on peoples' daily lives as well as comparing this type of intervention with other possible interventions and also with one product with another.

O'Hare, Pryde & Gracey (2013), conducted a systematic review of the provision for walking frames to improve mobility in the elderly. The studies considered neither proved nor disproved that walking frames can cause falls in older people. One can conclude that more aged persons still fall despite using a walking frame. These studies however indicated the importance and role of physical activity in the prevention of falls in the elderly. They revealed that certain subjects with a higher level of physical activity had a lower risk of falls. They concluded that the risk of falls in older people could be reduced by increasing physical activity. Walking aids could be used to facilitate this increased activity and therefore prevent falls. Healthcare providers and public health agencies have the challenge and task to ensure that the elderly population is fully aware of the benefits of maintaining their levels of physical activity.

Throughout the literature, individual healthcare professionals were pointed out as having the responsibility of prescribing walking aids. Physiotherapists were especially suitable due to their skills in movement analysis and also their ability to holistically assess the individual. Prescription reduces the possibility of device abandonment or falls (O'Hare et al. 2013).

The above systematic reviews point out the scarcity and need for good-quality evidence for the effectiveness of the use of walking frames for the elderly.

### 3 Theoretical framework

The theoretical background of this thesis is focusing on user experience, service design, mobility assistance device need, and health, health promotion and wellbeing. ICT is presented through framing lens of motivation and engagement. In this chapter, these terms are being defined and presented.

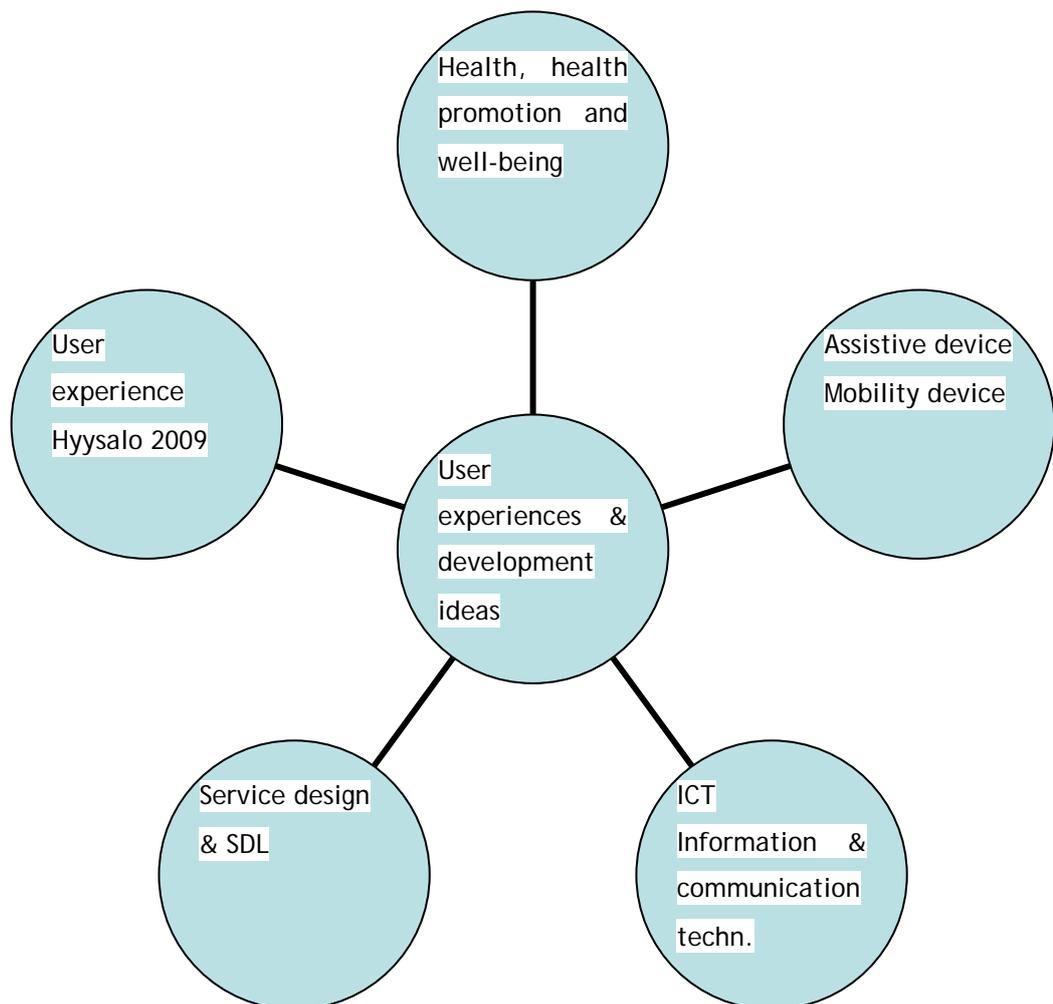


Figure 2. Summary of the theoretical concepts used in the empirical study.

### 3.1 User experience

Researchers Nielsen & Norman (2011) summaries “ End user experience encompasses all aspects of the end-user's interaction with the company, its services, and its products” (The Definition of User Experience (UX.)

A product designer or a market seller has the desire to succeed in user experience and sales. Weak knowledge of a product's end user experience is a common reason for failing in product design. A successful product design requires a deep understanding of the end users' style, actions, and needs. The designing process is holistic, creative and detailed using end user experience to create new products and improve already existing products. This kind of product is desirable, useful, functional and pleasant. Hyysalo (2009, 12-71). End user experience is a relatively new way to design and develop products, and its popularity is rising continuously. Jetter & Gerken (2007, 1-3) describes that wholesome user experience is created through incorporation of various concepts from psychology, design, and marketing.

There are five areas that are benefiting from understanding of the end user experience. Information about the end user experience is a crucial part of technical product, implementation, marketing, business, technical product support and services plans and ultimately to the end user. A successful product contains three main parts: it must be functional, be commercially viable and bring pleasure and benefit for the user. The end user experience is frequent behind peoples' purchase decision, and it involves in individuals' authentic functions and overall rating of the product. (Hyysalo 2009, 12-36). Jetter & Gerken (2007, 1-3) state that is serving every possible need and feeling is impractical. In the arrangement for a service to begin its operation, a business should create a design frame accordingly to company's values and business models.

There is one way to understand the end user experience and that is to separate the experience into the “worlds.” These “worlds” are connecting to each other within the product. These are the human world, the world of functionality, the product world, the world of product significance and the physical world. (Jääskö & Keinonen 2004, 84-89; Hyysalo 2009, 33-36). The following Figure 3 shows the link between a product and the environmental “worlds.”

Human world: users' identity, personality, attitudes, values, motivations, and the way of life  
 Operational world: use situations, pretensions, straight aims, and relations between people.  
 The product or service should be usable, meaning that it can be successfully operated and enables the user to reach his or her goals, or desirable outcome.

Novelty of the product: Another aspect is that the product or service should give the user a pleasant feeling or even joy. The novelty value of the product or service can also bring about this sense. In any case it should at the very least reduce the feeling of misery. Feeling can come from how the product looks or how the product works.

Importance of the product: previous experiences, memories, attachment to certain products, stories and story types that help to understand products, product's customizing to part of life and environment.

Physical environment: physical and esthetic environment: nature, architecture, and infrastructure. Hyysalo gives several attributes that constitute this world. These are esthetics, how the product looks, and the use and ownership of the product in relation to physical environment dimensions. These dimensions can be natural or manmade for example infrastructure and architecture. (Hyysalo 2009, 33-34).

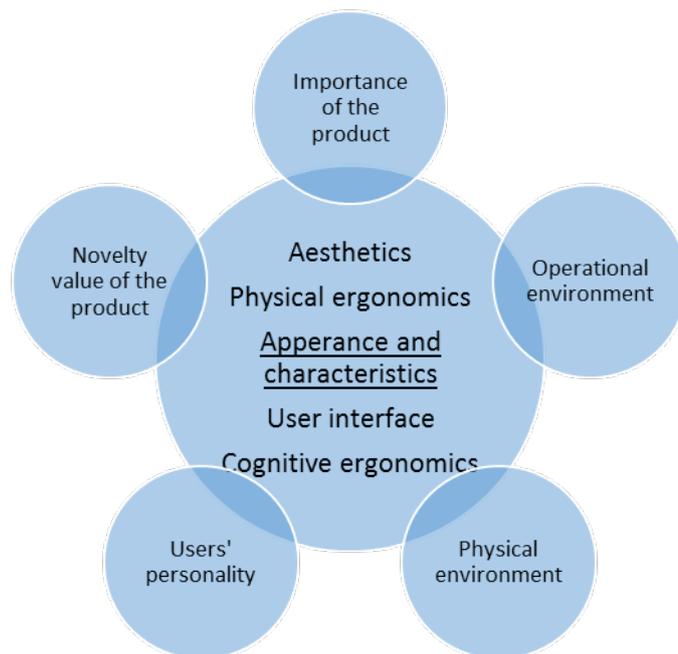


Figure 3. The end user experience with respect to environmental "worlds" (Hyysalo 2009, 35.)

Jetter & Gerken (2007, 5) reflects the viewpoint of Karen Donoghue. That is "A successful user experience creates an elegant equilibrium between delivering value to customers and

value for the firm” This suggests that businesses vision should show a relationship with building for real user experience. They continue to conclude, which is supported by Norman & Nielsen (2011) that designing for end users is not a standalone task of interaction of designer or marketer.

### 3.2 Service design and Service-Dominant (S-D) Logic

Traditionally, different services and products were seen either a product or service. In current years, the view has been shifted for that distinct offerings consist of both physical and service elements and focus has been directed at the traditional product orientation towards a modern customer-oriented service business. (Lovelock 1996, 26-33). Furthermore, there is a mindset for a unified understanding of the purpose and nature of organizations, markets and society called Service-Dominant (S-D) Logic. According to Lusch & Vargo (2004), the core idea is that the service is exchanged for service and therefore marketing thought, and practice should ground in service philosophy, principles, and theories. They assess all firms as service companies.

Service dominant (S-D) logic (Vargo and Lusch 2004) is a paradigm for understanding economic exchange and value creation among service systems. The idea behind this service-centered view is that service application is the source of all exchange. S-D logic has acknowledged as an applicable philosophical foundation for the development of the service science. New service marketing theory S-D logic embraces concepts of the value in use. Also co-creation of value rather than value in exchange and embedded value notions of Goods-Dominant (G-D) Logic, which has been the recreation of the services marketing sub-discipline for the last several decades. Grönroos (2007) describes “The focus is not on products, but on the consumers’ value -creating processes, where value emerges for consumers, and is perceived by them. The focus of marketing is value creation rather than value distribution.”

#### The idea of Service design

In current years, there have been grand advances in healthcare. Despite longer life expectancies, chronic conditions are on the rise, and this puts a challenge and opportunities for the service design sector too. Today, well-being and health are important topics for society, families, individuals, and businesses. Service design provides innovative improvements to processes, services, and interactions. Polaine et al. (2013) are defying service design, as work at a strategic level, connecting business propositions with the details of how they will deliver. The idea of designing with people and not just for them is essential.

Service design is also about doing design and implementation. User experience has cooperative recognition. (Polaine 2013, 37; Hyysalo 2009, 13). In this thesis, service designs application is examined through general well-being and health.

Polaine et al. (2013) found that it was difficult to build common theoretical framework for all the elements of service design. Service design's remit is forming from customer experience, user experience; interaction design and SD works at a strategic business level as well. Some SD projects have an important role in product design, marketing, graphic design and business and change management. All services are relying on liaison between vendor and client. Service user's term might vary depending on the context; user, customer, partners, client, patients or the service user may also be a service provider, such as a teacher or a nurse. They see SD as distinct from design thinking in that it is in addition to doing design and implementation. Furthermore, SD makes use of designers' capabilities to visualize and make abstract ideas tangible.

According to Koskinen (2014), there is a valid demand for holistic understanding analysis and critique of design. He is proposing from experience of lecturing and writing about design critique following preliminary notions on the perspectives of design critiques.' These eight view points were used as theoretical checkpoints of service design and product quality.

Infinity perspective: is it so good it will last forever

Futures or strategic perspective: the quality has future or strategic viewpoint

Revenue perspective: capitalizing prospect.

Users' perspective: usability and functionality, first users and DIY approaches.

Sustainability perspective: ethical and ecological view.

Production perspective: how efficiently could it be produced?

Brand perspective: is it well-known, unique and a wonderful experience for users?

Esthetic perspective: is the product or service beautiful or esthetically attractive? (Koskinen 2014, 38).

#### Research insight

Many service design projects are about innovation and results of these projects come to the public through new services, or the results are improving the existing services. Research insights needs to be presented precisely, so the key is to prepare the actions. Polaine et al. (2012) are introducing three levels of detail that it is possible to go. Low (what they say), middle (what we saw) and high (what it means).

Low - what they say is a summary of four or five research participants' state. It forms in short depth interview and does not include in-person observation, workshop, site visits or testing.

Middle - what we saw is level of analysis that provides 10 participants. It is deeper and more crafted insight than the low level.

High - what it means, is a detailed degree of analysis. It requires depth interviews and a combination of other insights techniques to generate the data. This level of research includes what the insights mean strategically for the field and the client's project.

Polaine et al. (2012) describe the following methods as universally in use on service design projects:

**Depth Interviews** are relatively open structured, long, in-context interviews. Photos or film recording can take. Usually, interviews are guided by theme. There are two variations on the Depth Interview: Interviewing consumers in pairs and Business to business depth interviews B2B.

**Participant Observation** or shadowing provides insights into how users' use the products, procedures, and processes. It shows the reality of what people do instead of what they say they do. Observations should be carried out in the participant's natural environment. In this method, there are two approaches: fly-on-the-wall method and active approach in which interviewer interacts by asking the questions.

### Service quality and dimensions

Service design's quality is in accordance with researchers Reeves & Bednar (1994) who identify four dimensions of quality, which are excellence, value, conformance to specifications, and meeting and/or exceeding expectations. Authors have challenge to clarify and explicate definitions of quality by three examine headlines. First, the attributes history trace, secondly, examining their strengths and weaknesses. Third, describing the trade-offs characteristic in accommodating one definition of quality over another. (Reeves & Bednar 1994, 420-424). Kroon (1995, 7) signifies two other dimensions, which are market perception and strategic quality. These are not a universal definition of the quality. Global world is using different definitions of quality appropriate for the topic. These six dimensions of quality that are widely accepted encompass those five to seven fundamental elements of service quality in customer service that need to be next in this text.

In marketing research, attention to customer service needs has been identified by Zeithaml & Parasuraman (2004). In their study five elements were the most important to clients: reliability, assurance, tangibles, empathy, and responsiveness. The five service dimensions in Figure 4 shows that the service elements are in comparison to each other. (Service performance 2013.) In the eighties, Zeithaml & Parasuman developed these features to theSERVEQUAL instrument used to examine service quality. E- SERVEQUAL is an updated version of the traditional model with seven elements: efficiency, reliability, fulfillment, privacy, responsiveness, compensation and contact (Zeithaml & Parasuraman 2004).

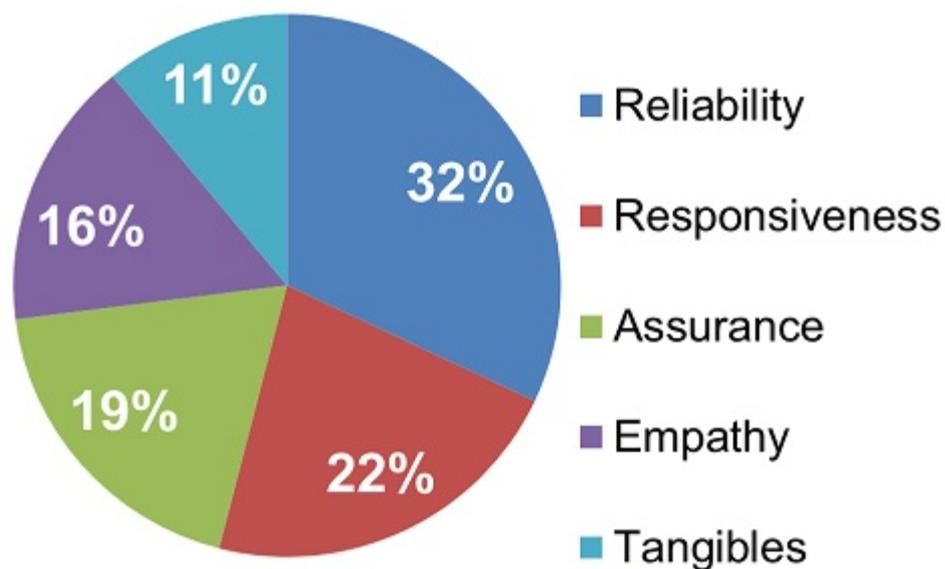


Figure 4. Five service dimensions.

Thorough knowledge about customer expectations is critical to service marketers. First step and maybe most essential in delivering quality service is understanding of what the customer expects. There is a framework for rationing about customer expectations. According to Zeithaml, Bitner and Gremler (2013) there are three main sections for thinking about customer expectations. (1) the definition and categories of expected service, (2) those features that influence customer expectations of the service, and (3) matters that were involved in customers' service expectations. (Zeithaml et al. 2013, 51.) Clear definition of expectations is needed by service marketers to comprehend the measure and manage them. Variations between expectation levels can vary widely. Expectations are reference points that service delivery is compared. Types of expectations: High and low are shown in Table 2.

High		Low		
1 Ideal Expectations or Desires	Normative "Should" Expectations	Experience-Based Norms	Acceptable Expectations	1 Minimum Tolerable Expectations= Adequate Serv.
2 Personal Needs				2 Perceived Service
Personal Service Philosophy				Alternatives
3 Derived Service Philosophy				3 Situational Factors

Table 2. Factors which influence customer expectations of service. (Zeithalm et al. 2013, 53-59.)

### 3.3 Health, health promotion, and well-being

There is a range of definitions of this term, but in this thesis health refers to WHO (2006) definition of health. "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." Oxford dictionary (1999) has a definition of health. That is "the state of being free from illness or injury". Synonyms are good physical condition, healthiness, fitness, physical fitness, well-being, haleness, good trim, good shape, fine fettle and a good kilter.

Health promotion is the "process of enabling people to increase control over and to improve their health" (WHO 2006). The definition supported by the World Health Organization recognizes that health needs reflect multi-level elements and therefore approaches that target individual, interpersonal, community, environmental and political strategies are required. (WHO 2006). According to Tahmaseb & Riley (2003, 522), health promotion is understood as a lifelong process that involves personal growth and fulfillment, physical health and well-being, and self-actualization. As such, it is a holistic outlook that includes a person's well-being in the physical, mental, spiritual and social realms.

McMahon & Fleury (2013) define Wellness as "a purposeful process of individual growth, integration of experience, and meaningful connection with others, reflecting personally valued goals and strengths and resulting in being well and living values. While the processes of wellness may intersect with health promotion, the goals are different. The goals of health promotion relate to health while the overarching objective of wellness is improved quality of

life through living values and being well.” Wellness is the outcome of the adoption of health-promoting behaviors by older adults. Well-being is given as a synonym for health, but the Oxford dictionary (1999) defines well-being as, “the state of being comfortable, healthy, or happy”. Synonyms: welfare, health, good health, happiness, comfort, security, safety, protection, prosperity, profit, good, success, fortune, advantage and interest.

There are meters that have been developed to measure quality of life. One of these meters is Wisconsin (1996) quality of life client questionnaire; another is Ferrans and Powers (1998) Quality of life index. These are instruments to measure individuals’ opinions about their quality of life.

These topics, health, and well-being, are one of the critical issues for society, families and individuals as well as for organizations, especially nowadays because chronic conditions are on the rise due long life expectancies. Both these conditions, health, and well-being, are not steady ones; instead they can fluctuate for many different positions even during a short period. This fluctuation makes it possible to focus on improving, promoting and restoring health and well-being. Status for well-being is a subjective view of an individual. It appears possible to measure health conditions through physical means more quickly, like laboratory tests. (Healthy People 2020).

Older adults have a higher risk for chronic illness, functional deterioration, and syndromes associated with old age. Although there is an increase in knowledge on health problems that are prevalent among the elderly, and a development of care management and coordination models for elderly with chronic diseases and complex healthcare needs. There still remains a lack of knowledge about ways to promote continued growth in the elderly population. (McMahon & Fleury 2013).

In a strategy document, the WHO discusses the concept of adding ‘life to years, not just years to life.’ The WHO has also accepted active aging as an achievable goal. This is a radical shift in focus from a clinical model to health promotion to a standard of care. The purpose of active aging should be the cornerstone of all state policies for older people as well as the individual. Active aging applies to both individuals and particular population groups. Systems that support lifelong health, disease prevention, health promotion, assistive technology, mental health services, rehabilitative care, promotion of healthy lifestyles, and supportive environment, can reduce disability levels associated with old age and lead to budgetary savings.

In Finland, the proportion of elderly people among municipal residents will grow quickly in the next few years. To reflect this future demographic change, the new Health Care Act for

the first time now requires local authorities to arrange guidance services for the elderly aimed at advocating healthy lifestyles and preventing illnesses and accidental injuries. Older people and their relations need guidance on matters associated with aging, health and social issues. They also need guidance as to what kinds of support and services are available and how they can be found. To meet these needs, Finnish municipalities have compiled service guides and websites and founded guidance centers in collaboration with several partners. Home visits promoting well-being were arranged in approximately two-thirds of municipalities in Finland. (Kuntaliito 2014).

#### 3.4 Helping Devices (Assistive Devices) and assistance's meaning for health

An assistive device is defined as any item, equipment, or system that increases, maintains, or improves functional abilities of individuals with disabilities (Eizmendi & Azkoitia 2007, 21.) In older individuals with chronic pain, adaptive devices are frequently prescribed to prevent further impairment. Assistive devices compensate for a range of motion restrictions, promote safety, and manage pain during the course of completion of activities of daily living. (Klinger & Spaulding 2001). Of the devices used to assist with activities of daily living, hygiene methods (bathtub boards and grab rails) have been found to be the most common. They were followed by mobility devices, devices for grip/reaching, and devices used for transfer into and out of bed or from bed to chair and back. The use of assistive devices tends to increase as people age. Overall, individuals report that the tools provide them with a feeling of safety in daily activities. (Klinger & Spaulding 2001).

There is a direct relation between aging and disability; in a way that while a population gets old the number of people with disability increases. For this reason, elderly people will represent the core of the group with disabled persons in the future. On the other hand, technology has an unstoppable evolution and penetration in all fields, becoming an essential element in people's life. However, technology is having great difficulties to penetrate the field of aging, and elderly people are far from taking advantage of the potential benefits of technology in terms of quality of life. (Eizmendi & Azkoitia 2007).

In the rehabilitation of elderly persons with disabilities, the prescription of assistive devices is an important measure to maintain or restore the ability at the highest possible level. The goal is to reduce the impact of physical limitations by providing bridge between a person's particular abilities and the demands of the environment thereby reducing the degree of handicap. (Kronl & Sonn 1999). Walking is usually the primary form of exercise for the elderly. Inactivity leads to increased morbidity and mortality in the elderly, therefore, devices that promote daily exercise may result in improved health and well-being. Regular physical

activity is beneficial to older adults. It reduces the risk of diseases such as cardiovascular disease, thromboembolic stroke, hypertension, type 2 diabetes mellitus, osteoporosis, obesity, colon cancer, breast cancer, anxiety, and depression. There is also substantial evidence that physical activity reduces the risk of falls and injuries from falls and prevents or mitigates functional limitations in older adults. There is also some evidence that physical activity prevents or delays cognitive impairment and disability. (Nelson, Rejeski, Blair, Duncan & Judge 2007).

Most of the elderly prefer to remain as independent as possible for as long as possible, whether they are living in their homes or a continuing care retirement community. Intelligent assistive technologies that alleviate the effects of chronic disorders and extend independence can hold great promise for a growing elderly population whose families may be living far from them. Moreover, for those who do not have access to in-home supportive services because of unavailability, or they are unaffordable, or undesirable. "At its best, technology makes life easier and better - but it only has value if people can and will use it". (Mathews et al. 2003).

#### Assistive device assessment tools

An evaluation of an assistive product throughout the life cycle and the outcome of their use by specific end-users or groups of end-users is essential. On the other hand, these two types of evaluations may not always yield similar results. For an assistive device or product to perform well for end-users, it needs to have a good design, usability, and accessibility. Good end-user outcomes also rely on compatibility of the product or device with the user's lifestyle and desires, as well as a number of other factors. Consequently, a high evaluation of end-user outcomes for a particular assistive product implies that the product is well designed, but little evaluation of end-user outcomes does not mean that it is poorly designed. (Hersh 2010).

Assistive devices can be used by people of all ages whose functioning is impaired. Their effectiveness can be assessed through the use of questionnaires. These assessment tools can be used to improve the development of these devices and improve the quality of existing ones. (THL 2014).

#### NOMO 1.0 (Nordic Mobility-Related Participation Outcome Evaluation of Assistive Device Intervention)

It is defined as a new Nordic instrument for assessment of mobility-related participation outcomes of mobility device interventions. NOMO-meter measures the effectiveness of the assistive devices in the everyday lives of the users and their involvement in social activities. The evaluation of the assistive devices effectiveness is focused on movement and movement

related activities. The target group is adults who use or will use the mobility aids. (Brandt & Iwarsson 2012).

#### QUEST 2.0 (The Quebec User Evaluation of Satisfaction with Assistive Technology)

This satisfaction assessment tool was designed as an outcome measurement instrument to evaluate a person's satisfaction with a broad range of assistive technology. It was intended as a clinical and research tool. As a clinical tool, the rating scale provides practitioners with a means of collecting satisfaction data to document the real life benefits of assistive technology and to justify the needs for these devices. (Demers, Weiss-Lambrou & Ska 2002).

#### PIADS (Psychosocial Impact of Assistive Devices Scales)

This scale is a 26-item self-report questionnaire designed to assess the effects of an assistive device on functional independence, well-being, and quality of life. This scale is a responsive measure and sensitive to relevant variables such as the user's clinical condition, device stigma, and functional features of the instrument. (Jutaia & Day 2002).

#### Matching Persons and Technology (MPT)

This framework is divided into the three core components which are, the person using the technology, the technology, and the background or environment. For a proper assessment, the end-user and the service provider complete somewhat different versions of a number of forms. Moreover, then discuss the outcomes and action. This approach is based on the medical model of disability and its purpose is to uncover 'limitations' on functioning and identify the goals and techniques that could be used to develop functioning. As well as characteristics of a person, environment or technology that could lead to incorrect use or abandonment of these technologies. This model also includes some personal characteristics, experiences and attitudes towards technologies and the degree of satisfaction with various aspects of life. (Hersh 2010).

#### Consortium for Assistive Technology Outcomes Research (CATOR)

This framework can be used for both short and long term outcomes, and involves taxonomy of assistive devices. It is based on the International Classification of Functioning Disability and Health (ICF 2014) (WHO 2001) and is grounded in three sets of descriptors called vantages: effectiveness, social significance and subjective well-being. This CATOR framework appears to be more appropriate for rehabilitation rather than the provision of an assistive product. (Hersh 2010).

#### Human Activity Assistive Technology (HAAT) model & Comprehensive Assistive Technology (CAT) model

Both models provide a framework that could be used for a systematic description and evaluation of the use of assistive products by an individual in a certain context to carry out specific activities. This assessment can pinpoint both excellent design features and any inadequacies or disadvantages of a particular assistive product. This enables the development of a better modified and improved version or other solutions which have better performance and are best suited to the meet end-user requirements. (Hersh 2010).

### 3.5 ICT meaning for health

ICT is a particular term that underlines the role of unified communications and the integration of telecommunications and computers systems, which enable users to access, store, transmit and manipulate information. In order to function, telecommunications can use telephone lines and wireless signals and computer systems can use required enterprise software, middleware, storage and audio-visual systems. (Wikipedia 2014).

Caldwell (2013) is one of the many writers to show that ITC provides new opportunities for improving health promotion and quality of life via empowerment through physical exercise and interactive feedback. Physical activity can transform into mental empowerment to help fight neurological, metabolic and cardiovascular diseases. Kato (2012, 74) describes that the field of games for health is growing rapidly and that the interest and activity in this area has attained 'critical mass'.

Many games for health are not verified for their use as a tool to improve outcomes. Guidelines are suggested for conducting high-quality efficacy studies on games for health. Exceptions are seen in assessment of games used to promote physical activity, physiotherapy, and healthy eating. This view is partly supported by Mphil, Moffat & Sykes (2012, 205) their study states that there is health benefits of exergaming, but there is limited knowledge concerning user experience in this new context. In their study they identified key elements in three contexts (exercise, computer games, and exergaming) that support such participation. Their findings suggest that perceptions of enjoyment and feeling better after a session are key factors that encourage involvement in the three contexts. Involvement in a social situation is one key element in their study context. Involvement in exercise is also encouraged by perceptions of being healthier.

Gamification is an informal umbrella term by (Pereira, Duarte, Rebelo & Noriera 2014) for the use of video game elements in systems that intend to improve user experience and user engagement. In health and wellness related contexts gamification is an approach that seeks positive impact. It can get people more engaged and make them more responsible for their

health decisions. Gamification can enhance the performance of healthcare professionals. Consequently, it affects both the costs of personal health and well-being and the healthcare.

Lahey (2014) speaks in favor of gamification through motivation and engagement. While not fully comprehending the games' captivating individual components, he describes the behavioral engagement model that is based on social scientist David Maxfield's research and theory. The model identifies two domains that drive behavior: motivation and ability. These domains are divided into social, personal and structural sources. These three sources typify psychology, social psychology, and organization theory.

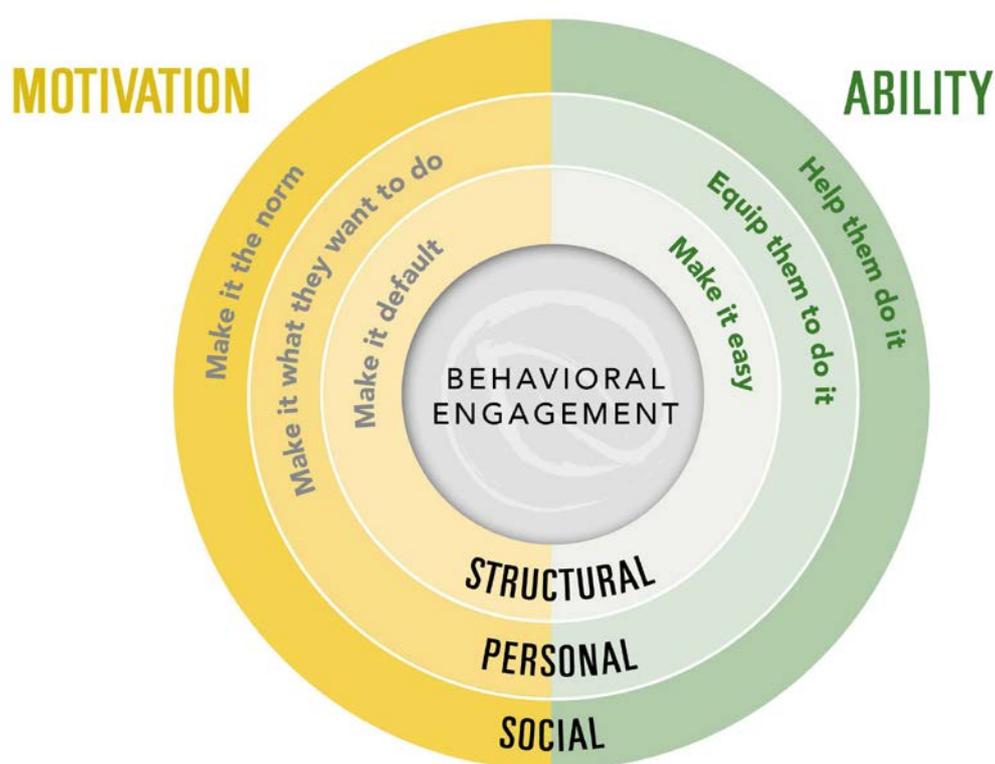
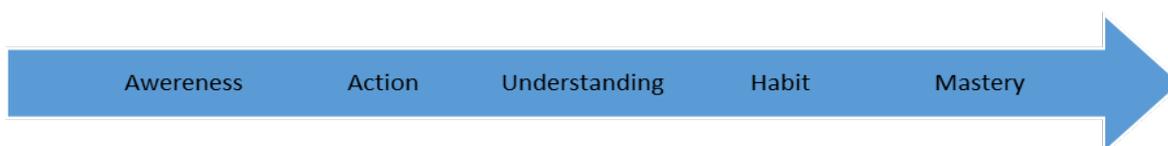


Figure 5. Behavioral engagement model (Lahey 2014.)

Traditionally, the engagement and communication process comes from awareness through understanding and commitment to action.



- Awareness of the conditions
- Understand what exercise is and importance of exercise
- Be in agreement the changes are necessary and become committed
- Take action by activity choices



Gamification changes the engagement and communication of health process through motivation and ability.

- Awareness of the conditions
- Into action, first level of game is easy, can be learned with playing
- Player learn by doing and gaining understanding
- Becomes a habit, similar to commitment
- Mastery level (Lahey 2014).

Moreover, ITC programs can be updated nowadays without the users' action and that feature adds superior quality to the service they provide. According to Au (2012, 449) new technology trends may suggest future approaches to application of videogame-based health interventions and perhaps the future is about engaging with health anytime, anywhere.

#### 4 Research design

The research process has been iterative in nature. Definitions of the phenomenon, theoretical framework and analysis of data have been processed until the coherent understanding of the outcome structure is reached. It is recommended that research be systematic and contains a set of actions and steps. Additionally, the research has to meet the norms established by the international science society. The research presented through questions is significant to bring answers to the themes of this thesis. Aiming to provide a coherent picture of the study; the report was organized in a logical manner. Qualitative research method has powerful strength in this thesis context over other methods. Human experience can be investigated in detail and depth.

The first chapter is stating the purpose. The second chapter is presenting and mitigating the research questions. The third chapter describes the thesis methodology. Chapter four describes the study's implementations. This section ends with recitation of the data analysis process in detail for the purpose of enabling the reader to evaluate the quality of the research.



Figure 6. Thesis process structure.

#### 4.1 The purpose of thesis and research questions

The purpose of this thesis was to investigate test user experiences and developmental ideas of Veloped walker and its role in promoting health and well-being. These results should be formed so that they serve working life partners and health care parties to understand what a service concept consists of and what are the key uniqueness and benefits of the services provided. Analysis of six collected interviews and seventy-five questionnaires aim to investigate users' experiences and identify development ideas. Tendentious drive to this thesis study was to provide insight for working life partners and their liaisons. For the purpose of company's development of Veloped's services, so that results could aid to improve their customers' health and well-being.

The study aims to answer the following research questions: There are three main research questions. Questionnaire has five questions.

What are the test user experiences of Veloped walker?

The first question explores those aspects and attributes that are relevant for a particular participant.

How Veloped could be developed or improved?

This question was addressed to find out how co-creation and co-development ideas could add value for this product and service to serve a versatile group of people.

How Veloped walker could improve well-being and health?

The motivation behind this research question was to understand whether the exercise and its benefits were linked to the mobility assistance device.

**Questionnaire for Imaginary Veloped.** This questionnaire was developed by researchers after they perceived the denial of test users while participating in this research. The questionnaire has a picture of Imaginary Veloped with ICT and fitness equipment technology integrated into the current version of Veloped walker. The questionnaire contained five questions. These questions were designed to bring supportive information to appreciate the new service idea of Veloped. For questions one and two, the enthusiasm was to gain information about general knowledge of fitness equipment use. Could it be that particular age group is not familiar with fitness equipment? Question three is providing a view of the importance. The last question asked contributed to the thesis purpose; investigation of development and improvement ideas of Veloped walker.

Questionnaire questions:

1. What is your age group? under 30, 30-50, over 50, over 60, your age\_\_
2. Have you ever used fitness equipment with technological features? YES/NO
3. How important do you feel this Imaginary fitness equipment would be in your life, if you would have a necessity for helping equipment?
  - Extremely important
  - Very important
  - Important
  - Neither important or unimportant
  - Unimportant
4. Do you use a rollator? YES/NO
5. What features of fitness equipment do you think would be useful integrated in the Veloped?

Number of questions was limited to five so the respondent can answer them in minute or two because long and complicated questionnaires will not receive accurate replies. Majority of subjects were chosen to be closed questions to facilitate their easier process from respondent point of view. Only the last question was open to purpose of broad line answers. Questions were kept clear and simply for time consuming matter and accurate reasons. (Hirsjärvi et al. 2003, 183-193).

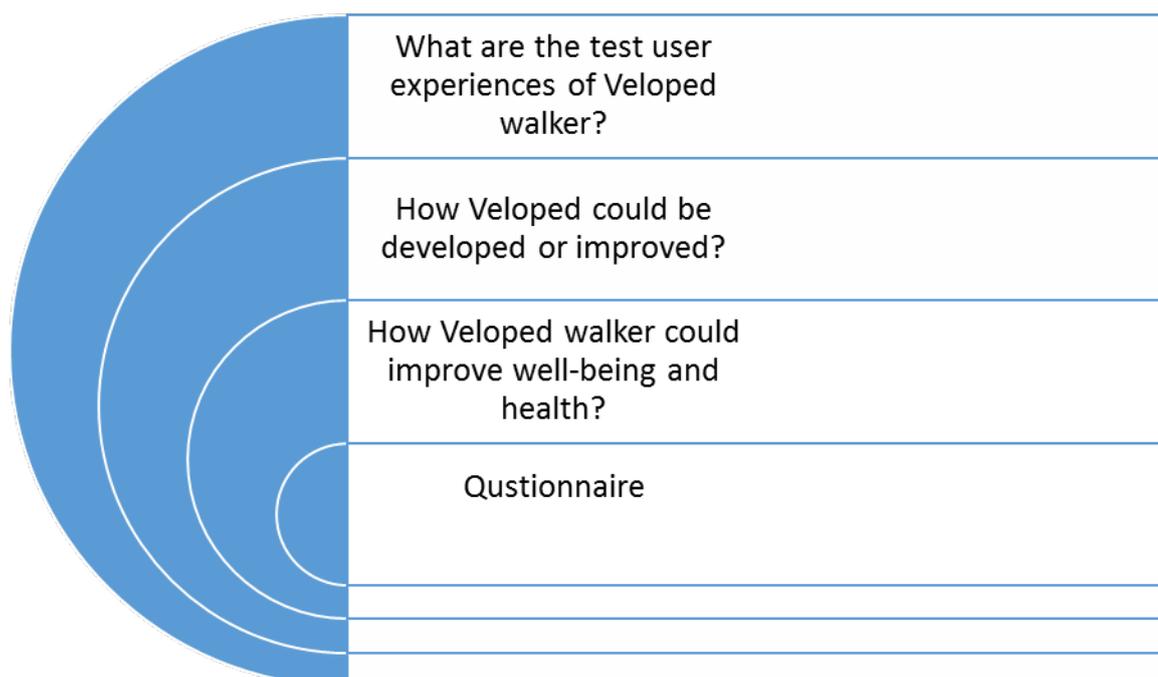


Figure 7. Shows research questions.

#### 4.2 Thesis methodology process and participants

This study was iterative in nature and interviews were conducted using the qualitative methodology. The qualitative user research perceived to get close to the user and opened out the user's thoughts, values, physical environment and operational environment. In which case, few carefully selected participants could review the enormous amount of information (Jääskö & Keinonen 2004, 91.) Portugal (2013, 120) states that interview is an interaction between humans. Interviewing can be used to help to guide the redesign of an existing product that is already in the marketplace. Interviewing can reveal new models that turnover the problem on its head. These new ways of looking at the problem are critical to identifying

new, innovative opportunities. (Portigal 2013, 10 - 11). Interviews contained three main research questions and three supporting questions.

The study followed a qualitative approach. Data collection in study depended on research tradition. Empirical evidence for the qualitative study may come in many forms, such as meeting reports, observation, documentation or interviews. In the present study, an interview method was chosen as the primary data collection method. Interviews were chosen due to the nature of the research questions, the scope of the theoretical framework and the selected participants' group. Questionnaire results had quantitative report form. The interview method was considered an appropriate way to investigate user experience. 'Talking loud' approach in an interview provided insights into value and attributes that were relevant for the users of Veloped walker. 'Talking loud' allowed the interviewee to use language and phrases that a person regularly uses.

#### Methodology for denial aspect and imaginary Veloped

There seemed to be a rejection in peoples' minds about the value of the walker from the start. Students noted by observation patterns and weak signals what they saw. During the interviews denial of mobility assistive was discovered by student's observation and from data. Additionally, preliminary finding concept of interviews was made. Denial was defined as a preliminary finding which led the students to abductive conclusion. Abductive inference was applied, because it is an attitude towards data and towards one's knowledge: data are to be taken seriously, and the validity of previously developed knowledge is to be queried. Abduction was reasoning process of thesis students that brought together things that one had never associated with one another. (Reichertz 2004, 299-305). Logical conclusion, namely deduction and induction could not been applied to form imaginary Veloped (invention). Additionally, action research approach - living theory was implemented in this thesis study to guideline representation of imaginary Veloped.

A study conducted by Bright & Coventry (2014) revealed the existence of substantial evidence suggesting that people have a negative view towards assistive devices. Individuals can be reluctant to adopt it despite the fact that it has been explicitly designed to compensate for functional loss. This was evident in our research when some of the test users clearly described these feelings while for others it was an observation by us as researchers. Five of the participants stated that they do not need the Veloped walker. This unwillingness to contemplate the use of the walker could be that it gave them a feeling of defeat and unavoidable decline. That then translated into a denial of need, despite the obvious benefits the use of the Veloped walker would have on their mobility levels and independence.

### Action research - living theory

The term action research (AR) and its matching part participatory action research (PAR) are tools for public who seek to create change in situations for the sake of sustainable development. The AR methodology directed constraints and ideas of the study project. (James et al. 2012: 3-35; Lehto 2014). Living theory approach meant the use of reflection during qualitative thesis process to assistance the researchers in realization their highest ideals (James et al 2012, 310.) According to Whitehead and McNiff (2006) who have constructed this theory, the maximum form of our work is to our ideals and that run in an infinite number of cycles in AR practice. Theory is living in the sense that it is theory of practice, generated from within our existing practices or issues. It present best thinking that incorporates yesterday into today, and which holds tomorrow previously within itself. Data need to be understood in relation researcher's claim to improvement and development ideas. (Whitehead & McNiff 2006, 32-34).

### Representation of imaginary Veloped

The invention of imaginary Veloped in this thesis was student's ideal. Students have formed in their understanding, a standard of excellence for Veloped's service. The living theory approach created guidelines into qualitative methodology that ideal imaginary Veloped could be added to the study. Students wanted to expose invention to the public and find more attributes to add from public. "Ideals are like stars; you will not succeed in touching them with your hands. However, like the seafaring man on the desert of the waters, you choose them as your guides and following them you will reach your destiny" - Carl Schurz. (James et al. 2012). There were five questions on representation of imaginary Veloped questionnaire which were formed and report with quantitative method. Fitness equipment technology or ICT were presented to public as it shows in the questionnaire's picture, more detailed information about its possible actions were not shared with questionnaire's respondents. We wanted them to think themselves openly what ICT means and what the applications could be.

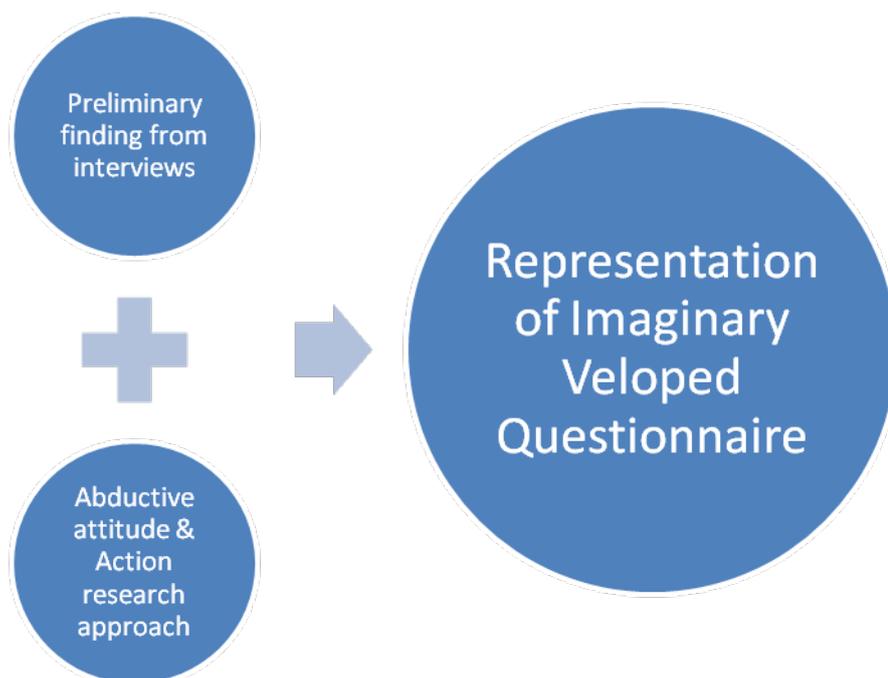


Figure 8. Methodology of representation of imaginary Veloped.

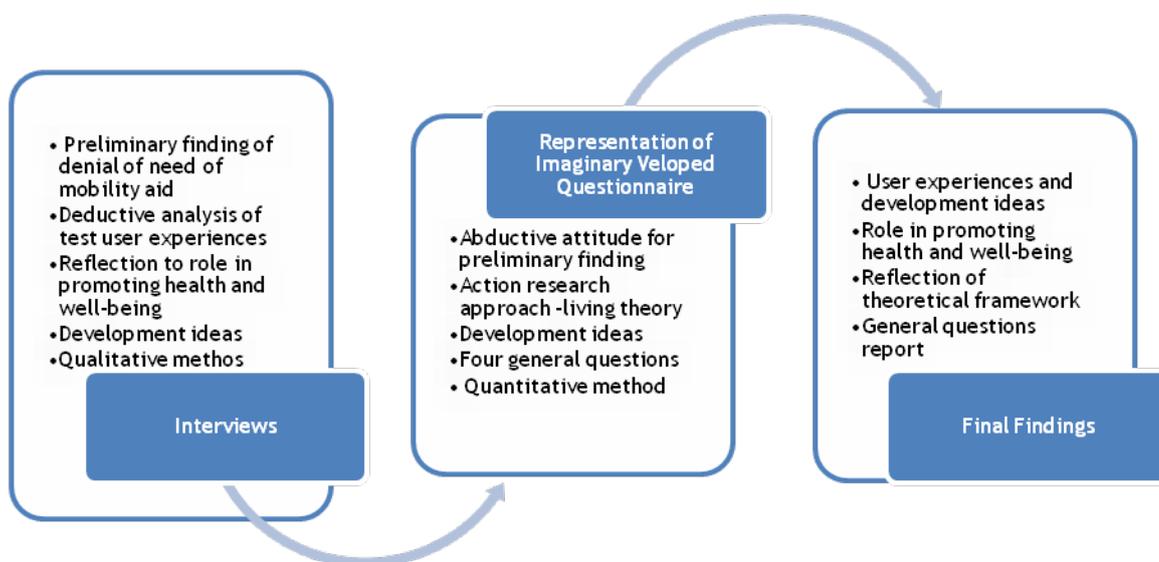


Figure 9. Thesis methodological process.

## Participants

Participants for six interviews were selected carefully, at which time they brought relevant information to the study. Four out of six interviewees were men and two were women. Working life partner could not make available Veloped ownership users for the study. Therefore, participants were Veloped walker's test users. All participants were considering mobility assistance device's use at the moment, or that need was present probably in the near future. Connections to research participants happened via separate ways during April - September 2014. Following table explores different contact ways.

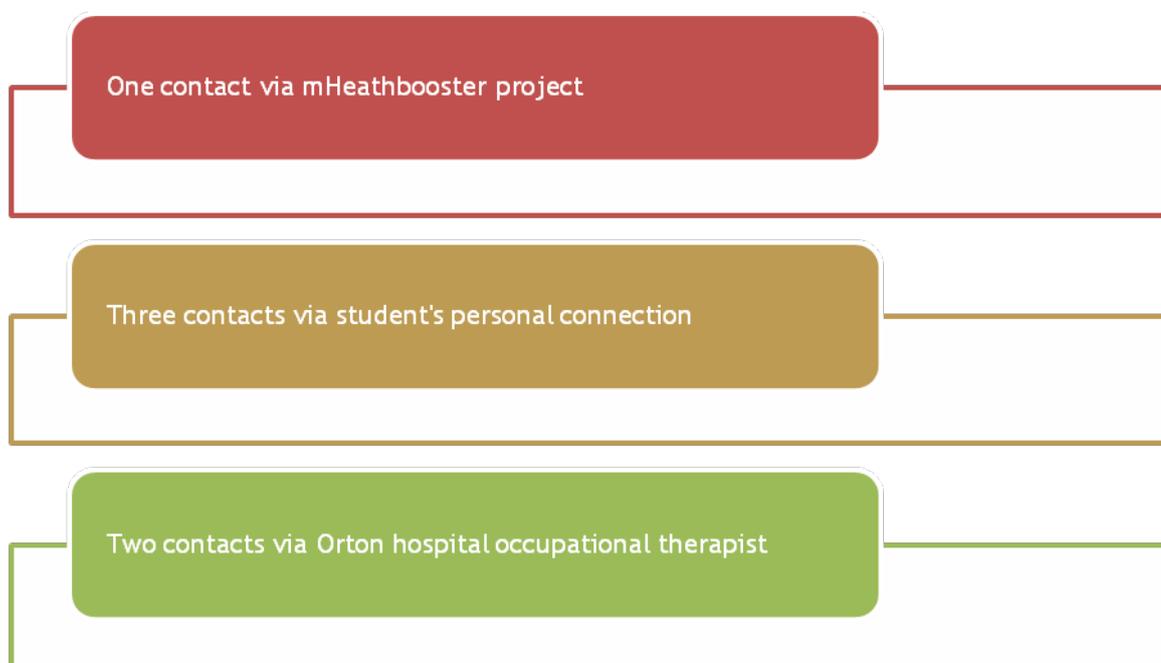


Figure 10. Contact links with interviewees.

The students wanted a diverse selection of respondents to the questionnaires, at which point they brought a broad spectrum of information on the study. Three separate standing desk events were held. One was in an educational institute to target the youth. The second was in a local supermarket hall to reach a diverse group of respondents. The third occasion was at a senior citizens event at the city hall.

Epistemological issues in this thesis consist of origin, nature and limits of knowledge. In this research the key concepts of theoretical framework are based on academic literature and research. These combined with students' research forms the origin of the knowledge applied in this thesis. This also defines the limits of the study. The knowledge created from this research gives companies and healthcare professionals' opportunities for further development products and services. This study was conducted under (Laurea) academic guidelines and ethical principles were observed throughout this thesis study.

### 4.3 Implementation

Interviews were audio recorded. Video recorded observation method could have provided insight from body language and facial expressions. However, the main reason video recording was not chosen was because participants expressed opinions against video recording. Note taking would have been inconvenient because of the large size of data. Moreover, the open-ended questions supported unique user experience investigation instead of the ready questionnaires meters such as PIADS. The questionnaires were filled in by momentary present public members at Veloped standing desk days in three different open locations: Between 11<sup>th</sup> of August and 5<sup>th</sup> of September 2014.

#### 4.3.1 Implementation of interviews

First interview took place April 5<sup>th</sup> and last one was conducted August 12<sup>th</sup>. At the start of all interviews audio recording machine was turned on. Interviews were carried out in 35-50 time frames. Following questions and supporting questions were asked.

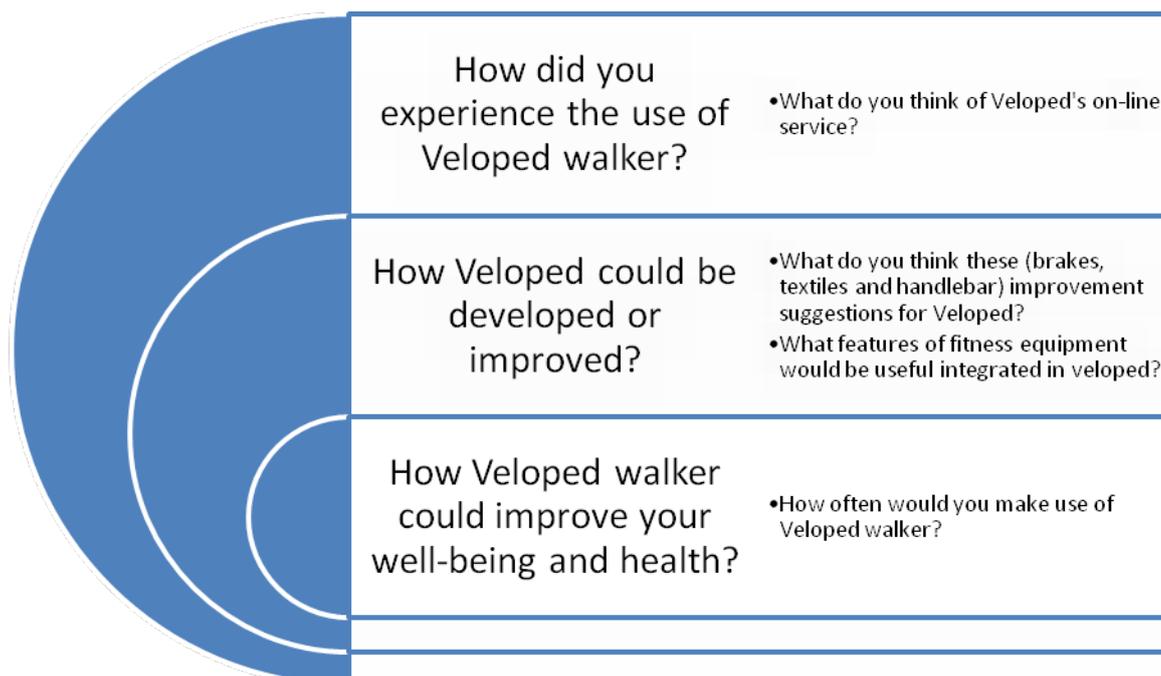


Figure 11. Questions asked in the interviews.

The interviewees were selected carefully using consideration for participant's linkage to the mobility assistance devices. Veloped walker was relatively new in the market; therefore, working life partner could not indicate Veloped owners for interviews. All six participants were test users who used Veloped walker two to three days. In four cases interviews took place in interviewees' residential area. Veloped rollator was delivered to participants' homes for two to three days for their use in their environment. Students asked the participants opinion for a suitable interview place. The question was underlined by the importance of the participant's comfort towards the chosen place. All four preferred to be interviewed in their home. On three interview occasions, the interview was conducted in a quiet private garden area. One interview took place around the participant's kitchen table. In two cases, the Veloped was delivered to a hospital's occupational department from where the participant received Veloped to their home to test the use. These two participants preferred to return the Veloped walker to the hospital and logically they suggested hospital for meeting place. Two interviews took place in the hospital hall. The room was quiet and private enough for a successful interview.

Concluding Portigal (2013, 69 - 81; 120 - 133) views and student's own ideas of optimizing the interview students made preparations for interview events before the conduction of the interviews. The form of quality interview was created by students that emphasized

respectfully acting in participants' residential area. Furthermore, the model highlighted the understanding that students are not marketing the Veloped walker and that they were a neutral party. Moreover, model aimed for pleasant and beneficial experience for the participant. Reeves & Bednar (1994) quality criteria Reliability, Responsiveness, Assurance, Empathy and Tangibles were adapted. This was done to ensure pleasant and positive atmosphere, listening and communication skills, clear language, prompt timetable, clear instructions, and details of the study were functional on the interview occasions.

#### 4.3.2 Implementation of questionnaire

As a result of preliminary findings of denial of mobility assistance need, inspired students were appropriate with AR living theory approach which carried in ideal invention to the thesis process. Thesis students brainstorming created the imaginary Veloped service. The research interest shifted to imaginary Veloped walker. A representation of an imaginary Veloped was established for the questionnaire form that made it easier to be realized. Visualization was set up on Microsoft word document paper by cut and paste principals. Imaginary Veloped invention was the inclusion of current Veloped, fitness equipment technology and ICT. Fitness equipment technology or ICT prospects were not explained or described more in detail than the picture shows in the questionnaire form for the respondents.

From the student's point of view, the ICT features enables the user to be connected to peer support groups, allows them to socialize. It could enhance the users' self-esteem and quality of life by helping them to get over the 'embarrassment' of using a mobility aid. A gamification aspect supported by the ICT platform can transform the lives of the users by keeping them motivated and engaged in an active lifestyle. Fitness equipment technological features or ICT prospects were not explained more in detail in questionnaire for respondents. The reason for this was to prompt the respondents to think broadly how ICT and fitness features could be applied.



Figure 12. Representation of imaginary Veloped.

Imaginary Veloped service concept can withstand critique as it satisfies some theoretical checkpoints put up by Koskinen (2014). The imaginary Veloped service has quality attributes to satisfy future and strategic viewpoints in that it could be adopted for healthcare programs. Therefore it shall have a capitalizing prospect based on the fact that chronic conditions and rehabilitation are increasing globally. Imaginary Veloped concept is economical to realize as ICT and technology is cheap and accessible to a large consumer group. Currently, technical solutions like gamification strategies are approaching strongly for the healthcare sector. Inclusion of gamification to health programs has already started quite widely.

Information communication technology (ICT) was studied to understand the imaginary Veloped service. Designing a positive and engaging user experience in thesis topic is particularly challenging due to psychological aspects and chronic conditions. We have introduced motivation engagement through a framing lens of gamification and technology in the theoretical framework.

Questionnaire questions:

What is your age group? under 30, 30-50, over 50, over 60, your age\_\_

Have you ever used fitness equipment with technological features? YES/NO

How important do you feel this Imaginary fitness equipment would be in your life, if you would have a necessity for helping equipment?

Extremely important

Very important

Important

Neither important or unimportant

Unimportant

Do you use a rollator? YES/NO

What features of fitness equipment do you think would be useful integrated with the Veloped?

The filled in questionnaires were derived from three standing desk days arranged in open public areas in Espoo. First market day was held 11<sup>th</sup> August 2014 in Laaksolahti K-supermarket hall. This day's outcome was twenty-four answered questionnaires. People were not interested in standing desk or Veloped. Two people arrived at the desk voluntarily. Persuading contact to people was necessary to carry out the survey. Second standing desk day was with mHealthbooster project day in Leppävaara in Sellosali hall at 1<sup>st</sup> of September 2014. Invitation guests for this event were a senior citizen and senior citizen alliances. Interest towards Veloped walker was natural and active in the exacting event. Outcome was seventeen filled questionnaires. Final, significant standing desk day was held 5<sup>th</sup> of September 2014 in Leppävaara Laurea University of Applied Sciences hall. Atmosphere on that day was young and vibrant. Few international students were energized by imaginary Veloped service idea. Outcome was thirty-four answers.

#### 4.4 Data analysis

Research literature suggested that there were various ways to study and measure user experience and helping devices use. There were instruments like questioners and frameworks to classify the outcomes. Some approaches agreed to and gave advice to researchers to redirect the research questions and refine the theoretical framework more freely. That was based on insights gained during the research process (James et al. 2012; Byrne & Ragin, 2009). In this kind of iterative qualitative study, researchers managed freely between the thesis aim, theory and empirical data. The challenge was to create an engaging narrative that reveals the unique user experiences and underlying phenomena under study. Moreover, results shall tell a story to those significant stakeholders.

#### 4.4.1 Test user experiences

The interviews were transcribed, coded, and labeled for categories. In that process, research students realized that Jääskö & Keinonen (2004) & Hyysalo (2009) has created a theory model that is appropriate for this research analysis. That was already an element of thesis theoretical framework. The resulting text was used in deductive data analysis.

The preliminary formulation of the thesis topic was inspired by earlier studies of the theme by Jääskö & Keinonen (2004); Hyysalo (2009) and the initial focus was on authentic user experience. Analytically, the product's appearance, functionality, body and esthetic were part of creating a user experience. Another part of creating a user experience was that people were always in a situation with a product. In relation to persons or objects, and they base their experience from previous events and moreover they aim to achieve something. The analysis can be discussed through Hyysalo's (2009) understanding of different "worlds" which were interacting with each other and contributed towards unique user experience. Despite from that fact health was analyzed in its chapter.

Qualitative research method allowed the use of the different kind of data analysis methods. Deductive method was applied for themed content data analysis. The study was using a previous system of concepts for framework analysis. Deductions were therefore tautological, they told nothing new. Deductions were tautological as well as truth conveying, because if the rule offered for application is valid, then the result of the application of the rule is also valid. (Reicherz 2004, 303.) The methodology for themed content data analysis makes use of the following steps: Transcription, coding, creating categories and labeling categories. (Portical 2013: 136; James et al. 2012: 201-224; Hirsjärvi 2003: 209-215, JYO 2014). These actions have been used by Jääskö & Keinonen (2004, 84-89); Hyysalo (2009, 37) to create "worlds" which were the categories of this study's analysis form. There were; Importance of the product, Users' personality, Novelty value of the product, Physical environment and Operational environment. These applications were used in this study of themed content data analysis. These worlds were considered suitable to communicate the message of user experience and development ideas. Recorded interviews were listened through first as whole. Notes were marked with first impressions. After many listening times, the coding was repaired following the theoretical framework. Forming coding in labeled the categories makes it achievable to describe the connections between them. Example for coding that followed labeled category form.

- First            'käyttäisin päivittäin, tarvitsen tukea seisomisessa ja kävellessä'  
would be used daily, I need support to stand and walk.
- Second        'nyt pystyn kävelemään Velopedin kanssa , käveleminen on ollut poissuljettu'  
I am now able to take a walk with Veloped, before this was out of question.

These two reply lines were coded under categories: aim of the product and they form in Operational environment world. Second reply line creates a note in Novelty value of the product world also. These 'worlds' are interactive and overlapping, so some of the lines could be interpreted for different worlds. Some reply lines which were coded under health form cohesion with value that is one attribute in Importance of the product. In the findings, there is a section for health separately.

Product: esthetics ,physical ergonomics, appearance and characteristics, user interface, cognitive ergonomics Hyysalo (2009)	Over 70 years old participants (four out of six) - elderly	
	User personality	'monimutkainen huoltokirjaa' Complicated user manual 'ei tarvitse huoltoa' Does not need maintenance 'en vielä ole niin huonossa kunnossa' I am not that bad shape yet
	Importance of the product	'olisi apua ulkoilessa ,pikillä kävelylenkeillä vuodenaikoina' Would be helpfull for long walks in all seasons 'olisi apua ostoksilla ja ulkoilessa' Would be helpful on shopping trips and walks
	Novelty value of the product	'hinta on liian kallis' Price is too high 'en ostaisi' I would not buy 'moderni ulkonäkö' Modern looking 'hyvä etupyörä, helppo työntää eri maastoissa' Front wheels are a great invention, makes it easy to use in different environments
	Physical environment	'näyttää raskaalta, isolta ja kummalliselta Looks heavy, huge and awkward 'ei internet kauppa. En ostaisi' Would not buy from online shop 'luotan katsekontaktiin' I trust eye contact
	Operational environment	'ei mahtuisi kotona sisätiloihin, liian iso' Too big for indoor use at home. 'hyvä kokemus eri maastoissa' Good experience in different outdoor environments

Table 3. Data analysis for elderly test users.

Product: esthetics ,physical ergonomics, appearance and characteristics, user interface, cognitive ergonomics Hyysalo (2009)	Under 50 Years old participants ( two out of six) - rehabilitation	
	User personality	<p>'tykkään matkustaa, mutta jään hotellihuoneeseen tai mökille, nyt voin päästä mukaan, kun pääsen kävelemään'</p> <p>I love to travel but I always end up staying in the hotel room or the cottage. Now I can go along as I am able to walk with the help of Veloped.</p> <p>'taivas avautui mulle henkilökohtaisesti '</p> <p>The sky opened for me personally</p> <p>'liikunta helpottaa kipuja'</p> <p>Physical activity helps relieve pain</p> <p>'pääsen ulos, antaa vapautta ja mahdollisuuden'</p> <p>Gives freedom and possibilities</p> <p>hyvä kaikille jotka tarvitsivat, mutta eivät käytä</p> <p>Great for those who know they need to have a walker but will not use it'</p>
	Importance of the product	<p>'en anna pois, jos ei ole pakko'</p> <p>Veloped was superb. I would not give it back if I did not have to.</p> <p>'turvallinen, koko, ulkona ja tukeva'</p> <p>Good support because of the size. Safe feeling when outside</p>
	Novelty of the product	<p>'tosi näppärä voi tanssia vaikka ripaskaa'</p> <p>Very handy one can even dance with it.</p>
	Physical environment	<p>'kyllä nettikauppa, jos saa kokeilla ja silti palaute oikeus'</p> <p>Yes would buy online if I can try and return if not satisfied</p> <p>'tällaisten laiteen kansa pitää olla henkilökohtaista palvelua'</p> <p>With this device one needs personal service</p>
	Operational environment	<p>'käyttäisin joka päivä, en pääse liikkeelle ilman tukea'</p> <p>I would use Veloped daily; I cannot be mobile without support</p> <p>'toimii hyvin metsäteillä ja lenkkipolulla'</p> <p>Operates well in forest roads and walking paths</p> <p>'en suosittelen sisätiloihin, on kömpelö, liian iso, pätsi laitoksiin, joissa hyvä'</p> <p>Would not recommend it for indoor use at home. Could be used in big buildings like institutions</p> <p>'saa positiivista palautetta kadulla '</p> <p>positive feedback from the public</p>

Table 4. Data analysis for rehabilitation test users.

#### 4.4.2 Veloped development

Analyzes were conducted both for voluntary participants' development ideas and for those opinions that were given to supporting research questions. Report structure of the analysis especially serves working life partners. Those technical features pointed out about Veloped could be universal qualities to give critical viewpoints to all mobility assistance associates.

IMPROVEMENT IDEAS FOR CURRENT VELOPED AND IMAGINARY VELOPED	
Improvement ideas from Turvallinen koti: new more simple brake, more textile options, joints and hinges into handlebar	<p>'ohjaustanko on hyvä näin'</p> <p>3x-could not say if changes to the handle bar would make it better. It feels ok the way it is.</p> <p>'jarrut hyvät minulle'</p> <p>2x-could not say if changes to the brakes would be good.</p> <p>'ohjaustangossa voisi olla saranat'</p> <p>-handlebar can have hinges to make it adjustable</p> <p>'olisi hyvä olla yksiportainen jarru pois-päälle'</p> <p>Simple on off breaks would be good</p> <p>'ohjaustanko on oikea näin -ei niveliä'</p> <p>2x not important to make changes to handle bar</p> <p>'ei tarvetta eri väreille'</p> <p>No need for different colors</p> <p>'kangasmateriaali ok-vaihtoehdot ei merkitse - käytännölliset ja hyvät'</p> <p>Textile material need to be practical</p> <p>'suuri merkitys tekstiiliväreillä'</p> <p>'hyvin tärkeä tekstiileissä nykyaikainen ilme'</p> <p>Textiles are very important that are modern and supplied in various colors</p> <p>'tekstiileissä voisi olla naisten värejä enemmän' /</p> <p>'huomioarvo'</p> <p>Could be feminine colors, perhaps luminous, attention value</p>
Improvement ideas volunteered by users	<p>'merkit ohjaustankoon, että tulisi kumpikin puoli samalle tasolle' / 'hyvä maatilän emännälle'</p> <p>Handlebar has no marks to indicate that it is even(in a level position) after unfolding</p> <p>'astinlauta keskelle, jolla voisi seisoa ja potkaista kyytiä'</p> <p>Footboard/ foot rest to give a scooter effect</p>

	<p>'onko kaksi rengasta etupyörässä tarpeellinen'</p> <p>Questions the two front wheels. Would the price reduce if only one wheel were used?</p> <p>'istuessa selkään sattuu, voisi pehmustaa'</p> <p>Foam to soften the frame/ had bar so one could lean on it when sitting</p> <p>'kevyempi' / 'sileämpi rengas' / 'pitäisi mennä helpommin kasaan'</p> <p>Can be made lighter and smaller, more smooth tires</p> <p>'ohuempi putkirunko' / 'pitäisi olla helposti taitettava, että menisi pieneen kasaan'</p> <p>The frame/body could be made thinner and lighter</p> <p>'isompi kori' = Bigger basket</p> <p>'talvirenkaat nastoilla voisi olla hyvät jääkeliille'</p> <p>Winter tires with studs would be a good idea, for use when icy and slippery'</p> <p>'käyttöohje on monimutkainen'</p> <p>Complicated user manual</p> <p>'en löytänyt tietoa nettisivuilta*</p> <p>Not easy to find information on the web page'</p> <p>'voisi olla optio tilata yhdellä jarrukahvalla, joka ottaisi molemmille puolille'</p> <p>Option to order Veloped with the brake lever on one side instead of in both'</p> <p>'toivoisin, että aisa olisi taitettu ylöspäin niin kuin kuntolaitteissa'</p> <p>The handlebar can be curved upright like in fitness machines'</p> <p>'juomapulloteline vakiona'</p> <p>Drink holder can come standard instead of ordering as an extra'</p> <p>'ajovalot ja jarruvalot'</p> <p>Night light and brake lights</p> <p>'vakautta voisi parantaa laittamalla eturenkaat etäämmäksi toisistaan - eturenkaiden väli pikkuisen laajemmalle</p> <p>Stability can be improved by making the space between the two front wheels a bit bigger</p> <p>'M ja L koko korkeussäädössä välissä saisi olla yhteistä säätövaraa enemmän'</p> <p>Between M &amp; L sides there should be more adjusting lever</p>
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<p>Improvement ideas for imaginary Veloped Walker (invention)</p>	<p>2 x - removable pedals for cycling jokin poljettava pedaali jalkojen treenaamiseen</p> <p>3 x - one that would enable hand workout käsitreeni</p> <p>4 x - call button if in trouble, SOS button = turvanappi</p> <ul style="list-style-type: none"> <li>- sormipuristin = finger press</li> <li>- lasten kopan kiinnitys mahdollisuus = baby features, like carseat</li> <li>- S-koukkuja = S-hooks</li> <li>- astuimet, joilla voisi seistä kun laite rullaa eteenpäin = standing platform</li> <li>- personalized healthcare = henkilökohtainen terveystieto</li> <li>- radio, music, TV</li> <li>- kunto- ja liikuntaohjelmia = fitness- and physical education programmers</li> <li>- erilaisia henkilökohtaiseen terveydentilaan liittyviä mittaus mahdollisuuksia</li> <li>personalized health</li> <li>- integrointi terveystietoon = Integration with health watch</li> </ul> <p>2x - moottori (hitaasti auttaisi eteenpäin, pysähtyisi kun ote irtoaa) , sähkömoottori = motor</p> <ul style="list-style-type: none"> <li>- pienempi koko = smaller size</li> <li>- sateenvarjoteline = umbrella holder</li> <li>- kuntoutukseen lainaksi = lending programs for rehabilitation</li> <li>- yksilöllinen design (värit ym.) = individual design for example in colours</li> <li>- pelimäisyys, ohjelma ( joku app joka seuraa ja haastaa käyttäjää eteenpäin kuntoutuksessa)</li> <li>features from games, gamification</li> <li>- paikka tarjottimelle (kahvikupille tai lautaselle) = tray</li> <li>- peili = mirror</li> </ul> <p>2x - pulloteline = water bottle holder</p> <ul style="list-style-type: none"> <li>- the reflector to indicate you are on the move, ex. in the evenings and nights, early mornings etc. = vilkkuvalot</li> <li>- use the pedals as brakes while cycling (pedal backward)</li> </ul> <p>jalkajarrut polkimissa</p> <ul style="list-style-type: none"> <li>- telepathic communicator = telepaattinen kommunikointi</li> <li>- sensory programs for visually disabled</li> </ul> <p>sensori ohjelmia näkövammaisille</p>
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	<p>yhdellä napilla kasaan = one button folding</p> <ul style="list-style-type: none"> <li>- kevennys rakenteisiin hiilikuidulla =carbon fiber to light the structure</li> <li>- night lights=valot</li> <li>- translator / voice recognition app</li> </ul> <p>kääntäjä / äänentunnistin</p> <ul style="list-style-type: none"> <li>- iso kori = big basket</li> <li>- keppiteline = walking stick holder</li> <li>- turvallinen, tukeva, helposti liikuteltava, ei liikaa säädettäviä osia</li> </ul> <p>safety, steadily, agility, not many adjustable parts</p> <ul style="list-style-type: none"> <li>- keveys, ketteruus ja kestävyys</li> </ul> <p>light weight, agility, sustainability</p>
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Table 5. Raw data for development and improvement ideas of Veloped.

Conclusions were drawn concerning similarities and differences between user experiences. Concurring and comparing was prepared between previous researchers and mobility aid measurement tools. Overall findings were drawn with the assistance of all of these phases. Figure 12 below shows components of the findings of both interviews and questionnaire.

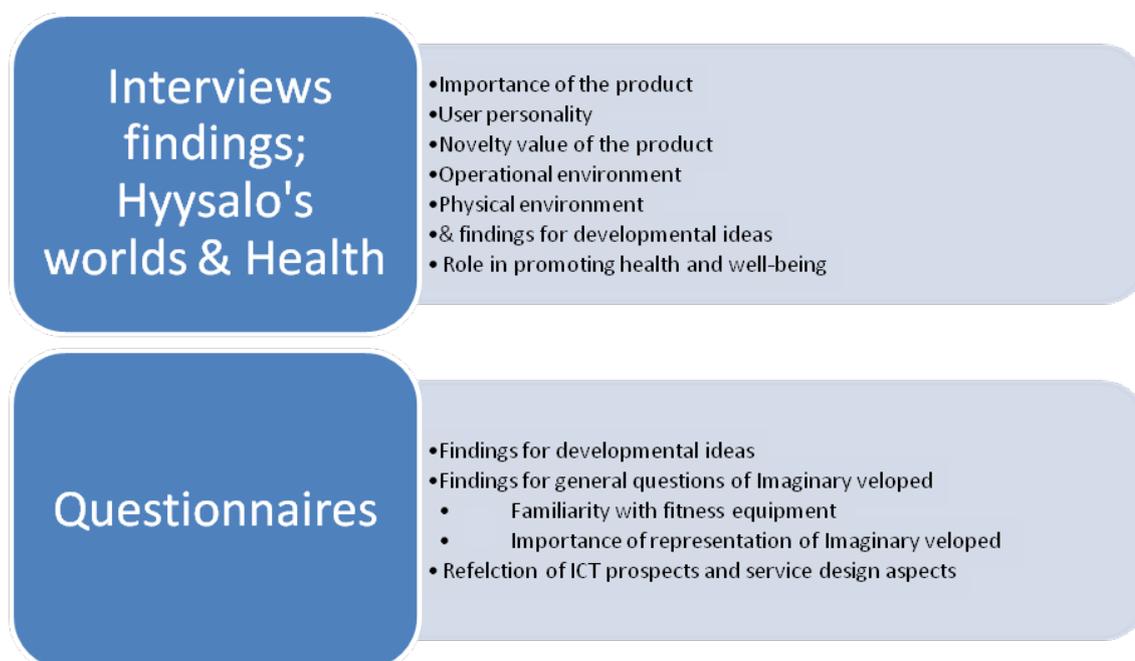


Figure 13. Shows components relevant to data findings.

Appendix 5 presents a document of openly written interviews, transcribed.

## 5 Findings

The results of the study are reported in three chapters. First chapter is presenting overall significant new insights that Veloped users experienced, in other words, produces the investigation insight of user experiences of Veloped walker. Chapter two addresses how test users would develop and improve Veloped's service. Summary of development ideas is presented. Imaginary Veloped image is expressed in the questionnaire. It is provided in appendix 3 and 4.

Additionally in this research, students identified a psychological barrier among test users to use Veloped walker in their daily life. In this qualitative research, five user' denied the need for helping equipment that was apparent regarding researchers' nurse's professional evaluation, this was a preliminary finding. Chapter three describes those health aspects Veloped users communicated.

### 5.1 Findings from user experiences explained through Hyysalo's "worlds."

In this chapter, the findings are interpreted through Hyysalo's worlds (Hyysalo 2009, 17-44.) The worlds are shown in Figure 14 below.

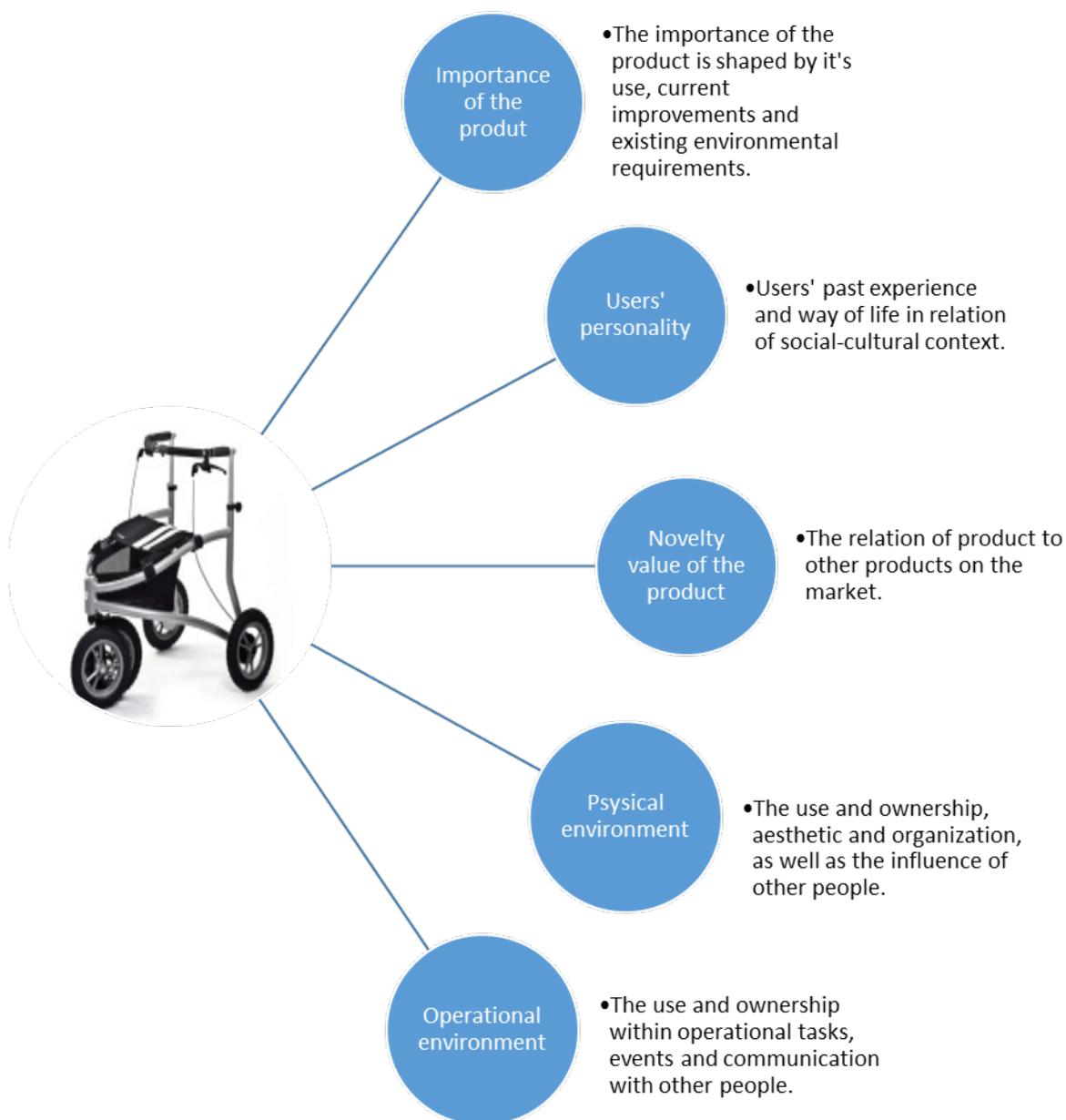


Figure 14. Shows findings structure as Hyysalo's "worlds" .

### 5.1.1 Importance of the product

Importance of product implies to previous experiences, memories, attachment to the product, product or service integration into user's world and environment. It is important to

not only create a product that is attractive and sells, but the product should fulfill its primary task to perform a particular task or function. The designer's mission is to create a striking product or service that sells. It is also significant how it accomplishes its functions: what experience its user or owner has with it, whether it is comfortable, convenient and enjoyable. The product or service and its user should be able to connect through personal experience; the particular product communicates about its user, but also invokes meanings that are only valuable to its owner. (Hyysalo 2009, 17-44).

While all the participants were test users of Veloped walker, one of them got very attached to the walker. They expressed that they had searched and tried different rollators on the market, but none allowed or provided her with the degree support that the Veloped did. There had housebound as no other rollator had satisfied their special needs.

'en anna pois, jos ei ole pakko'

I would not give it back if I did not have to.

All of the participants could also see the benefits of the walker in their everyday lives to perform daily activities and tasks. They recommended the Veloped walker for others who might have a need for mobility aid.

'olisi apua ulkoillessa, pitkällä kävelylenkeillä eri vuodenaikoina'

Would help full for long walks in all seasons

'olisi apua ostoksilla ja ulkoillessa'

Would be helpful for shopping and outdoors

This participant is in need of a mobility aid prescription. They expressed that they could not cope with daily activities such as shopping without support to stand and walk.

'käytän ostokärryä kaupassa, en pärjää ilman tukea'

Uses shopping trolley for support

### 5.1.2 Novelty value of the product

Novelty value of the product involves the use supports other products, competing products, comparison between products, and comparison to trends. In today's aggressive market competition world, a product's appearance may be the only distinguishing tool or distinctive characteristic. Consumers may choose products of the same or similar quality and price based

on their visual and esthetic impression. This fact clarifies the reason why design and its role in developing product's look are critical. (Hyysalo 2009, 17 - 44).

In this case the five test users felt that the Veloped walker performed extremely well because of certain features that were not in traditional walkers. One of these innovative characteristics in the Veloped walker that is not in another regular walker is the double front wheel that enables it to go over obstacles easily. In regards to this feature, all test users' felt that this made Veloped walker easy to use on top of different environments.

'hyvä etupyörä, helppo työntää eri maastoissa'

Front wheels are a great invention, makes it easy to use in different environments

'pääsen ulos, antaa vapautta ja mahdollisuuden'

Gives freedom and possibilities

'hyvä kaikille jotka tarvitsisivat, mutta eivät käytä'

Great for those who know they need to have a walker but will not use it'

Four of the user's compared the Veloped walker with other products and other competing products available and from this, made a decision whether they would buy or not. All the participants complemented the textile features; they are easy to clean and withstand all weather. One participant however expressed the opinion that there should be feminine color options. Two embraced the modern look of the Veloped walker.

'hinta on liian kallis'

Price is too high

'en ostaisi'

I would not buy

'kummallisen kookas'

Strange looking

'teksiilimateriaali on hyvä, voi jättää ulos kaikenlaisessa säässä'

Textiles are excellent; the walker can be left outside in any weather

'voisi olla naisten värejä,

Could be feminine colors

One of the test users commented on the Veloped walker's performance capability in reference to the novelty aspect. This was in comparison to other walkers that she had tried. This test user has actively searched for a suitable mobility aid that would suit her special needs.

'tosi näppärä, voi tanssia vaikka ripaskaa'

Very handy, one can even dance with it

### 5.1.3 Physical environment

Physical environment contains esthetics proportions; the use and ownership are linked to the physical dimensions of the environment, a naturally formed as architecture and other infrastructure (Hyysalo 2009, 17-44.)

A design aspect that brought out conflicting feelings in the users' was the size of the walker. All of the participants felt that it was both a real and inconvenient attribute. All the elderly users were in agreement that esthetically; the size made the Veloped walker look awkward. Four participants felt that the size made it heavy, and all six test users stated that the Veloped walker was not suitable for indoor use.

'näyttää raskaalta, isolta ja kummalliselta

Looks heavy, huge and awkward

'liian iso joihinkin hisseihin, vanhoihin taloihin'

Too big to fit doorways of older buildings and elevators

'ei mahtuisi kotona sisätiloihin, liian iso'

Too big for indoors

### Online service

In regards to ownership of the product or service, in this case, the Veloped walker is only available for sale from an online shop. All the test users were in agreement that one should have the opportunity to try the product before committing to it. More importantly, five expressed the need for professional service for advice before buying the walker. All users felt strongly against an online shop, one who had previous experience of buying online was to some extent okay with the online shop idea. The availability of the Veloped from only an online shop is alienating most of its potential users. Five out of six test users expressed the

need to try the product before buying and most importantly have professional advice and consultation from a physical premise. Previous researches show that there are likely to be less device abandonment cases or possibilities if professionals have prescribed mobility aids. These results suggest that customers' expectations for services quality are high.

'täytyy saada omaan käteen väännellä ja käännellä'

I have to touch and try

'tälläisen laitteen kanssa pitää olla henkilökohtaista palvelua'

With this device one needs personal service

'ei välttämättä tulisi tilattua ilman kokeilu mahdollisuutta'

Would not order without the possibly to try the product first

'ei internet kauppa, en ostaisi

Would not pay from online shop

'ei mitään järkeä myydä pelkästään netissä'

No point to sell only online

'vaikea hahmottaa netistä säädöt ym. muut'

Difficult to figure out how adjustments work from online

'tuotteen pitäisi mennä asiakkaan luo'

The product should go to the customer

'en ostaisi netistä, liian vaikeaa

Would not buy from online shop, too difficult

#### 5.1.4 Users' personality

Users' personality includes users' identity, personality, attitudes, values, motivations, and the way of life. Successful products require in-depth understanding of the user's actions, styles, and desires. User personality in Hyysalo's 'worlds' can be defined by investigating who might buy, how and where the product was purchased and finally the end use of the product. Also by identifying how the user's values are upheld in relation to the product use. (Hyysalo 2009, 17 - 44). When this is applied to the case of Veloped walker, it reveals the following; in case test users were those individuals that require support to walk.

'en pääse liikkeelle ilman tukea'

I cannot be mobile without support

We identified the participants both positive and negative attitudes towards Veloped walker. A study conducted by Bright & Coventry (2014) revealed the existence of substantial evidence suggesting that people generally have a negative view towards assistive devices. They can be reluctant to adopt it despite the fact that it has been explicitly designed to compensate for functional loss. This was evident in our research when some of the test users clearly described these feelings while for others it was an observation by us as researchers. Five of the participants stated that they did not need the Veloped walker.

'en ole vielä niin huonossa kunnossa'

I'm not in that bad shape yet

One of the test users had a positive attitude towards the Veloped walker. One particular test user mentioned, by using the Veloped walker.

'taivas avautui mulle henkilökohtaisesti'

The sky opened for me personally

Overall, the participants (six) recognized that Veloped walker would help promote health and well-being. Health promotion was one of the values of the Veloped's test users. Tahmaseb & Riley (2003, 522) describe health promotion as being a lifelong process involving personal growth and fulfillment, physical health and well-being and self-actualization. This view is a holistic outlook that includes a person's well-being in physical, mental, spiritual and social aspects. Veloped walker test users agreed that the Veloped walker played a critical role in health promotion.

'edistää henkistä ja fyysistä terveyttä'

Promotes psychological and physical health

'liikunta helpottaa kipuja'

Physical activity helps relieve pain

### 5.1.5 Operational environment

Operational environment comprises of the use and ownership within operational tasks, events and intercommunication with other people (Hyysalo 2009, 17 -44.) Two of the participants stated that they would use the Veloped walker on a daily basis. All the participants mentioned that is too big for indoor use but best suited for outdoor environments. Two of the test users reported that they got positive feedback from the public about the modern look of the walker. The test user's (one) motivation for using the Veloped walker was to be able to participate in everyday activities. These activities promote independence and in turn an individual's general well-being.

'tykkään matkustaa, mutta jään hotellihuoneeseen tai mökille, nyt voin päästä mukaan, kun pääsen kävelemään'

I love to travel, but I always end up staying in a hotel room or a cottage. Now I can go along as I am able to walk with the help of Veloped.

Another significant emotion that appeared to accompany the test user is (one) use of mobility aid was a feeling of embarrassment, closely connected to the idea of self-consciousness.

'olen tarkkailu parvekkeelta kuinka paljon rolaattoreita menee alla olevalla kävelytiellä'

I have been observing from my balcony how often someone using a walker passers by

'on iso kynnyks ottaa käyttöön, tuttavani kertoi, että hänellä meni kauan ennen kuin lähti rollaattorin kanssa ulos'

It is an important step to using a walker for the first time. A friend explains how it took her long to leave the house with one

### 5.2 Findings for development ideas for Veloped and Imaginary Veloped

As a summary, following primary development ideas were found. Answers for those development ideas that were specifically asked by Turvallinen Koti Ltd are; three of the test users felt that textile options would be very important. One test user mentioned the textiles attention value for safety reasons. Test users also requested for modern and feminine colors. Three test users felt that the available colors were enough and the most important aspect in textiles to them was that they are more practical. In regards to the handlebar, four participants could not say if any changes would make a difference. The other two requested that some change for example hinges or an arch to be implemented. The test users gave various suggestions about changes to the brakes; few felt they were ok as they were. Two

suggested simple on-off breaks would suffice. One important suggestion was a brake function that could be activated with one hand from one side.

The second research question is asking the test users how they would develop the current Veloped gave the following responses. The most popular suggestion was that the bottle holder to come standard rather than ordered separately. Several mentioned that it was uncomfortable to sit and lean back as the handle bar was hard. Five of the test users would have preferred that the Veloped would be lighter, and all six were in agreement that it was too big for indoor use. One test user noticed that either Medium or Large size of the Veloped walker was optimal for her. She felt that there could be greater adjusting levels for height in both sizes.

Helpful additions like mirror, bell, and light were suggested. For fitness purposes, hand exercise implements like finger press and roll-on hand belt were brought up.

There were a few suggestions from questionnaire respondents for motor integration into Imaginary Veloped. Footboards or footboard were suggested to give a scooter effect few times by respondents.

#### 5.2.1 Findings for service design aspects and ICT prospects

One respondent gave an idea of borrowing the Veloped service. If the service is managed on that way, health care district would have the facility to lease the service for the time needed. This kind of business operation mode would bring other quality dimensions. Advances of quality for the customer and business supplier could be for example in service maintenance line up.

#### ICT prospects

From the theoretical framework, the students have understood that the ICT features enable the user to be connected to peer support groups, enabling them to socialize. It could enhance the users' self-esteem and quality of life by helping them to get over the 'embarrassment' of using a mobility aid. A gamification aspect supported by the ICT platform can transform the lives of the users by keeping them motivated and engaged in an active lifestyle.

Questionnaire respondents gave the following suggestions of ICT that could be integrated into Imaginary Veloped. Personalized healthcare options and applications where health information can be monitored, stored and transferred to the health care professionals.

Security button suggestion was mentioned a few times. One interesting viewpoint was the thought of sensors to aid visually impairment individuals. Gamification appeared in one answer. Television and radio were among answers once.

Quality definition and customer expectations are considered important factors in order to understand, design and evaluate services. ICT's technical solutions which are occurring now enable the Veloped service to be tangible. Veloped service could easily exceed the customers' expectations. Responsiveness of personal online contact is obvious. ITC programs can be updated imperceptibly. Moreover, technical solutions are practically reliable. Technology architectures and management systems are consistent with a new service and are appropriate to operate and sustain it. Koskinen (2014) brings critical and holistic understanding analysis evident in the design. We use those perspective points to discuss the Imaginary Veloped service quality in the implementation section.

### 5.2.2 General findings of representation of an imaginary Veloped

The graph below indicates that sixty-six of the respondents regarded the innovations in the imaginary Veloped to be extremely important or very important in case they would have a need for Veloped service. Nineteen felt that the Veloped service would be important, and only three felt Veloped service would not be important, as shown in Figure 15.

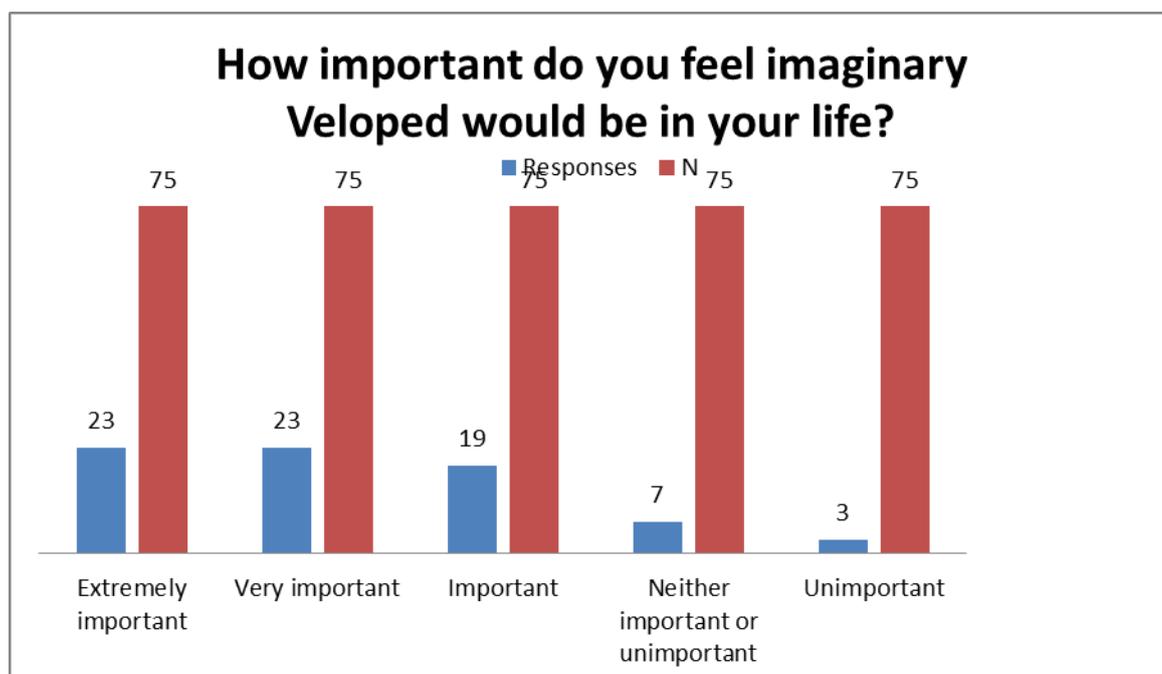


Figure 15. The results for importance of Imaginary Veloped.

Out of seventy-five respondents only nine did not have previous experience of fitness equipment with technology. This result shows delicately how commonly fitness equipments with technology are used and known among people. The frequencies of use were not asked.

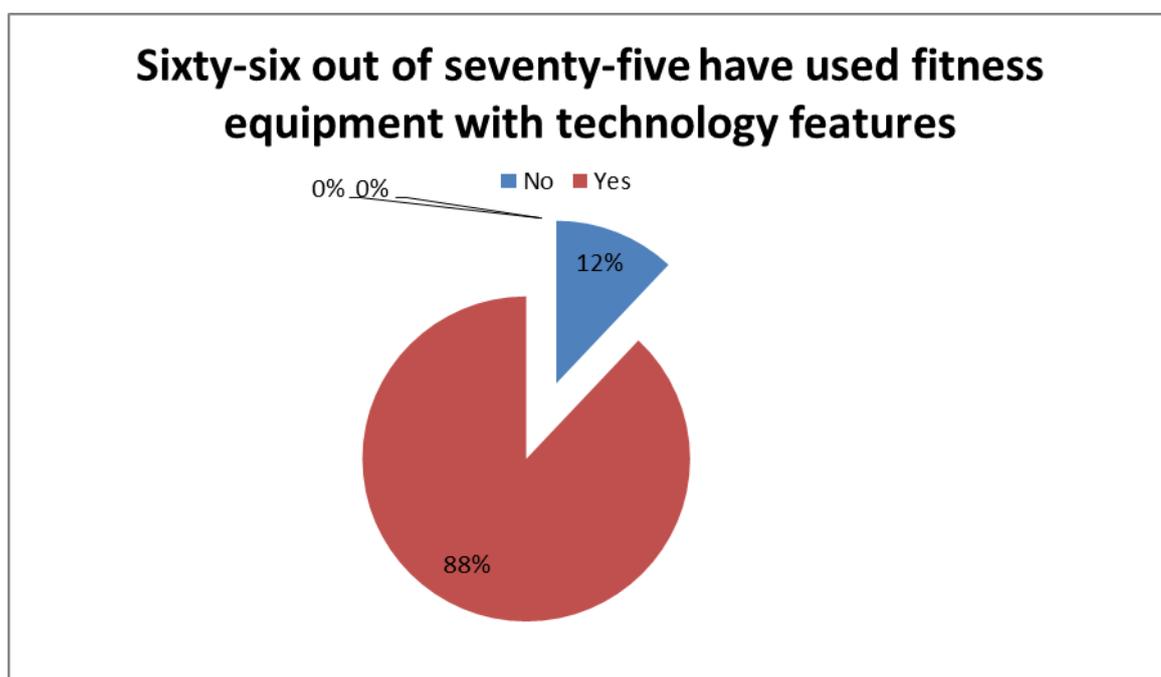


Figure 16. Number of respondents that have used fitness equipment with technology features.

Three out of nine respondents who have not used fitness equipment technology were over sixty-year-old. One was over fifty-year-old, four were between thirty and fifty-year-old and one was under thirty-year-old. These answers do not indicate that a particular age group would be unfamiliar with fitness equipments. Conversely, all age groups were familiar with fitness equipments with technology.

Only one respondent ticked yes for the question that asked; do you use the rollator at the moment.

### 5.3 Findings for health promotion and well-being

Jutaia et al. (2005) conducted research on the assistive devices outcomes and their effect on the well-being of the user. They identified one principle domain, satisfaction, which could be responsible for an individual's well-being. If the user is satisfied with the device, the service

it provides or the effects of the device or service, this will in turn improve their quality of life and health. The level of satisfaction with assistive device or technology can be measured by the QUEST assessment tool. This evaluation tool is essentially a questionnaire consisting of 12 satisfaction items, where for each, the user is supposed to rate their satisfaction with the assistive device and the related services.

With the Veloped walker, user satisfaction with the device would then mean that they will use it more, for example on a daily basis. Regular use of the Veloped Walker would have the user taking part in more outdoor activities, able to carry out normal day to day activities such as shopping, or walking the dog and get support in carrying out their hobbies such as travelling. These are reflected in some of the responses from the users'.

'tykkään matkustaa, mutta jään hotellihuoneeseen tai mökille, nyt voin päästä mukaan, kun pääsen kävelemään'

I love to travel but always I end up staying in a hotel room or a cottage. Now I can go along as I am able to walk with the help of Veloped

Ferrans & Powers (1984) have designed a tool for measuring quality of life, which is essentially a series questionnaire to help make this assessment. In these questionnaires they ask about amount of pain the individual has, ability to get around and go places and also about relationships with friends and family. All these are aspects that contribute an individual's well-being. Another questionnaire developed by the University of Wisconsin(1996) included questions about physical health, social relations and support, activities of daily living and goal attainment. These are some of the factors that affect the quality of life. Assistive devices help improve the quality of life and maintain a sense of independence. For an assistive device to be considered to be of a high quality it should be well designed to be able to support those disabled due to age, injury or medical conditions with independent living. Independence is promoted by enabling individuals to perform tasks that they were previously unable to undertake, or had great difficulty doing. Mobility aids provide enhancements or changed methods of interacting with the environment so as to be able to accomplish such tasks.

The elderly are affected by changes in relationships such as loss of a spouse, less contact with friends probably due to mobility impairments, fewer friends as age progresses. It is a challenge for them to adjust to these changes and can lead to depression and loneliness and consequently reduced emotional and psychological well-being. It is, therefore, important to provide resources and come up with strategies to help the elderly adapt to these changes.

'olisi apua ostoksilla ja ulkoillessa'

Would be helpful on shopping trips and walking outdoors

'olisi apua ulkoillessa, pitkällä kävelylenkeillä eri vuodenaikoina'

Would be helpful for long walks in all seasons

Through the reflection of Hyysalo's worlds, the world of user personality, it is important how individuals and society around them view their product, in this case, the Veloped walker. These impacts usually are not concerned with functional improvements; they could be more to do with a cosmetic appearance. Positive feedback from the public of a rollator may considerably improve device satisfaction leading to increased use and well-being. In the case of Veloped, users suggested cosmetic modifications such as feminine colors for the textiles and were happy that the Veloped had a more modern look compared to other rollators in the market.

The test users in this research recognized and recommended the Veloped walker use for physical activities such as long walks in different seasons. According to Nelson et al. (2007), aging brought about a decline in levels of physical functioning and increased occurrence of chronic health diseases. Regular physical activity is beneficial to older adults maintain healthy functioning longer. Walking is usually the primary form of exercise for the elderly. Those who are physically active have a lesser disposition to develop diseases such as cardiovascular disease, thromboembolic stroke, hypertension, type 2 diabetes mellitus, osteoporosis, obesity, colon cancer, breast cancer, anxiety, pain reduction and depression. There is also substantial evidence that physical activity reduces the risk of falls and injuries from falls and prevents or mitigates functional limitations in older adults. The students aimed to influence and change the traditional view of the rollator by inventing the Imaginary Veloped service. This version offered more opportunities to have more features that support and encourage physical activity, exercise, and an active lifestyle. Test users' recognized many beneficial health aspects of Veloped walker and physical activities.

'edistää henkistä ja fyysistä terveyttä'

Promotes psychological and physical health

'liikunta helpottaa kipuja'

Physical activity helps relieve pain

'saa arkiliikuntaa ja hyötyliikuntaa'

Everyday activities are beneficial activities

The aspects and perspectives discussed above in this chapter are all geared towards empowering individuals realize they are in control and capable of improving their well-being and health. The Veloped walker is designed with the primary purpose of supporting an active lifestyle by use in outdoor environments. Some of the development and improvement ideas, for example, those to do with ICT could be used to empower individuals. This could be through the use of personalized healthcare programs, fitness programs, and rehabilitation programs. The possibility of using gamification strategies in health and exercise programs could transform users' engagement and motivation levels to help keep an active lifestyle. These programs can also allow for real time interaction with healthcare professionals and updates for current levels.

According to Nelson et al. (2007) regular physical activity is beneficial to individuals and it reduces the progression or risk of diseases such as cardiovascular, neurological and metabolic diseases. It also reduces the risk of falls and injuries from falls. They also note that walking is usually the primary form of exercise for the elderly. This psychological mindset prompted the creation of the Imaginary walker with fitness equipment and ICT integrated to motivate the users into participating in more physical activities.

When asked if they felt that the use of the Veloped walker would promote health and well-being, all of the participants were in agreement that it would. WHO (2006) defines health promotion is a process of enabling people control over life to improve their health. One of the users was particularly pleased with the Veloped walker. To her Veloped walker opened the door to many possibilities. All which were not options before using the walker.

'taivas avautui mulle henkilökohtaisesti'

The sky opened for me personally.

This master thesis is part of an educational body: Degree Programme in Health Promotion, Family Healthcare. Therefore, health and health promotion are ontological arguments for this thesis. Project mHealthbooster and Veloped's importer and distributor Turvallinen Koti Ltd are thesis working life partners, and their interest is in well-being. Helping devices (Assistive devices) like mobility aid Veloped walker are intended to make proficient a person's capability towards values, freedom, social security, and equality. Veloped walker underlines those United Nation's stated human rights via offering social security, towards promoting health, supporting participation in the community, emphasizing standards of living, rest and leisure. Freedom is attainable with helping device's ability to make movement possible. Equality is transparent with the achievement to carry on duties in the community and maintain autonomy in one's life. In all healthcare situations, these human rights are considered as a core value of actions and decisions.

## 6 Discussion

In this section the first chapter briefly presents the study, main research questions, materials, and methods. Findings are discussed. The second chapter evaluates the study's trustworthiness. Strengths and limitations of the study are examined. Chapter three presents other lines of research that are recommended for further study. The final chapter, chapter four is considering ethical principles fulfillment in the study.

### 6.1 Practical discussion

In this thesis, we have presented user experience and development results relating to the mobility aid Veloped walker in its user testing period. This thesis also reflects the role of Veloped walker in health promotion and well-being. Veloped walker is a mobility assistance device designed specifically for outdoor use to give support and encourage physical activity.

The research is gathered together in qualitative methodology. The objective of the thesis was to investigate of Veloped's user experience and supply development ideas of Veloped walker the suppliers. This was explored with the aim of identifying those issues and factors that underline users' creation value and development value among Veloped walker users. The results from each interview and questionnaire form the evidence for the research questions of this thesis. The purpose of this thesis is to investigate authentic user experiences and development ideas in the study of Veloped walker's role in promoting health and well-being. There are three main research questions:

What were the test user experiences of Veloped walker?

How Veloped walker could be developed or improved?

How Veloped walker could improve well-being and health?

Questionnaire - provides answers to question two and contains four general questions.

In the interviews, the three main research questions have been answered through the 'talking loud' interview method, and therefore these questions provide subjective and holistic responses. Imaginary Veloped service was inspired by service-dominant logic and created under the Living Theory guidelines from Action Research methodology and expressed in questionnaires. In order to be able to study and form the study's research outline, we have

structured a theoretical framework. We have focused on definitions, models, and theories, which are regarded as resourceful for conducting a concrete study.

A practical approach was used to explore user experience because a unified definition of user experience does not exist. This means that researchers have to know and identify those factors that influence user experience. Jääskö & Keinonen (2004) and Hyysalo (2009) have created comprehensively explanatory "worlds" of user experience. These worlds help us to understand that user experience is influenced by many aspects. This framework shows that users are always aiming for an inevitable outcome when using the service. Users are living and gaining the experiences in operational, physical, personal and product environments.

In this thesis, the findings for user experiences are presented in different sections in an overall view as they were expressed by the participants. They have also been explained deductively through worlds. These worlds were used to present and explain the findings because they were found to encompass all the other meters used to measure mobility aids use. For example, the PIADS meter which is used to measure psychological satisfaction among assistive aid users falls under the user's personality world. Part of data analysis were presented in two tables representing two sets of test users; the elderly, over seventy years old and rehabilitation users who were under fifty years of age.

From the interviews, there were similarities in views or experiences from both sets as well as differences. All test users stated that the Veloped walker was too big for use in indoor environments, and numerous respects is ergonomically advantageous in comparison to other rollators when used in outdoor environments. The elderly test users were in agreement that the Veloped walker has lots of beneficial aspects, however, that understanding was not enough for them to reach a decision to purchase a walker.

The rehabilitation users were especially enthusiastic and active towards the Veloped walker. These rehabilitation users also reported that they would use the Veloped walker on a daily basis as it gave them a chance to be more independent and able to participate in daily activities and hobbies. A comparative previous study conducted in 2006 in Sweden by Hallen, Orrenius & Rose on the Veloped walker revealed similar results. In their study, they concluded that the Veloped walker appealed to younger users possibly because the functions of the walker were better suited to fit the needs of those with medical disabilities. This was also evident in our study. It could be concluded that there would be more market prospects among the rehabilitation users.

The Veloped walker as whole has novelty value by being new product on the market. The use of the patented double front wheel adds to Veloped's novelty value. Novelty is valued when it

relates to something of interest to the consumer. Different users have various interests. For them, novelty has to be of interest and relevant and, otherwise it will be ignored. Most consumers view products as bundles of benefits, not attributes. Consumers have less interest in a product's or services' technical features, but more interest in the benefits they will get from buying, consuming or using the product. (Hyysalo 2009, 27-30). Veloped walkers extra features like golf bags that had novelty value were not of interest to all test users. One beneficial innovative feature which was appreciated by test users was the patented climbing double wheel. This wheel allows the users to benefit of rough terrains like hiking and uneven surfaces. Because of this double wheel, Veloped was preferred to other rollators.

A major concern among the elderly test users of the Veloped walker was the price. In their opinion, Veloped was priced too high. The price played a key role in their decision to buy or not to buy. They compared the cost of Veloped to that of existing rollators in the market.

A review of previous researches on mobility aids meant for health revealed the importance of physical activity for the aging population and those with special conditions such as chronic diseases and performance challenges. The elderly test users recognized the Veloped walker's functional benefits but could not make a direct link how Veloped supports an active lifestyle and, as a result, promote health. They were not motivated to use the Veloped walker. It appeared to us that the elderly test users had a challenge to change their mindsets or habits to make the necessary interventions to promote their health and well-being. Our claim is that this Imaginary Veloped service could be used by healthcare programs to empower the public, for example, through interactive health-promoting exercises. Active, healthy lifestyle application needs early beginning.

The aspect of denial of the necessity of a mobility aid was evident among participants but more so among the elderly users. Some users in this set stated that they were not yet in that bad a shape to need the Veloped walker. They seemed fixated on the size of the Walker, though they understood that it was designed to support the user in outdoor environments, they still insisted they prefer one which is smaller. This indicates high customer expectations towards Veloped qualities. A study conducted by Bright & Coventry (2014) revealed the existence of substantial evidence suggesting that people generally have a negative view towards assistive devices. That can be reluctant to adopt it despite the fact that it has been explicitly designed to compensate for functional loss. People felt that mobility aid technology evidently drew attention to their disability and age. One of the users had a positive attitude towards the Veloped walker. Positive emotions are usually the result of authentic experiences with assistive devices (Bright & Coventry 2014).

This was evident in our research when some of the test users clearly described these feelings while with others it was an observation by us as researchers. Five of the participants stated that they did not need the Veloped walker. This unwillingness to contemplate the use of the walker could be that it gave them a feeling of defeat and the unavoidable decline. Then the feeling translated into a denial of the need, despite the obvious benefits the use of the Veloped walker would have on their mobility levels and independence. Veloped test users recognized the need of mobility aid for other people, but not themselves.

Service design has inspired this thesis processes with its applicable philosophical foundation. Grönroos (2007) & Vargo & Lusch (2004) describe the paradigm for understanding economic exchange and value creation among service systems. "The focus is not on products, but on customers' value creating processes, where value emerges for consumers, and is perceived by them." We have introduced the representation of imaginary Veloped service whose profound design ideal evolved from Service Dominant (S-D) Logic.

In this thesis, those development ideas reported in both current and imaginary version of Veloped walker could be used in development projects. Development projects for healthcare services or private companies can utilize these ideas. The utilization of these ideas can bring about economic exchange that is capitalizing on customers' value creation processes.

In conclusion, the involvement of the public in the representation of the Imaginary Veloped service's developmental process showed how broad service functions could be with the inclusion of ICT. These features vary from different personal health care programs which include social, security and business approach aspects. The future shall be positioned around ICT and co-operational with public in creation and development process can be resourceful as our study proved.

The Veloped walker is available for purchase only at the on-line shop ran by Turvallinen Koti Ltd. Support services are online based or to be bought separately. It is important to notice that test users did not realize the benefits of the on-line service. Based on the test users opinions, recommendations can be made that suppliers business form be rethought to include a physical shop. They value personal contact, customer service and possibility to touch the product. The rehabilitation test users expressed the need for healthcare professional involvement in the process of obtaining the walker. The considerations of these test users viewpoints could add to co-creation values. Customer service qualities on the Turvallinen Koti online service concept are inadequately addressed based on interpretation of the feedback given by test users.

Seventy-five implied coverage of the questionnaire study in the months of August and September 2014 has led us to the conclusion that representation of Imaginary Veloped service would be significant to people in case they would be in need of mobility aid. We concluded that health promotion and rehabilitation processes might need to be rethought. From an ethical viewpoint, a mobility aid like Veloped walker improves quality of life by promoting values, freedom, and equality when made accessible to those who need it.

## 6.2 Trustworthiness

The actual Veloped walker was provided to the participants for test use. These participants were selected carefully; the criteria used were that they had a present or obvious near future need for mobility aid. The researchers and participants had no previous knowledge of each other, so it did not affect the study's credibility. Their perspective was authentic and current. All components of our theoretical framework are relevant and apply to the whole thesis process.

There are two areas where this thesis is applicable to the area outside of thesis perspective. The first one is improvement and development ideas for Veloped which could be considered for use in the design of more diverse helping (assistive) devices. The second one is the Imaginary Veloped service concept, which can be adopted and modified partly or whole by different healthcare programs.

The objectiveness of this thesis is reflected in the way the findings have been reported. All viewpoints, positive and negative have been presented as given by the users. We have established confidence in the truth of the findings for the subjects and the context in which the study was undertaken.

In this thesis, qualitative research describes participants' empirical world from their authentic viewpoints as test users. We have accessed their subjective and holistic experiences through in-depth interviews. Open-ended questions were asked to avoid manipulating and leading the participants. These questions were simple and not structured, in other words, not defined a priori by the researchers. The supporting questions were not meant to bring new information. These questions were to remind the test user and research students to cover certain significant aspects.

The talking loud method allowed participants to express themselves in their terms and a familiar language to convey what they felt was important to them. This method allowed us to get rich, detail, appropriate and well-saturated data. Voice recorded interviews made it

possible to use direct quotations; we did not report our interpretation of what was said. Transcribed documents have been added in an appendix so every reader can evaluate our interpretation of findings and discussion. This is one way we endeavored to make the research transparent.

This research's conclusions were compared and contrasted with previous comparative research study of Veloped, conducted in Sweden (2006). Results comparison of the Veloped from different research is done to reduce the impact of individual bias. This was done to test the credibility of our research findings. This research study has included previous reviews of mobility aids and essential elements of the study field in the theoretical framework. Our research findings were broad and also had coherent critical elements as those from previous reviews and research.

As always, this investigation has a number of limitations to be considered in evaluating its findings. The study was carried out during the summer and early autumn time; therefore more severe conditions such as those in winter were excluded. Number of participants could have been greater. Other methods such as conversational analysis, randomized controlled trial, case studies might have been used. Data was collected from six individuals so findings cannot be generalized to a larger population. Findings can however be transferable to another setting such as other mobility aids. The researcher's presence during data gathering can affect subjects' responses. Autonomy and confidentiality of participants was taken care of in every step of research. Interviewees were numbered to match numbered voice recordings. From findings, interviewees can find his/hers own comment lines, but cannot find each others, because they do not know each other.

### 6.3 Ethical considerations

Ethical codes for research fragment into principles and standards. The codes are guiding the actions, and law obligates the standards. Five ethical principles form the basic guidelines for researchers. (James et al. 2012, 50-51, Hirsjärvi 2003, 25-28, APA) These principles explained below were taken into consideration and practiced in this thesis process.

Furthermore, students had made preparations for interview events before the conduction of the interviews. The form of quality interview was created by students that emphasized respectfully acting in participants' residential area. *Respect for people's rights and dignity* came into sight by respecting, being aware of and promoting the dignity of all individuals, regardless of any differences occurring because of culture, age, socioeconomic standing, national origin, language, disability or sexual orientation.

Moreover, the model highlighted the understanding that students are not marketing the Veloped walker and that they were a neutral party. *Beneficence and No malfeasance* meant that research work was promoting the welfare of others and was doing no harm. The student's model aimed for pleasant and beneficial experience for the participant. Reeves & Bednar (1994) quality criteria Reliability, Responsiveness, Assurance, Empathy, and Tangibles were adapted to ensure a pleasant and positive atmosphere. Listening and communication skills, clear language, prompt timetable and clear instructions and details of the study were functional on the interview occasions.

*Fidelity and responsibility*, promoting trust through research work that was of value to the community, taking self-responsibility and when needed, offering services to others. Letter of intent/research was written in English and Finnish. It is in the appendix. The letter included a question for permission Yes/No to Turvallinen Koti Ltd for marketing purposes. Letter of intent/research was given to every participant. This letter also contains information about the research topic and confidentiality, research's authors and contact details.

*Integrity* showed in behavior that promoted and ensured accuracy, honesty, and truthfulness according to scientific survey standards throughout this thesis process. *Justice* was demonstrated in the effort to ensure that all persons benefit and have access to research outcomes, and none were held back or took part due to bias or prejudice. The thesis shall be published in Laurea's thesis online application open to all.

#### 6.4 Future perspectives and research areas

Health care and the health promotion sector are in constant need for strategies to improve health. For sustainable success, there is a call for integrated approaches. Rehabilitations and chronic conditions especially require holistic approaches to influence, motivate and lead peoples' change towards their personal goals. Those objectives can be part of person's autonomy and capability for daily tasks.

All elderly people interviewed articulated that they did not want to use mobility assistance before they cannot walk. At that moment when ability to walk has gone or is nearly gone, it is too late for many reasons. It is recommended that this contradiction between health care professionals understanding and citizen opinion be further studied. Another fact noticed as a sideline in the thesis process, was the lack of services and furthermore lack of modern services that provide quality of life for mobility assistant users. The idea for the "future image" of Veloped was introduced for these reasons.

Veloped's service concept design which is integrating fitness equipment technology to resourceful Veloped walker's effects and information and communication technology ICT to convey service inclusion is one possible future study area. Currently, technical solutions like gamification strategies are approaching strongly for the healthcare sector. Inclusion of gamification to health programs has already started quite widely, and it is a recommended future study area.

Development plans were asked with main research question and the questionnaire had a question "what features of fitness equipment do you think would be useful integrated into Veloped?" All development ideas given by this thesis process are worth pursuing further and directed into assistance device area.

We used qualitative methodology in this research to investigate user experience of Veloped walker. In future studies, other research methods might be used to gather user experience from another perspective. One point of view could be randomized controlled trial RCT. That kind of study would compare results of the treatment group (Veloped walker users) and control group (rollator of another kind users).

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## Appendix 1. Research letter

### User Experience Research

Dear Sir/Madam

I do the research thesis on the user experience in Laurea Master's degree program. None of the defendant's information will be registered individually. Videotaped answer will be themed for analyzing together with all the answers, and the results are reported in combination with all the answers. That way, the answers are strictly confidential, and the research is following academic research rules.

Product representative Turvallinen Koti Oy is asking your permission for research data for possible marketing purposes. You can subscribe your permission below.

YES an answer can be used for possible marketing purposes

NO an answer cannot be used for possible marketing purposes

If you want to ask something about this study, please call tel. 044-3220770 Niina Joronen and 044-0181836 Margaret Kibatha

Thank you for participating and your research assistant  
Niina Joronen and Margaret Kibatha

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## Appendix 2. Tutkimuskirje

Käyttäjäkokemustutkimus Veloped rollaattorista

Hyvä Vastaaja

Teemme tutkimusta aiheesta käyttäjäkokeemus opinnäytetyönä Laurean YAMK ohjelmassa. Kenenkään vastaajan tietoja ei rekisteröidä yksittäisinä vaan videoitu käyttäjäkokeuksenne analysoidaan teemoittain koottuna kaikista vastauksista ja tulokset raportoidaan yhdistettyinä kaikista vastauksista. Näin menetellen vastaukset käsitellään täysin luottamuksellisina akateemisia tutkimussääntöjä noudattaen.

Tuotteen edustaja Turvallinen Koti Oy kysyy Teidän lupanne tutkimusaineiston mahdolliseen markkinointikäyttöön. Voitte merkitä lupanne alla.

KYLLÄ Vastaustani voi käyttää markkinointiin

EI Vastaustani ei voi käyttää markkinointiin

Jos haluatte kysyä jotakin tutkimuksesta, soittakaa puh. 044-3220770 Niina Joronen ja 044-0181836 Margaret Kibatha

Kiitos osallistumisestanne ja tutkimusavusta  
Niina Joronen ja Margaret Kibatha

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Appendix 3. Questionnaire



IMAGINARY VELOPED ROLLATOR WITH CLICK ON/OFF INTEGRATED FITNESS TECHNOLOGY:

What age group you belong? Or state your age approximately.

under 30 \_\_\_\_ 30-50 \_\_\_\_ over 50 \_\_\_\_ over 60 \_\_\_\_ your age \_\_\_\_

Have you ever used fitness equipment? YES \_\_\_\_ NO \_\_\_\_

How important do you feel this imaginary helping fitness equipment would be in your life, if you would have a necessity for helping equipment / or your present rollator?

Extremely important: \_\_\_\_ Very important: \_\_\_\_ Important: \_\_\_\_ Neither important or unimportant: \_\_\_\_ Unimportant: \_\_\_\_

Do you use a rollator? YES \_\_\_\_ NO \_\_\_\_

What features of fitness equipment do you think would be useful integrated with the Veloped?

#### Appendix 4. Kyselylomake

Kosketusnäyttö: aika,  
syke, kalorikulutus, matka  
GPS, Wi-Fi, ICT



Laurea YAMK  
www.turvallinenkoti

Kokoontaitettava  
istuin ja polkimet

Vastuspyörä, joka mahdollistaa  
kunto-ohjelmat: mäki, cardio  
intervalli



#### MIELIKUVITUKSELLINEN VELOPED ROLLAATTORI, JOSSA IRROITETTAVAA KUNTOLAITETEKNOLOGIAA JA TIETOTEKNOLOGIAA:

Mihin ikäryhmään kuulut? Tai kirjoita ikäsi.

alle 30 \_\_\_\_ 30-50 \_\_\_\_ yli 50 \_\_\_\_ yli 60 \_\_\_\_ ikäsi \_\_\_\_

Oletko koskaan käyttänyt kuntolaitetta? KYLLÄ \_\_\_\_ EI \_\_\_\_

Kuinka tärkeä tällainen mielikuvituksellinen kuntoapuväline olisi sinun elämässä, jos sinulla olisi tarve apuvälineeseen?

Erityisen tärkeä: \_\_\_\_ Hyvin tärkeä: \_\_\_\_ Tärkeä: \_\_\_\_ Ei kumpikaan tärkeä / Ei tärkeä: \_\_\_\_ Ei tärkeä: \_\_\_\_

Käytätkö tällä hetkellä rollaattoria? KYLLÄ \_\_\_\_ EI \_\_\_\_

Millaisia ominaisuuksia mielestäsi olisi hyvä yhdistää Velopediin ?

## Appendix 5. Transcrip document

### Importance of the product and novelty value of the product

'hinta on liian kallis' = price is too high

'en ostaisi' = I would not buy

'kummallisern kookas' = strange looking

'raskas..13kiloa' = heavy...13kg

'renkaat hätävarjelun liioittelua' = the tracks of the tires have been exaggerated

'hyvä etupyörä, helppo työntää eri maastoissa'

front wheels are a great invention, makes it easy to use in different environments

'en anna pois, jos ei ole pakko'

Veloped was very good. I would not give it back if i didn't have to.

'tukeva-ei kaadu' / 'turvallisen tukeva'

'turvallinen, koko, ulkona ja tukeva' = good support / safe feeling when outside

'tuo tuntuman tiehen ja pitäätasapainon'

one gets a good crib of the road and holds the balance

'renkaiden asento on hyvä, on tukeva/ ei kaadu'

the wheel positioning increases balance / not easy to fall over

'moderni ulkonäkö' = modern looking

'modern looking' ... very important

'kummallisen näköinen' = looks awkward.(compares it to the sister's model)

'renkaat ovat hyvät' = wheels are good

'korin koko on hyvä' = size of the basket is good

'jarrut on hyvät' = great breaks

'tekstiili materiaali on hyvä, voi jättää ulos kaikenlaisessa säässä'

textiles are good / the walker can be left outside in any weather

'kömpelön näköinen' = awkward looking

'kangasmateriaali ok' = textile materiaali ok

'näyttää raskaalta, isolta ja kummalliselta' = looks heavy, huge and awkward

'istuessa ohjaustanko painaa selkää'

handle bar is too hard on the back when i sit and lean back.

'hyvä, että tekstiili on helppo puhdistaa' = good that textiles are easy to keep clean

'tärkeää, että tekstiilejä saa eri väreissä' = important that textiles come in different colours

'renkaat tuovat paljon roskaa sisälle, varsinkin kurakelillä' =tyres collect dirt

'liian iso - pituus' = too big - lentgh wise

'materiaali miellyttävä' = material is pleasant

'liian pieni kori' = basket is too small

'kokoontaitettavuus hyvä' = good that it is foldable

'renkaat menee kuin ajatus' = tires are moving like a thought  
 'menee kokoon nätisti' = goes compact nicely  
 'yllättävän iso kokoontaitteetunakin' = surprisingly big even when folded  
 'huonokuntoinen ei saa kasaan'  
 complicated to fold especially is physical functioning is impaired  
 'monimutkainen kokoontaitettava yhdelle, erityisesti naiselle'  
 complicated to fold especially to ladies  
 'etupyörä vaikea irrottaa' = front wheel is difficult to release  
 'vaikea laittaa kasaan' = difficult to fold  
 'tulisi taittua, mennä kasaan pienemmäksi' = should fold smaller  
 'ei voi edellyttää käyttäjältä renkaiden irrottamista'  
 can not expect that the user can release the wheels  
 'kädensijat on hyvät' = handlebar is good  
 'jarrun lukitus vaikea' = brakes are too complicated  
 'helppo työntää' = easy to push  
 'tehokas jarru-puree kiinni' = powerful brakes  
 'kevyt työntää menee yli esteiden' = light to push over obstacles  
 'raskas nostaa = heavy to lift

### Users' personality

'monimutkainen huoltokirjaa' = complicated user manual  
 'ei tarvitse huoltoa' = does not need maintenance  
 'olen tarkkailu parvekeelta kuinka paljon rolatoreita menee alla olevalla kavevelytiellä'  
 I have been observing from my balcony how often someone using a walker passes by  
 'on iso kyynnyys otaottaa käyttöön, tuttavani kertoi hänellä meni kauan ennen kuin lähti rollaattorin kanssa ulos'  
 It is a major step to use a walker for the first time. A friend explains how it took her long to actually leave the house with one.  
 'taivas avautui mulle henkilökohtaisesti' = the sky opened for me personally  
 'edistää henkistä ja fyysistä terveyttä'  
 promotes psychological and physical health  
 'liikunta helpottaa kipuja' = physical activity helps relieve pain  
 'saa arkki liikunta ja hyötyliikuntaa' = everyday activities are beneficial activities  
 'olisi apua ulkoillessa ,pikillä kävelylenkeillä vuodenaikoina'  
 would be helpfull for long walks in all seasons  
 'olisi apua ostoksilla ja ulkoillessa'  
 would be helpful on shopping trips and walking outdoors  
 'hyvä kaikille jotka tarvitsisivat, mutta eivät käytä'

great for those who know they need to have a walker but will not use it'

'en vielä ole niin huonossa kunnossa' = i am not that bad shape yet

'tarvitsen ison selkäleikkauksen'

has a back problem and in need of major back surgery

'käytän ostoskärryä kaupassa, en pärjää ilman tukea'

needs shopping trolley for support on shopping trips

### Physical environment

#### Professional service

'luotan katsekontaktiin' = I trust eye contact

'tällaisten laitteen kanssa pitää olla henkilökohtaista palvelua'

with this device one needs personal service

'tuotteen pitäisi mennä asiakkaan luo'

the product should go to the customer

'täytyy saada omaankäteen väännellä ja käännellä'

I have to touch it and try it

#### Online shop

'vaikea hahmottaa netistä säädöt ym.'

difficult to figure out how adjustments work from webpage

'ei mitään järkeä myydä pelkastaan netissä' = no point to sell only online

'kyllä nettikauppa, jos saa kokeilla ja silti palaute oikeus'

yes would buy online if i can try and return if not satisfied

'ei valtamata tulisi tilattua ilman kokeilu mahdollisuutta'

would not order without the possibility to try the product first

'nettisivut vaikuttavat vaikeilta löytää tietoa velopedista'

was difficult to find information about veloped from the web page

'internet kauppa, mikä ettei ehkä' = would maybe buy from online shop

'ei internet kauppa. En ostaisi' = would not buy from online shop

'en osta netistä, liian vaikeaa' = would not buy from online shop...too difficult

'en suosittelen sisätiloihin, on kömpelö, liian iso, päitsi laitoksiin, joissa hyvä'

would not recommend it for indoor use at home. Could be used in big buildings like institutions

'hyvä kokemus eri maastoissa' = good experience in different outdoor environments

'toimii hyvin metsäteillä ja lenkkipolulla' = operates well in forest roads and walking paths

'liian iso joihinkin hisseihin, vanhoihin taloihin'

too wide to fit in the doorways of older buildings

'ei mahtuisi kotona sisätiloihin, liian iso' = too big for indoor use at home

### Operational environment

'tykkään matkustaa, mutta jään hotellihuoneeseen tai mökille, nyt voin päästä mukaan, kun pääsen kävelemään'

I love to travel but i always end up staying in a hotel room or in the cottage. Now I can go along as I'm able to walk with the help of Veloped.

'tosi näppärä voi tanssia vaikka ripaskaa' = very handy one can even dance with it.

'edistää henkistä ja fyysistä terveyttä' = promotes psychological and physical health

'liikunta helpottaa kipuja' = physical activity helps relieve pain

'saa arkki liikunta ja hyötyliikuntaa' = everyday activities are beneficial activities

'olisi apua ulkoileessa ,pikillä kävelylenkeillä eri vuodenaikoina'

would be helpfull for long walks in all seasons

'olisi apua ostoksilla ja ulkoileessa' = would be helpful on shopping trips and walks

'pääsen ulos, antaa vapautta ja mahdollisuuden' = gives freedom and possibilities

'käyttäisin päivittäin' = would use daily

'päivittäin, en pääse liikkeelle ilman tukea' = would use daily, needs support to be mobile

'nyt pääsen vuosiin ulos kävelylle koiran kanssa ja kauppaan'

for the first time in years im able to go out for a walk, take the dog out and go shopping

'saa positiivista palautetta kadulla' = positive feedback from the public

'herättää mielenkiintoa kaikkilta, mummo rollaatorilta ei kysytä mikätuolaite on'

it aroused positive curiosity from the public... not called "granny walker"

'kokoontaitto ei onnistu huonokuntoiselta, renkaat ovat vaikea irrottaa, tarvitsee ison auton'

the folding mechanism is not convenient for all. one has to remove the wheels which is challenging. or a big car is needed.

'terveen ihmisen on vaikea laittaa takakonttiin, kasaanlaittamisessa on kova työ'

difficult to put in the boot for a healthy person. to take it apart so it fits in the boot is a big job.

### Development ideas

Three development ideas were given by Stefan from Sweden via email:

-could not say if changes to the handle bar would make it better. It feels ok the way it is.

-could not say if changes to the brakes or handle bar would be good.

-handlebar can have hinges to make it adjustable

'ei tarvetta eri väreille' / 'ei merkitystä ohjaustangolla tai jarrulla' / 'sirompi' / 'tanakan näköinen pitääkö

'onko pakko olla niin paksua putkea'

'kangasmateriaali ok-vaihtoehdot ei merkitse-käytännölliset ja hyvät' / 'en pysty vastaamaan parannusehdotuksiin jarru ja tanko'

'olisi hyvä olla yksiportainen jarru pois-päälle' / 'ohjaustanko on oikea näin-ei niveliä'

'suuri merkitys tekstiiliväreillä' / 'jarrut hyvät minulle' / 'ohjaustangossa olisi saranat hyvät'

'hyvin tärkeä tekstiileissä nykyaikainen ilme' / hänelle ei tärkeää tehdä muutoksia ohjaustankoon tai jarruihin'

'tekstiileissä voisi olla naisten värejä enemmän' / 'huomioarvo'

'3 portainen jarru on hyvä'

### Volunteered by users

-simple on off breaks would be good

-handle bar has no marks to indicate that it is even(in a level position) after unfolding

-brakes are too complicated. simple brakes that can be put on or off.

-can be made lighter and smaller

-complicated user manual

-foot board/ foot rest to give a scooter effect

-The frame/body could be made thinner and lighter

-questions the two front wheels.

-would the price reduce if only one wheel was used?

-Foam to soften the frame/ had bar so one could lean on it when sitting.

'kevyempi' / 'sileämpi rengas' / 'pitäisi mennä helpommin kasaan'

'istuessa selkään sattuu, voisi pehmustaa'

'onko kaksi rengasta etupyörässä tarpeellinen'

'astinlauta keskelle, jolla voisi seisoa ja potkaista kyytiä'

'ohuempi putkirunko' / 'pitäisi olla helposti taitettava, että menisi pieneen kasaan'

'merkit ohjaustankoon, että tulisi kumpikin puoli samalle tasolle' / 'hyvä maatilan emännälle'

'isompi kori' /

'Stability can be improved by making the space between the two front wheels a bit bigger'

'winter tires with studs would be a good idea, for use when icy and slippery'

'not easy to find information on the web page'

'option to order Veloped with brake lever on one side instead of in both'

'voisi olla optio tilata yhdellä jarrukahvalla, joka ottaisi molemmille puolille'

'the textiles used can be made more noticable for safety reasons' DRAW MORE ATTENTION??

'the handlebar can be curved upright like in fitness machines'

'drink holder can come standard in stead of ordering as an extra'

'night light and brake lights'

'toivoisin, että aisa olisi taitettu ylöspäin niin kuin kuntolaitteissa' / 'juomapulloteline vakiona'

'ajovalot ja jarruvalot'

'more feminine colours for the textiles'

'vakautta voisi parantaa laittamalla eturenkaat etämmäksi toisistaan - eturenkaiden väli pikkuisen laajemmalle

'M ja L kokojen korkeussäädössä välissä saisi olla yhteistä säätövaraa enemmän'

### Questionnaire

- removable pedals for cycling = jokin poljettava pedali jalkojen treenaamiseen I
- one that would enable hand workout = käsitreeni II
- call button if in trouble, SOS button I I I I = turvanappi
- sormipuristin = finger press
- langaton tiedonvälitys = wireless information, bluetooth I
- lasten kopan kiinnitys mahdollisuus = baby features, like carseat I
- navigaattori = GPS II I I I
- S-koukkuja = S-hooks
- astuimet, joilla voisi seistä kun laite rullaa eteenpäin = standing platform I
- personalized healthcare = henkilökohtainen terveystieto
- radio, music, TV I
- kunto- ja liikuntaohjelmia = fitness- and physical education programmes
- online puhe- ja kuvayhteys I = Online voice and picture connection
- erilaisia henkilökohtaiseen terveydentilaan liittyviä mittaus mahdollisuuksia personalized health
- integrointi terveys rannekkeeseen = Integration with healthwatch
- moottori (hitaasti auttaisi eteenpäin, pysähtyisi kun ote irtoaa) , sähkömoottori I I motor
- pienempi koko I = smaller size
- sateenvarjoteline = umbrella holder
- kuntoutukseen lainaksi = lending programs for rehabilitation
- yksilöllinen design (värit ym.) = individual design for example colours
- pelimäisyys, ohjelma ( joku app joka seuraa ja haastaa käyttäjää eteenpäin kuntoutuksessa) features from games,
- paikka tarjottimelle (esim. kahvikupille tai lautaselle) = tray
- peili = mirror
- pulloteline = water bottle holder I I
- hands-free technology for answering the phone = langaton yhteys
- the camera in, the touch screen for capturing images

- the reflector to indicate you are on the move, ex. in the evenings and nights, early mornings etc.
- use the pedals as brakes while cycling (pedal backwards)
- telepathic communicator = telepaattinen kommunikointi
- sensory programmes for visually disabled I
- yhdellä napilla kasaan = one button folding
- kevennys rakenteisiin hiilikuidulla = carbon fiber to light the structure
- night lights = valot I
- translator / voice recognition app.
- 3G technology
- iso kori = big basket I
- askelmittari = step calculator
- keppiteline = walking stick holder
- turvallinen, tukeva, helposti liikuteltava, ei liikaa säädettäviä osia
- keveys, ketteryys ja kestävyys tärkeitä

